JANUARY 2021 • VOLUME 47, NUMBER 1

ENA 50 YEARS
EMERGENCY NURSES ASSOCIATION

Journal of EMERGENCY NURSING

OFFICIAL PUBLICATION OF THE EMERGENCY NURSES ASSOCIATION

- Emergency Care Considerations for the Transgender Patient: Complications of Gender-Affirming Treatments
- An Interrupted Time Series Analysis of the Dissemination of a Sickle Cell Vaso-Occlusive Episode Treatment Algorithm and a Case Management Referral Form for Individuals With Sickle Cell Disease in the Emergency Department
- Establishing Research Priorities for the Emergency Severity Index Using a Modified Delphi Approach
- Assessment of Interrater Reliability of the Emergency Severity Index After Implementation in Emergency Departments in Jamaica Using a Learning Collaborative Approach
- The Effectiveness of Pictorial Discharge Advice Versus Standard Advice Following Discharge From the Emergency Department: A Systematic Review and Meta-Analysis
- The Effect of a Cartoon and an Information Video About Intravenous Insertion on Pain and Fear in Children Aged 6 to 12 Years in the Pediatric Emergency Unit: A Randomized Controlled Trial
- Initial Testing of a Web-Based Intervention to Reduce Adolescent Driver Inattention: A Randomized Controlled Trial
- Development and Feasibility Testing of a Contextual Patient Movement Intervention
- Displaced Gastrostomy Tube in the Pediatric Emergency Department: Implementing an Evidence-based Algorithm and Quality Improvement Project
- The Effect of Catheter Length Placed Into the Vein on Peripheral Ultrasound-Guided Catheter Survival Time: A Prospective Observational Study

ELSEVIER

WWW.JENONLINE.ORG

ProQuest

Report Information from ProQuest

27 September 2023 07:24

TABLE OF CONTENTS

Search Strategy v

1. Transcutaneous Pacing: An Emergency Nurse's Guide: JEN 1

2. Implementing Point-of-Care Troponin Testing in the Emergency Department: Impact on Time to Result: JEN 6

3. Table of Contents: JEN 8

4. Cardiopulmonary Resuscitation Feedback: A Comparison of Device-Measured and Self-Assessed Chest Compression Quality: JEN 9

5. Thank You to Reviewers: JEN 21

6. Hope—We Are Seeing a Light at the End of the Tunnel: JEN 22

7. Information for Readers: JEN 25

8. Importance Ranking of Electrocardiogram Rhythms: A Primer for Curriculum Development: JEN 26

9. Asynchronous Testing of 2 Specimen-Diversion Devices to Reduce Blood Culture Contamination: A Single-Site Product Supply Quality Improvement Project: JEN 37

10. Leading and Accelerating Change: JEN 48

11. Prone Positioning of Patients With Coronavirus Disease 2019 Who Are Nonintubated in Hypoxic Respiratory Distress: Single-Site Retrospective Health Records Review: JEN 53

12. Editorial Board: JEN 55

13. Impact of ED Triage Symptom- and Travel-Screening Strategy: JEN 56

14. Emergency Nursing Review Questions: March 2021: JEN 58

15. Commentary on "Prone Positioning of Patients With Coronavirus Disease 2019 Who Are Nonintubated in Hypoxic Respiratory Distress": JEN 62

16. The Emergency Nurses Association: 50 Years of Advocacy and Advancement: JEN 66

17. Syncope in the Emergency Department: A Guide for Clinicians: JEN 80

18. Board of Directors: JEN 89

19. Improving ED Emergency Severity Index Acuity Assignment Using Machine Learning and Clinical Natural Language Processing: JEN 90

20. Time-to-Treatment and Its Association With Complications and Mortality Rate in Patients With Acute Myocardial Infarction: A Prospective Cohort Study: JEN 111

21. Proning Pains: Recognizing the Red Flags of Body Mechanics for Health Care Workers Involved in Prone Positioning Techniques: JEN 126

22. Response to Chmielewski Letter: JEN 130

23. CE Earn Up to 10.5 Contact Hours: JEN 133

24. Emergency Care EMTALA Alterations During the COVID-19 Pandemic in the United States: JEN 134

25. Factors Affecting Attitudes Toward Defibrillator Use Among Clinical Nurses in South Korea: A Cross-Sectional Study: JEN 140

26. Providing a Safe Haven: Staff Response to a Simulated Infant Relinquishment in the Emergency Department: JEN 151

27. Commentary on "Syncope in the Emergency Department: A Guide for Clinicians": JEN 153

TABLE OF CONTENTS

28. Use of the Donabedian Model as a Framework for COVID-19 Response at a Hospital in Suburban Westchester County, New York: A Facility-Level Case Report: JEN..... 156

29. Information for Readers: JEN..... 169

30. Job Stress Among Emergency Nurses: JEN..... 170

31. Understanding ED Buprenorphine Initiation for Opioid Use Disorder: A Guide for Emergency Nurses: JEN..... 172

32. Emergency Nursing Review Questions: January 2021: JEN..... 185

33. Assessment of Interrater Reliability of the Emergency Severity Index After Implementation in Emergency Departments in Jamaica Using a Learning Collaborative Approach: JEN..... 189

34. Initial Testing of a Web-Based Intervention to Reduce Adolescent Driver Inattention: A Randomized Controlled Trial: JEN..... 198

35. CE Earn Up to 10.5 Contact Hours: JEN..... 215

36. Cost Savings of Frequent, Concise Skills Competency Training in the Emergency Department: JEN..... 217

37. Scientific Approach to Assess if Change Led to Improvement—Methods for Statistical Process Control Analysis in Quality Improvement: JEN..... 222

38. Editorial Board: JEN..... 229

39. Evaluation of a Nurse Pediatric Emergency Care Coordinator–Facilitated Program on Pediatric Readiness and Process of Care in Community Emergency Departments After Collaboration With a Pediatric Academic Medical Center: JEN..... 230

40. The Effect of Catheter Length Placed Into the Vein on Peripheral Ultrasound-Guided Catheter Survival Time: A Prospective Observational Study: JEN..... 244

41. Organ Donation and the Islamic Faith: JEN..... 253

42. Health Disparities and Emergency Nursing: JEN..... 255

43. Finding My People: My Experience as an Emergency Nurse Scientist in a Research Postdoctoral Fellowship at an Academic Medical Center: JEN..... 259

44. Consideration of Testicular Torsion in Young Males With Abdominal Pain Is Essential: A Case Review: JEN..... 263

45. The Effectiveness of Pictorial Discharge Advice Versus Standard Advice Following Discharge From the Emergency Department: A Systematic Review and Meta-Analysis: JEN..... 270

46. The Effect of a Cartoon and an Information Video About Intravenous Insertion on Pain and Fear in Children Aged 6 to 12 Years in the Pediatric Emergency Unit: A Randomized Controlled Trial: JEN..... 279

47. External Female Urinary Catheter: Implementation in the Emergency Department: JEN..... 281

48. Perceptions of the Essential Components of Triage: A Qualitative Analysis: JEN..... 289

49. An Interrupted Time Series Analysis of the Dissemination of a Sickle Cell Vaso-Occlusive Episode Treatment Algorithm and a Case Management Referral Form for Individuals With Sickle Cell Disease in the Emergency Department: JEN..... 297

50. If you Can’t Assess It, How Can you Treat It? Improving Pain Management in Sickle Cell Disease: JEN 311

TABLE OF CONTENTS

51. Dermal Hydrofluoric Acid Toxicity Case Review: Looks Can Be Deceiving: JEN..... 315

52. Factors Associated With ED Use Among New Asian Immigrants in New Zealand: A Cross-Sectional Analysis of Secondary Data: JEN..... 321

53. Board of Directors: JEN..... 336

54. Strategies to Aid Identification of Apheresis PowerFlow Ports: A Case Report: JEN..... 337

55. Emergency Care Considerations for the Transgender Patient: Complications of Gender-Affirming Treatments: JEN..... 344

56. Communicating With the American Sign Language User in the Emergency Department: JEN..... 352

57. Establishing Research Priorities for the Emergency Severity Index Using a Modified Delphi Approach: JEN..... 355

58. Displaced Gastrostomy Tube in the Pediatric Emergency Department: Implementing an Evidence-based Algorithm and Quality Improvement Project: JEN..... 363

59. Table of Contents: JEN..... 373

60. Development and Feasibility Testing of a Contextual Patient Movement Intervention: JEN..... 374

61. 2021…Time to Elevate: JEN..... 385

Bibliography..... 388

SEARCH STRATEGY

Set No.	Searched for	Databases	Results
S1	Journal of Emergency Nursing: JEN	Ebook Central, Public Health Database, Publicly Available Content Database	3455°

° Duplicates are removed from your search and from your result count.

Transcutaneous Pacing: An Emergency Nurse's Guide: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Transcutaneous pacing is commonly performed in emergency departments to treat patients with cardiac dysrhythmias. Although emergency nurses are required to complete a standardized course that reviews components of transcutaneous pacing, such as Advanced Cardiac Life Support, performing transcutaneous pacing on patients may be done infrequently in some facilities and can lead to anxiety and fear for bedside emergency nurses, especially novice emergency nurses and nurses who infrequently care for patients requiring external pacing. This manuscript provides a practical guide for emergency nurses to care for patients who require transcutaneous pacing. Key information found in this manuscript includes indications for transcutaneous pacing, the nurse's role when performing transcutaneous pacing, and transcutaneous pacing troubleshooting information.

FULL TEXT

Introduction

Cardiovascular dysrhythmias are 1 of the most common causes of ED visits among adults aged 65 years or older.[1] The number of patients seeking care for cardiovascular emergencies will continue to increase as a result of the growing number of aging people in the "baby boomer" generation (1946-1964 birth years) with cardiovascular disease.[2] Therefore, it is important that emergency nurses feel confident when providing care for these patients during cardiovascular emergencies. Treatments of cardiac dysrhythmias can include a combination of medications, defibrillation, pacing, and/or cardioversion. The goal of this manuscript is to provide emergency nurses with a practical guide on the application and use of transcutaneous pacing (TCP) on the basis of current evidence-based practice recommendations and current clinical guidelines. Although the guidelines for TCP have not changed, it is important to ensure that novice nurses are adequately prepared to manage patients presenting with cardiovascular emergencies. Continuing education and training on critical skills are increasingly important owing to the increased number of novice nurses entering critical care environments as a result of a large number of experienced nurses retiring from practice.[3]

What Is TCP and When Is It Used?

TCP is a temporary treatment option or therapeutic bridge that can be initiated to stabilize a patient until the cardiac functioning recovers or until more permanent treatment options are available; it is never a replacement for permanent pacing options.[4,5] The goal of TCP for patients with bradycardia is to increase the heart rate so that cardiac output is normalized and the perfusion of brain and other end organs is maintained to meet the physiologic demand.[5,6]

TCP is most commonly used in the ED setting to treat patients presenting with bradycardia who are unresponsive to pharmacologic therapy and/or experiencing signs of clinical instability, such as systolic blood pressure less than 90 mm Hg, heart rate less than 40 beats per minute (bpm), or an arrhythmia that is compromising organ perfusion.[4,5] TCP temporarily re-establishes regular electrical activity when the electrical conduction of the patient's heart is abnormal; it works by monitoring the patient's cardiac rate and rhythm and supplying pacing impulses through the skin and muscle tissue in the chest wall to cause depolarization and subsequent cardiac contraction to promote cardiac output.[5]

The American Heart Association recommends that TCP be immediately initiated for patients with symptomatic

bradycardia if atropine sulfate fails to alleviate the bradycardia.[4] TCP should also be considered when more invasive methods of pacing are not recommended, for example, in patients with the potential for excessive bleeding, an increased potential for infection, or where placement of a temporary wire might be difficult. TCP can be used to stabilize patients presenting to the emergency department with the aforementioned issues. Therefore, it is important for emergency nurses to possess clinical competency when caring for patients requiring TCP.

Emergency Nurses' Role in TCP

Before performing any type of pacing, if possible, it is important that the patient and family are notified of the treatment plan and given an explanation of the procedure. External pacing can create patient discomfort owing to skeletal contractions associated with pacing and cutaneous nerve stimulation.[4,7] The pain level can vary, depending on the level of current delivered to the patient and the level of anxiety that the patient is experiencing. If feasible, depending on the hemodynamic stability of the patient, sedation or analgesia should be considered to improve the patient's level of comfort during the procedure.[4,7]

Necessary supplies to perform TCP include an electrocardiogram (ECG) monitor, ECG electrodes and cables, pacing electrodes and cables, and the defibrillator device.[7] Patient preparation interventions include preparing the skin for electrodes, removing excessive chest hair, and cleaning and drying the skin.[5] ECG electrodes should be positioned as distant from the pacing electrodes as possible to promote a clear ECG signal and reduce interference of the ECG signal by the pacing current.

Pacing electrodes may serve many functions, including monitoring, defibrillation, and pacing, although some are single-function electrodes that only allow for pacing. It is important that the emergency nurse determine what type of supplies their facility has on hand before performing the procedure to promote the safety and effectiveness of the procedure. Pacing electrodes can be applied on the patient using various types of placement. The manufacturer's recommendations for the application of pacing electrodes should be followed. It is important to ensure that the reversal of electrode placement does not occur because this can result in failure to capture or extremely high capture thresholds.

The most common pacing electrode placement for TCP is anterior-posterior placement, which is performed when the anterior electrode is placed on the left anterior chest wall, halfway between the xiphoid process and the left nipple at the apex of the heart (avoiding placement over the nipple, diaphragm, or sternum).[7,8] The posterior electrode is then placed on the left posterior chest beneath the scapula and lateral to the spine at the heart level (avoiding placement over the bony prominences of the spine or scapula) (Figure 1).[7] In female patients, breast tissue may need to be lifted out of the way to ensure that the electrode can adhere firmly to the skin beneath the breast. The anterior-posterior position is the preferred method because it minimizes electrical impedance by "sandwiching the heart" between the 2 pads.[8] The anterior-lateral placement may also be used when performing TCP, which is performed when the lateral electrode is placed on the left anterior torso, just lateral to the left nipple in the midaxillary line, and the anterior electrode is placed in the right subclavicular area lateral to the sternum (Figure 2).

It is important to note that pacing electrodes and equipment compatibility may vary from unit to unit in the same facility and from emergency medical services (EMS) to hospital. The nurse should anticipate potentially needing to reapply pacing pads using the facility-specific equipment and have supplies ready to prevent delays in treatment, which can result in poor patient outcomes. For example, if a patient who is actively being paced arrives to the emergency department from EMS, the emergency nurse may need to replace the pacing pads and ECG electrodes on the patient to ensure equipment compatibility and to avoid delays in TCP. New pads should be applied and be ready to begin treatment before removing the noncompatible pacing pads from EMS or a transferring facility. Precautions should be taken to ensure that noncompatible pacing pads are not removed prematurely to ensure that therapy is continued. In addition, it is important to ensure that the pacing pads and wires are not damaged, removed, or cut when transferring patients onto the ED stretcher or when clothing is removed on arrival to the emergency department.

After application of the pacing electrodes, the pacing device should be turned on, and the pacing mode (demand or fixed) should be selected. The demand or synchronous mode is preferred, if available, because it paces only when

the patient's heart rate falls below the level set by the operator.[7] The fixed or asynchronous mode paces at the rate set by the operator, regardless of the patient's actual heart rate.[7] This mode is not preferred; it is usually used when the pacer cannot adequately sense the patient's heart rate or when an ECG artifact prevents the pacer from adequately sensing the patient's heart rate.[7]

When setting up the pacing device, the pacing current should remain at 0 mA until the prescribed pacing mode has been set, and proper sensing of the device has been verified. Sensing refers to the pacemaker's ability to recognize the electrical activity of the heart.[7] The current can then be increased until capture is recognized (Figure 3). Electrical capture refers to the depolarization of the ventricles that occurs as a result of the pacing stimulus and is represented on the ECG monitor indicated by a wide-complex QRS after every pacer spike.[6] It is important to increase the current level slowly while assessing for capture in patients who are conscious to decrease discomfort. However, in unresponsive patients or code situations, the current can be increased quickly and adjusted downward to threshold when capture is obtained. The prescribed pacing rate should be selected to ensure adequate perfusion; the common range in adult patients is 60 bpm to 80 bpm.[6,8] The American Heart Association recommends an initial starting rate for TCP of 60 bpm and to adjust it up or down on the basis of the patient's clinical response.[4] The dose for pacing is set at 2 mA above the dose that produces observed capture.[6]

While performing TCP, it is necessary to continuously monitor the patient's ECG and to assess for mechanical and electrical capture. Mechanical capture is the contraction of the heart and is recognized by confirming a pulse that matches the set pacemaker rate by palpation; echocardiogram; pulse oximetry; arterial waveform; and signs of increased cardiac output, including increased blood pressure, increased level of consciousness, and improved skin color and temperature.[6,8] A quick guide to implementing TCP is found in Table 1.

Troubleshooting

When performing TCP on a patient, the nurse may experience multiple unexpected issues that they will need to address, including pain; failure to capture; excessive artifact; undersensing or oversensing; and, rarely, cutaneous burns.[6] Some patients may experience discomfort that becomes intolerable during the procedure. Research indicates that without sedation and analgesia, most patients are unable to tolerate pacing currents above 50 mA.[9] Therefore, analgesia and sedation should be considered for patients. Pacing electrode repositioning may also be considered to reduce discomfort.[7] Pain levels should be continuously reassessed and managed while the patient is receiving TCP.

A common complication that the nurse may face when performing TCP is failure to capture (Figure 4). This is often a result of failing to increase the pacing current to a sufficient level to electrically stimulate the heart.[8] Capture thresholds will vary on the basis of the patient and may change over time during treatment. The current must be increased to ensure that electrical capture occurs, or the treatment will be ineffective. Repositioning of the pacing electrodes may also facilitate capture if the nurse is still experiencing failure to capture after an increase in the pacing current level.[7]

Excessive artifact or noisy ECG signals on the ECG monitor may also occur. This can be addressed by ensuring adequate skin preparation or moving the ECG electrodes farther away from the pacing electrodes. ECG signal noise or excessive artifact may also be a result of electromagnetic interference caused by equipment in close proximity, including cell phones or radios. This can be addressed by ensuring that adequate distance is maintained between the patients and electromagnetic interference sources. The emergency nurse should make sure that no person uses their mobile phone or other electronic devices near the patient because this may interfere with the pacing unit.[5]

Finally, undersensing and oversensing can occur while performing TCP. Sensing is the ability of the pacemaker to identify electrical activity of the myocardium. Undersensing can take place when the pacemaker does not sense activity and delivers a pace pulse.[8] Oversensing happens when detection of signals other than the R wave signal, such as muscle artifact or T waves, occurs, leading to an ineffective or inadequate pace rate.[8] Both these issues can be addressed by repositioning the ECG electrodes or selecting a different monitoring lead. Applying new ECG electrodes with appropriate skin preparation may also be necessary to address the issue.

Clinical Considerations

When performing TCP, the patient should never be left unattended. To ensure safety of both the patient and health care personnel, it is important to ensure that the electrodes are properly adhering to the chest and that the area is kept as clean and dry as possible. It is safe to touch the patient during TCP, and procedures such as cardiopulmonary resuscitation can be performed. However, it is important to avoid contact with the conductive surface of the pacing electrodes to avoid transmission of the pacing current to the health care personnel. Universal precautions should be used when performing procedures on a patient receiving TCP therapy. Gloves are recommended to improve the safety of both patients and health care providers.

The emergency nurse should continuously monitor for signs of adequate perfusion, including blood pressure, level of consciousness, skin color, and temperature to monitor the effectiveness of the treatment. In addition, the patient's ECG monitor and pain level should be continuously monitored during TCP therapy to identify and address potential treatment complications. Charting should include rhythm strips before and during pacing, the selected pacing rate and the pacing current (in mA) required to perform adequate pacing on the patient, the patient's response to the treatment, and any medications administered to the patient. Rhythm strips should be printed and included in the patient's chart after any acute changes to the patient's rhythm or after any modifications to the pacing rate and/or pacing current (in mA).

It is important for the nurse to follow the provider's prescription orders regarding pacing settings and to notify the provider immediately of any potential complications or signs of decreased cardiac output and perfusion. If TCP is ineffective, it may be necessary to prepare for alternative emergency treatment options, including the insertion of a transvenous pacemaker. The emergency nurse needs to be prepared for alternative treatment options if TCP is ineffective and should have a transvenous pacer system kit and atropine at the bedside.[5] Treatment for a patient experiencing symptomatic bradycardia may also include the administration of an intravenous chronotrope medication such as EPINEPHrine or DOPamine.[4]

Owing to the temporary nature of TCP, it is important for the emergency nurse to be prepared for the transfer of patients to an outside facility or an inpatient specialty area for further treatment. Patients must continue to receive TCP during transfer; therefore, pacing pads and equipment must be transported with the patient. The patient will need to be continuously monitored by a licensed clinician and frequently reassessed to ensure adequate capture and perfusion during transfer. Additional resources to assist the emergency nurse with TCP can be found in Table 2.

Conclusion

TCP is a valuable therapeutic technique in emergency settings to temporarily support adequate cardiac output and tissue perfusion to patients experiencing cardiac dysrhythmic emergencies. TCP can be rapidly initiated to stabilize patients and improve their outcomes. Emergency nurses should be adequately prepared to implement TCP and care for patients requiring TCP therapy in the ED setting.

Steps
1. Locate pacer/defibrillator and obtain pacer pads.
2. Place ECG leads on the patient at the appropriate site.
3. Apply pacer pads to the patient at the appropriate site.
4. Connect ECG monitor and pacer/defibrillator device per manufacturer's specifications (if using an external ECG monitoring device).

5. Turn on the pacer/defibrillator ensuring that pacer mode is selected.
6. Confirm that the pacer/defibrillator is displaying the patient's 5-lead ECG rhythm.
7. Set milliamperage and rate per provider's prescription: Rate: Initial starting rate of 60 bpm (recommended adult rate) and adjust as needed. Milliamperage: Initial starting dose of 0 mA, adjust until capture is observed, set at 2 mA above the amount that produces observed capture.
8. Begin pacing.
9. Observe the patient closely for response.
10. Adjust pacer settings as needed on the basis of the patient's response and condition.

Resource	URL
Up-to-date TCP recommendations	https://cpr.heart.org/ https://www.ahajournals.org/
Additional detailed TCP information and instructions	https://www.elsevier.com/__data/assets/pdf_file/0019/271027/ch0049.pdf
TCP skills checklist	http://www.micunursing.com/transcut.htm
Patient education on cardiac pacing	https://www.uptodate.com/contents/pacemakers-beyond-the-basics
TCP information video	https://www.medmastery.com/magazine/mastering-transcutaneous-pacing

DETAILS

Subject:	Patients; Life sustaining treatment; Electrodes; Cardiac arrhythmia; Emergencies; Pacemakers; Blood pressure; Nursing care; Electrocardiography; Evidence-based nursing; Nurses; Baby boomers; Heart rate; Emergency services; Emergency medical care; Electric stimulation therapy
Company / organization:	Name: American Heart Association; NAICS: 813212
Identifier / keyword:	Cardiac Pacing; Transcutaneous; Arrhythmias; Electrical Stimulation Therapy; Emergency Nursing

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	326-330
Publication year:	2021
Publication date:	Mar 2021
Section:	Clinical Nurses Forum
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.11.003
ProQuest document ID:	2498288541
Document URL:	https://www.proquest.com/scholarly-journals/transcutaneous-pacing-emergency-nurse-s-guide/docview/2498288541/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-07-28
Database:	Public Health Database

Document 2 of 61

Implementing Point-of-Care Troponin Testing in the Emergency Department: Impact on Time to Result:

JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

In the emergency department, troponin assays are commonly used and essential in the evaluation of chest pain and diagnosis of acute coronary syndrome. This study was designed to assess the potential impact of implementing point-of-care troponin testing by comparing the time to point-of-care laboratory result and time to conventional laboratory result.

Methods

The study enrolled 60 ED patients deemed to need a troponin test in the evaluation of low-risk chest pain (HEART score <4 based on history, electrocardiogram, age, risk factors). Point-of-care troponin testing was performed with the same blood sample obtained for a conventional troponin assay. If the provider determined that the patient required 2 troponin tests, the second laboratory draw was used in the data collection. This was to correlate the time of laboratory result to time of disposition.

Results

Of the 60 subjects enrolled, 2 subjects were excluded because of user errors with the point-of-care testing equipment and 2 others for not meeting inclusion criteria on later review. The median times for the point-of-care troponin and conventional troponin assays were 11:00 minutes (interquartile range 10:00-15:30) and 40:00 minutes (interquartile range 31:30-52:30), respectively; P <0.001. There were 3 extreme outliers from the conventional troponin assay that significantly skewed the distribution of the mean, making the median the more accurate assessment of the central tendency.

Discussion

Point-of-care troponin testing provided results in a median time 29 minutes quicker than the conventional troponin assay. This result is statistically significant and has the potential to greatly improve time to disposition in all patients with chest pain requiring a troponin assay.

FULL TEXT

DETAILS

Subject:	Laboratories; Ambulatory care; Patients; Acute coronary syndromes; Emergency medical care; Software; Risk factors; Medical diagnosis; Electrocardiography; Blood tests; Equipment; Pain; Data collection; Heart; Nursing; Chest pain; Consent; Emergency services; Coronary artery disease
Identifier / keyword:	Point-of-care testing; Troponin; Chest pain; Acute coronary syndrome
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	299-304

Publication year:	2021
Publication date:	Mar 2021
Section:	Res earch
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.06.014
ProQuest document ID:	2498288540
Document URL:	https://www.proquest.com/scholarly-journals/implementing-point-care-troponin-testing/docview/2498288540/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-08-31
Database:	Public Health Database

Document 3 of 61

Table of Contents: JEN

ProQuest document link

FULL TEXT

TVM:UNDEFINED

DETAILS

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	A1-A3
Publication year:	2021
Publication date:	Mar 2021
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Tbl Of Contents
DOI:	https://doi.org/10.1016/S0099-1767(21)00018-0
ProQuest document ID:	2498288536
Document URL:	https://www.proquest.com/scholarly-journals/table-contents/docview/2498288536/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Mar 2021
Last updated:	2021-03-08
Database:	Public Health Database

Document 4 of 61

Cardiopulmonary Resuscitation Feedback: A Comparison of Device-Measured and Self-Assessed

Chest Compression Quality: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Background

High-quality cardiopulmonary resuscitation is the foundation of cardiac arrest care. Guidelines specify chest compression depth, recoil, and rate, but providers often fail to achieve these targets. Furthermore, providers are largely unable assess the quality of their own or other peoples' chest compressions. Chest compression feedback devices can improve chest compression quality; their use is endorsed internationally, but they remain largely absent in clinical care.

This article analyzes preclinical data collected during a quality improvement project. It describes provider demographics and perceptions about their chest compression quality and correlates them to measured chest compression quality, compares clinician perception of chest compressions to objective measures, and describes the effect of feedback on compression quality.

Methods

Clinicians were recruited from 2 metropolitan emergency departments. A questionnaire was used to assess participants' levels of training and experience. A before-and-after assessment of chest compression quality was performed using a Laerdal CPRmeter 2 and a CPR mannequin. Pretest measures of chest compression quality were made by covering the device screen thereby blinding providers to feedback; repeat measures were then collected from the same participants but unblinded to feedback. Provider charecteristic were collected by survey. Correlations between blinded chest compression quality and provider charecteristics; the reliability of providers estimated compared to measured quality; and the effects of feedback on chest compression quality were assessed using Pearsons correlations, Cohens κ, and paired *t* testing.

Results

84 participants were assessed. The mean years of certification were 11.74. Ninty-five percent of the providers self-assessed as more experienced than novice and 81% reported performing cardiopulmonary resuscitation at least occasionally. The frequency of performing chest compressions was correlated with self-assessed skill (r = 0.58, *P* <.001). However, self-assessed skill was only weakly correlated with chest compression quality (r = 0.29, *P* = .01) and not at all with the frequency of performing chest compressions or years of certification. There was no agreement between self-assessed and device-measured chest compression depth (κ = −0.10, *P* = 0.11), recoil (κ = −0.14, *P* = .03), or rate (κ = 0.06, *P* =.30). The overall quality of compressions improved by 16.9%; the percentage of chest compressions achieving target depth by 3.58%; recoil by 22.82%; and rate by 23.66% with feedback. A total of 97.6% of the staff rated chest compression feedback helpful.

Conclusions

Our findings suggest that participants' demographics were not correlated with chest compression quality and that providers cannot reliably assess chest compression quality. The data also demonstrate that with minimal training, feedback can significantly improve chest compression quality.

FULL TEXT

Contribution to Emergency Nursing Practice

••Chest compression feedback devices can improve the quality of chest compressions. International guidelines have supported the clinical use of chest compression feedback devices since 2010, and in 2021, will make them mandatory for basic life support training. Despite this, feedback devices have not been broadly incorporated into clinical care.

••This article suggests that ED providers overestimate the quality of their chest compressions and cannot accurately assess the quality of chest compressions and that chest compression feedback devices can yield immediate and significant improvements in chest compression quality with minimal training.

••Chest compression feedback devices are modestly priced and could be considered for both training and clinical care.

Introduction

An out-of-hospital cardiac arrest is the third leading cause of death in Europe.[1] High-quality chest compressions are an important intervention for cardiac arrest that can improve defibrillation success,[2] return of spontaneous circulation,[3,4] and neurologically intact survival.[5] International guidelines promote high-quality chest compressions.[6] Unfortunately, chest compressions are often suboptimal; even trained providers fail to achieve adequate compressions much of the time during training and resuscitation.[7,8]

Advanced measures for monitoring chest compressions such as end-tidal carbon dioxide and invasive blood pressure monitoring offer important feedback and prognostic data but have limitations. End-tidal carbon dioxide monitoring can be deployed with blind insertion airway devices, and the values can be used to prognosticate clinical outcomes, but there are no established parameters for using the values to guide chest compression metrics (depth, recoil, rate).[6] Invasive blood pressure monitoring offers feedback on the hemodynamic response to compressions but is typically only available in critical care environments. Most providers report using no form of objective compression feedback.[9-11] Compression feedback devices have been shown to significantly improve compression quality in preclinical settings.[8,12] Although survey data suggests most providers would use feedback devices if the resources and funding were available to do so,[9] they are unavailable in many practice areas,[9,10] and there is a paucity of direct evidence to support their use.[6]

This article examines chest compression quality during a multidepartment quality improvement project. It adds to previous work by describing provider characteristics, correlating these characteristics to compression quality, comparing self-assessed to measured compression quality, and comparing compressions quality with and without feedback.

Methods Design

Data were collected as part of a quality improvement project in August 2019 using a pre- posttest design. For testing, a cardiopulmonary resuscitation (CPR) mannequin (Laerdal Resusci Anne Q-CPR) was fixed to a backboard, atop a Stryker-brand stretcher (1105 Model) (Stryker Corporation, Kalamazoo, MI). The CPRmeter 2 (Figure) was attached using purpose-built adhesive backing. Chest compressions throughout were performed using the CPRmeter 2. During the pretest, the participants were asked to perform 2 minutes of high-quality continuous chest compressions using the CPRmeter 2 but were blinded to the device's feedback by covering the device's display. Immediately after the pretest, they received 2 minutes of rest during which they were asked to self-assess their quality of chest compressions and received a demonstration on the use of the feedback device. After the rest interval, the providers were again asked to perform 2 minutes of chest compressions using the CPRmeter 2, but this time, receiving visual feedback from the device screen. After the second round of chest compressions, the providers completed a questionnaire and rated their satisfaction with the device (Supplementary Appendix).

Setting And Ethics

Two metropolitan emergency departments were selected for this project. Site A was a community hospital without access to cardiac surgery or cardiac catheterization that services approximately 50 000 patients per year. Site B was a tertiary academic hospital with access to cardiac surgery and cardiac catheterization that services 85 000 patients

per year. They were 2 of 4 metropolitan hospitals that serve a community of 1.4 million people.[13] The quality improvement project received institutional and zone funding and approval. Data were collected to assess staff satisfaction with the devices selected and to ensure that brief staff orientation was sufficient to improve chest compression quality. The authors used the A Project Ethics Community Consensus Initiative Ethics Guideline Tool.[14] The use of the previously collected quality improvement data was assessed as low risk and not requiring further ethics review. The reporting of the quality improvement project followed the Standards for Quality Improvement Reporting Excellence 2.0 guidelines.[15]

Study Providers

A convenience sample of 84 providers, 43 from site A and 41 from site B, was assessed with the feedback devices. Although all staff were invited, participation was not mandated. All staff provided verbal consent before participating and were made aware that they could withdraw at any point. Providers with injuries or employment restrictions were excluded. All providers were provincially licensed physicians, nurses, and prehospital providers who would be required to provide chest compressions during work and, as a condition of employment, annually renewed their CPR certification.

Measures

Compression quality data were collected using a CPRmeter 2 device (Laerdal, Stavanger, Norway),[16] which measures 4 metrics: depth, recoil, rate, and overall quality (a proprietary combination of depth, recoil, and rate), and recorded by one of the authors (C.P., B.G.Y., or M.J.D.) using Microsoft Excel (Microsoft Corporation, Redmond, WA). Data were expressed as the percentage of compressions that met 2015 guideline recommendations[17] during the assessment interval. Provider characteristics were collected using a questionnaire that collected data on the number of years with CPR certification, where they last obtained CPR certification, self-assessment of expertise, and how frequently they performed chest compressions as part of their job. The providers were also asked to self-assess their compression quality (depth, recoil, rate) during the blinded period and to evaluate the device and were given the opportunity to provide unstructured feedback as a comment.

Statistical Analysis

Blinded and unblinded chest compression metrics (depth, recoil, and rate), as well as questionnaire responses, were extracted into Excel, and the statistical analysis was performed using IBM SPSS statistics version 25 (IBM, Armonk, NY). Continuous data were normally distributed, and a predetermined significance level of .05 was set. Descriptive statistics (means and SDs) were used to examine provider characteristics and device impressions. Kappa statistics were used to examine the degree of agreement between the provider's self-assessment of compression quality and the feedback device-measured quality. Pearson correlations were used to assess the relationships among self-assessed chest compression quality, years of certification, frequency of performing CPR clinically, and chest compression quality. The effect of the feedback device on chest compression quality was assessed using a 2-tailed paired *t* test. Post-hoc power calculations were calculated using an online power calculator (statulator.com).[18]

Results Provider Characteristics

We assessed 43 providers at site A and 41 at site B (n = 84). Complete data were collected for 80 providers. The mean years of certification was 11.74 years (SD = 8.40). A total of 95% (n = 80) of the providers self-assessed as intermediate, advanced, or expert; and 81.0% (n = 68) of the providers reported at least occasionally performing CPR. Table 1 provides the provider characteristics.

Questionnaire Data

When the questionnaire results were compared with the recorded data, there was moderate positive correlation (r = 0.58, *P* P = .01, n = 83) and not at all with frequency of performing chest compressions or years of certification.

There was no agreement between self-assessed and device-measured chest compression depth (κ = −0.10, *P* = .11), recoil (κ = −0.14, *P* = .03), or rate (κ = 0.06, *P* = .30) (Table 2 and Table 3).

Effect of Feedback

There was a significant improvement in the overall quality and consistency of chest compressions provided at both sites using feedback devices. Exposure to feedback resulted in a 16.9% (SD = 13.83) improvement in overall chest compression quality from 72.19% (SD = 16.66) to 89.08% (SD = 11.09), $t_{(79)}$ =−10.92, $P\,t_{(82)}$ = −8.22, $P\,t_{(82)}$ = −3.38, $P\,t_{(79)}$ = −6.78, *P* Table 4). Post hoc power calculations suggest that, assuming findings are similar to ours, future similar studies would need a sample of 59 participants to assess for differences in depth, 13 to assess for differences in recoil, and 17 to assess for differences in rate. Not only were there improvements in quality and consistency for all metrics, but 97.6% of the staff rated the chest compression feedback as “mostly” or “very” helpful.

Discussion

The combination pre- posttest design and questionnaire application allowed us to make several noteworthy comparisons. The questionnaire data offered insight into the composition of ED providers: years of practice, frequency of performing chest compressions, and self-assessed skill levels.

Correlating providers’ self-assessed compression quality with their measured quality suggests providers cannot accurately assess compression quality in both a global (overall quality) or granular sense (depth, recoil, and rate) (Table 3). Inaccurate assessments for depth and rate have been previously established,[8,19] but there is an apparent lack of data comparing perceived with measured chest recoil rates in the literature. The participants in this study tended to underestimate their percentage of chest compressions at the correct depth, wherein previous studies have shown overestimation.[8] Because of the better-than-expected chest compression depth achieved in this study cohort, the data still support that chest compression feedback, although not mandatory, can improve chest compression quality, which is frequently of unnecessarily low quality.[9-11,19-21]

There were significant improvements in compression quality metrics when feedback was used. Each component of high-quality chest compressions had an overall improvement in both quality and consistency, even when pretest quality was already high (depth) (Table 4). These findings reinforce previous research on the effect of chest compression feedback[8,12] and can help to describe more fully the degree to which feedback can improve overall quality, specifically in the emergency department.

There was a high degree of satisfaction with the chest compression feedback device; most providers found it helpful. There were 2 providers who described discomfort in providing chest compressions with the CPRmeter 2. Although there are not enough data to extrapolate these findings, it does suggest that the CPRmeter 2 may be more comfortable than other devices of which discomfort has been listed as a reason for not using the device clinically.[22]

Limitations

Our project had several noteworthy limitations. The providers volunteered their participation; therefore, this may not have been a representative sample. The questionnaire was completed in view of quality improvement personnel, and the provider responses could have been influenced by desirability bias. Furthermore, the questionnaire data collected the provider perceptions in a categoric manner (quintiles), and the retrospective coding of continuous CPRmeter data into quintiles could have exaggerated the discrepancy between providers’ perceptions and measured quality. Performing 2 rounds of chest compressions on a mannequin in a controlled environment likely presents a lower physical, cognitive, and emotional demand on providers than an actual resuscitation, which may last for significantly longer periods; real-world performance could thus be worse than what was recorded. There was a fixed before-after sequence with all participants performing blinded chest compressions before compressions with feedback; as a result, performance could have been negatively skewed by fatigue or positively skewed by a

maturation effect. There is an ongoing debate about the utility of power estimations for interpreting negative results,[23] as a surrogate for examining confidence intervals,[24] and for estimating required sample sizes,[25] so caution should be taken when interpreting our suggestions. A randomized design would be needed to establish if feedback is causally linked to improved chest compressions, and clinical replication is needed to determine if the correlations found in this study extend beyond simulated CPR.

Conclusions

The results of this analysis suggest that a provider's years of certification, self-assessed skill level, and frequency of performing chest compressions are poor predictors of compression quality. Furthermore, it suggests providers are unable to accurately self-assess their compression quality. In this sample, there was a significant improvement in all chest compression quality metrics and the overall quality of chest compressions provided when feedback devices were used, despite high–prefeedback chest compression quality. These findings suggest that chest compression quality feedback, with limited training, can yield a significant improvement in chest compression quality, with a high degree of provider satisfaction, in a simulated setting. We noted significant improvements in a controlled setting but believe there is even greater potential for improvement in clinical practice in which fatigue, arousal, and prolonged effort may lead to deteriorations in chest compression quality. Further research is needed to assess the causal nature of chest compression improvements and to determine if improvements extend to clinical practice in the emergency department.

Author Disclosures

Conflicts of interest: none to report.

For Matthew J. Douma, Laerdal has provided resuscitation equipment for the purposes of resuscitation evaluation and research though they have had no influence of the design, conduct, or analysis of any project.

Supplementary Appendix

Participant survey

•**1)**For how many years have you had CPR certification?

•**2)**How often would you estimate you have performed chest compressions in "real-life"?

•▫Frequently

•▫Somewhat frequently

•▫Occasionally

•▫Seldom

•▫Never

3)

Where did you receive your CPR training?

•▫AHS/Covenant Health

•▫St.John Ambulance

•▫Heart and Stroke

•▫Red Cross

•▫Other, describe:

4)

How satisfied were you with the training?

•▫Very

•▫Mostly

•▫Somewhat

•▫Not very

•▫Not at all

5)

How would you describe your chest compression/CPR ability? (circle one)

•▫Expert

•▫Advanced

•▫Intermediate

•▫Novice

•▫Beginner

6)

After compressing for two minutes, how fatigued do you feel? Indicate by marking on the line below. Zero being “no fatigue” and 10 being “completely exhausted.”

•0 1 2 3 4 5 6 7 8 9 10

7)

What percentage of your compressions were at the correct rate? (circle one)

•▫81-100%

•▫61-80%

•▫41-60%

•▫21-40%

•▫0-20%

8)

What percentage of your compressions had correct depth? (circle one)

•▫81-100%

•▫61-80%

•▫41-60%

•▫21-40%

•▫0-20%

9)

What percentage of your compressions had correct recoil?

•▫81-100%

•▫61-80%

•▫41-60%

•▫21-40%

•▫0-20%

10)

Was the CPR meter useful for feedback?

•▫Very

•▫Mostly

•▫Somewhat

•▫Not very

•▫Not at all

11)

Do you have any feedback about the device?

•_____

_____

_____

Thank you for participating!

Name (optional):

Participant ID number:

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.10.003.

Questionnaire Responses	Response

n	%	Total sample
84	100	Female
63	75.0	Male
21	25.0	Years of certification
		Total responses
82	97.6	Mean (SD)
11.74	(8.40)	Self-assessed skill
		Total responses
84	100	Expert
30	35.7	Advanced
28	33.3	Intermediate
22	26.2	Novice
3	3.6	Beginner
1	1.2	How often do you perform CPR?
		Total responses
82	97.6	Frequently
14	17.1	Somewhat frequently
27	32.9	Occasionally
27	32.9	Seldom
11	13.4	Never

3	3.7	Was feedback helpful?
		Total responses
83	98.8	Very
71	85.6	Mostly
10	12.0	Somewhat
2	2.4	Not very
0	0	Not at all

Control Variable		% compressions at target	Years of CPR certification	How often do you perform CPR?	Self-assessed skill
Percentage compressions at target	Pearson correlation	1	−0.13	0.18	0.29
Sig		.26	0.11	.01	N
83	81	81	83	Years of CPR certification	Pearson correlation
−0.13	1	0.06	0.08	Sig	.26
	.59	.43	N	81	82
80	82	How often do you perform CPR?	Pearson correlation	0.18	0.06
1	0.58	Sig	.11	.59	
< .001	N	81	80	82	82
Self-assessed skill	Pearson correlation	0.29	0.80	0.58	1

Sig	.01	.47	< .001		N

% of compressions at target	Subjective estimate		Objective measurement		κ	Standard error	95% CI	Sig
N	%	n	%	Depth (%)				
−0.10	0.06	0.06-0.17	0.11	81-100	45	54.2	71	85.5
				61-80	33	39.8	6	7.2
				41-60	5	6.0	5	6.0
				21-40	0	0	1	1.2
				0-20	0	0	0	0
				Total	83		83	
				Recoil (%)				
−0.14	0.06	0.05-0.16	0.03	81-100	43	52.4	28	34.1
				61-80	27	32.9	21	25.6
				41-60	11	13.4	18	22.0
				21-40	1	1.2	5	6.1
				0-20	0	0	10	12.2
				Total	82		82	
				Rate (%)				
−0.06	0.06	0.05-0.17	0.30	81-100	42	50.6	33	39.8
				61-80	35	42.2	17	20.5
				41-60	6	7.2	11	13.3

				21-40	0	0	7	8.4
				0-20	0	0	15	18.1
				Total	83		83	

Categories	Pretest		Post-test		Difference		Standard error mean	95% CI	t	df	Sig (2-tailed)
Mean	SD	Mean	SD	Mean	SD	Depth	91.65	14.90	95.23	8.01	3.58
9.64	1.06	1.47-5.68	3.38	82	< .001	Recoil	64.19	29.77	87.01	15.11	22.82
25.29	2.78	17.30-28.34	8.22	82	< .001	Rate	61.66	33.64	85.33	20.17	23.66
31.22	3.47	15.31-29.11	6.78	79	< .001	Overall	72.19	16.66	89.08	11.09	16.88

DETAILS

Subject:	Intubation; Emergency medical care; Quality management; Feedback; Self evaluation; Certification; Heart surgery; Lifesaving; Blood pressure; Employment; Cardiac catheterization; Questionnaires; Cardiopulmonary resuscitation--CPR; Myocardial infarction; Reliability; Ethics; Cardiopulmonary resuscitation; Statistical analysis; Emergency services; Quality control; Quality improvement
Business indexing term:	Subject: Employment Quality control Quality improvement
Identifier / keyword:	Cardiopulmonary resuscitation; Feedback; Quality impro vement; Chest compression; Resuscitation
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2

Pages:	333-341.e1
Publication year:	2021
Publication date:	Mar 2021
Section:	Heart Matters
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00 991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.10.003
ProQuest document ID:	2498288402
Document URL:	https://www.proquest.com/scholarly-journals/cardiopulmonary-resuscitation-feedback-comparison/docview/2498288402/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-05-18
Database:	Public Health Database

Thank You to Reviewers: JEN

ProQuest document link

FULL TEXT

TVM:UNDEFINED

DETAILS

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	A10-A12
Publication year:	2021
Publication date:	Mar 2021
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Credits
DOI:	https://doi.org/10.1016/S0099-1767(21)00022-2
ProQuest document ID:	2498288401
Document URL:	https://www.proquest.com/scholarly-journals/thank-you-reviewers/docview/2498288401/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Mar 2021
Last updated:	2021-04-09
Database:	Public Health Database

ProQuest PDF GENERATED BY PROQUEST.COM

Hope—We Are Seeing a Light at the End of the Tunnel: JEN

ProQuest document link

ABSTRACT (ENGLISH)

I am writing my second message as the president of the Emergency Nurses Association. At the time of my writing, we are at the close of 2020. A year that seemed like a lifetime—2020. A year that cast many shadows on our lives and left many of us with feelings of uncertainty and fear. Fortunately, we are experiencing some hope now that the first coronavirus disease vaccine has been administered to frontline health care workers around the world. At the time of your reading this message, I am hopeful that we are getting close to or actually vaccinating the general public. As nurses, we are instrumental in educating the public in the science and evidence of the vaccine. We have to step up and dispel rumors and misinformation. Nursing has been considered the most trusted profession for the last 19 years,1 and we need to use that trust to help get the public vaccinated and put an end to this pandemic for all of us.

FULL TEXT

I am writing my second message as the president of the Emergency Nurses Association. At the time of my writing, we are at the close of 2020. A year that seemed like a lifetime—2020. A year that cast many shadows on our lives and left many of us with feelings of uncertainty and fear. Fortunately, we are experiencing some hope now that the first coronavirus disease vaccine has been administered to frontline health care workers around the world. At the time of your reading this message, I am hopeful that we are getting close to or actually vaccinating the general public. As nurses, we are instrumental in educating the public in the science and evidence of the vaccine. We have to step up and dispel rumors and misinformation. Nursing has been considered the most trusted profession for the last 19 years,[1] and we need to use that trust to help get the public vaccinated and put an end to this pandemic for all of us.

This pandemic has taken a toll on all of us mentally and physically. We have to make sure we practice self-care and look out for each other. Only our fellow colleagues truly know what we have gone through…the only people that really get us is us. We face burnout and moral injury. Burnout is defined as a state of emotional, mental, and often physical exhaustion brought on by prolonged or repeated stress.[2]

Moral injury is defined as "**…**the challenge of simultaneously knowing what care patients need but being unable to provide it due to constraints that are beyond our control."[3] Both of these need our attention to help ourselves heal from the toll of the pandemic. We shall not subscribe to the negative stigma around mental health and the belief of some that those who reach out for help are weak. On the contrary, I believe those who seek out help and assistance in a time of need are the strongest.

In my message in the January issue of *Journal of Emergency Nursing*, I introduced the theme Elevate for 2021. Elevate yourself, your colleagues, our specialty of emergency nursing, our profession, and our communities around us. I challenged each of us to do something to elevate ourselves and our profession. What was your accomplishment? For the next issue, what will you be able to report back to yourself and others around you? Keep in mind the question: "What will I elevate and who will I elevate?"

As we are wrapping up the first quarter of 2021, we are certainly not done with the pandemic, but we are getting closer. We will still continue this fight. We are tired, but we will not give up. Remember the quote from Winston Churchill, "Never give in. Never give in. Never, never, never, never—in nothing, great or small, large or petty—never give in…."

Stay positive, stay focused, and be the good!
ELEVATE

DETAILS

Subject:	Emergency medical care; Moral injury; Vaccines; Nursing; Pandemics; Occupational stress; Immunization; COVID-19
Business indexing term:	Subject: Occupational stress
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
First page:	207
Publication year:	2021
Publication date:	Mar 2021
Section:	President's Message
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Commentary
DOI:	https://doi.org/10.1016/j.jen.2020.12.010
ProQuest document ID:	2498288390
Document URL:	https://www.proquest.com/scholarly-journals/hope-we-are-seeing-light-at-end-tunnel/docview/2498288390/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Mar 2021

Last updated:	2021-04-09
Database:	Public Health Database

Information for Readers: JEN

ProQuest document link

FULL TEXT

TVM:UNDEFINED

DETAILS

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
First page:	A8
Publication year:	2021
Publication date:	Mar 2021
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	General Information

DOI:	https://doi.org/10.1016/S0099-1767(21)00021-0
ProQuest document ID:	2498288381
Document URL:	https://www.proquest.com/scholarly-journals/information-readers/docview/2498288381/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Mar 2021
Last updated:	2021-03-08
Database:	Public Health Database

Importance Ranking of Electrocardiogram Rhythms: A Primer for Curriculum Development: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

Electrocardiogram interpretation is an essential skill for emergency and critical care nurses and physicians. There remains a gap in standardized curricula and evaluation strategies used to achieve and assess competence in electrocardiogram interpretation. The purpose of this study was to develop an importance ranking of the 120 American Heart Association electrocardiogram diagnostic labels with interdisciplinary perspectives to inform curriculum development.

Methods

Data for this mixed methods study were collected through focus groups and individual semi-structured interviews. A card sort was used to assign relative importance scores to all 120 American Heart Association electrocardiogram diagnostic labels. Thematic analysis was used for qualitative data on participants' rationale for the rankings.

Results

The 18 participants included 6 emergency and critical care registered nurses, 5 cardiologists, and 7 emergency medicine physicians. The 5 diagnoses chosen as the most important by all disciplines were ventricular tachycardia, ventricular fibrillation, atrial fibrillation, complete heart block, and normal electrocardiogram. The “top 20” diagnoses by each discipline were also reported. Qualitative thematic content analysis revealed that participants from all 3 disciplines identified skill in electrocardiogram interpretation as clinically imperative and acknowledged the importance of recognizing normal, life threatening, and time-sensitive electrocardiogram rhythms. Additional qualitative themes, identified by individual disciplines, were reported.

Discussion

This mixed-methods approach provided valuable interdisciplinary perspectives concerning electrocardiogram curriculum case selection and prioritization. Study findings can provide a foundation for emergency and critical care educators to create local ECG educational programs. Further work is recommended to validate the list amongst a larger population of emergency and critical care frontline nurses and physicians.

FULL TEXT

Contribution to Emergency Nursing Practice

••The interpretation of electrocardiograms (ECG) is an essential skill for emergency and acute care nurses and physicians. Accurate ECG interpretation can make a significant difference in clinical decisions, leading to rapid recognition and treatment of cardiac emergencies.

••The purpose of this study was to develop an importance ranking of the 120 American Heart Association ECG diagnostic labels as a primer for the development of a training curriculum.

••The findings from this study can assist educators in developing an ECG interpretation curriculum for emergency and critical care nursing and multidisciplinary audiences.

Introduction

The interpretation of electrocardiograms (ECGs) is an essential skill for frontline providers, including nurses and physicians working in emergency and acute care settings. Accurate ECG interpretation can make a significant difference in clinical decisions, leading to rapid recognition and treatment of cardiac emergencies and avoiding unnecessary interventions resulting from false-positive interpretations. Despite advancements in ECG interpretation technologies, machine readings are not 100% accurate. They should always be over-read by an expert who will be able to implement appropriate clinical protocols on the basis of the ECG findings.[1-4]

Nursing ECG training programs have evolved from traditional classroom instructor–led courses to technology-aided approaches, including the use of simulations and e-learning platforms.[5-8] The use of these learning technologies has a positive impact on learners' ECG knowledge and confidence,[5,6] as well as performance, attitudes, motivation, and critical thinking skills in ECG interpretation.[7] The Emergency Nurses Association[9] recommends the use of imPULSE 3.0 (Apex Innovations), which is an online ECG training program that includes a comprehensive review of ECG monitoring and interpretation of abnormal ECG rhythms as well as standards of care for the patient with acute coronary syndrome suitable for emergency and acute care staff training and development. Despite improvements in ECG teaching modalities and learning technologies, there is limited evidence concerning the education required for initial competency and subsequent maintenance of ECG interpretation skills for emergency and critical care nurses and physicians.

A primary assumption in the design of educational interventions for the development of ECG interpretation is that some ECG diagnoses are clinically more important than others and require more instructional time and resources. This importance weighting may depend on the health care provider discipline, specialty area, and local priorities.[10] Therefore, an ECG learning intervention would ideally consider the relative importance of possible diagnoses when blueprinting a curriculum and selecting cases to present to learners. The purpose of this study was to develop a process for importance ranking of the American Heart Association (AHA) ECG diagnoses with interdisciplinary perspectives to inform the selection of ECG cases by discipline (or clinician type) for the development of ECG training curricula.

The AHA has developed a taxonomy of diagnostic statements for ECG interpretation.[11] These 120 statements encompass most of the possible diagnoses. In this study, we had expert clinicians and educators (emergency and critical care registered nurses, cardiologists, and emergency physicians) rank the AHA diagnostic statements as to their clinical importance for their discipline and share their perceptions about the educational significance of specific ECG diagnoses for frontline providers.

Methods Study Design, Sampling, and Setting

This was a mixed-methods study using quantitative and qualitative descriptive approaches. The participants, including emergency and critical care registered nurses as well as physicians who were experienced in emergency medicine and cardiology, were purposively sampled. The nurse experts were invited because of their extensive nursing experience (at least 20 years) in emergency and critical care areas, having interpreted ECGs as part of their practice, and having conducted ECG teaching in classroom and clinical settings. Similarly, the physicians were invited because they interpreted ECGs in emergency and critical care areas in their daily practice and had a role in teaching ECG interpretation to trainees.

An importance ranking was achieved using a card-sort methodology where each participant was provided with a physical deck of 120 cards, each containing 1 diagnostic statement. The participants then sorted the cards into piles after being asked “which of the following ECG diagnoses are the 20 most important according to the definition you have specified?” and the “20 least important ECG diagnoses.”

After the card sort, focus groups were conducted for the emergency medicine physicians and cardiologists independently. The nurses’ data were collected through key informant interviews because we could not achieve a focus group quorum owing to scheduling issues. The focus groups were conducted in a private conference room on a medical school campus, and the interviews were conducted in the participants’ private offices or in secured conference rooms at their respective workplaces.

Participation in the study was voluntary. Before starting each focus group or interview session, each participant provided informed consent after a verbal explanation of the study, including confidentiality issues. This study was approved by the NYU School of Medicine Institutional Review Board (approval number: i16-01442).

Data Collection

During the focus groups and individual interviews, each participant individually completed the importance ranking. The importance ranking was completed after a warm-up reflection activity in which the participants were asked to identify what makes for an educationally important ECG. After this, the participants were asked to individually assign relative importance scores to all 120 AHA ECG labels. Data from the card sort were transcribed into an Excel spreadsheet (Microsoft Corporation) by 2 study investigators for quantitative analysis. After this, the participants were asked to discuss their rationale for ranking and prioritization of these diagnoses as well as to discuss the educational importance of ECG interpretation for frontline providers (nurses and physicians).

Two focus groups were conducted, 1 with the emergency physicians and 1 with the cardiologists. Individual face-to-face interviews were conducted with the nurse experts. All focus groups and interviews were recorded on audiotape and transcribed for qualitative analysis.

Data Analysis Quantitative Analysis

For each ECG diagnostic statement, we calculated the number of times it was listed as belonging to the 20 most important diagnoses. We further analyzed the “top 20” (numerically most commonly listed) diagnoses among the registered nurses, emergency physicians, and cardiologists.

Qualitative Analysis

The interviews were transcribed, and a content analysis was conducted.[12,13] Qualitative analyses were carried out manually using Excel spreadsheets to organize the interview texts. The transcripts were reviewed and coded by 2 study investigators who (1) individually read the transcripts several times to familiarize themselves with the information; (2) individually categorized ideas and generated initial codes; (3) individually searched for, reviewed, and defined themes; and (4) met to compare and combine individual themes into final themes by consensus.

Results

Eighteen participants for this study included 6 emergency and critical care registered nurses, 5 cardiologists, and 7

emergency medicine physicians.

Quantitative Results

The top 5 diagnoses listed across all participants were ventricular tachycardia, ventricular fibrillation, atrial fibrillation, complete heart block, and normal ECG. Table 1 presents the ranking of the 20 most important diagnoses across disciplines. Table 2 shows the ranking of the 20 most important diagnoses selected by each discipline. The full ranking of all 120 diagnoses, including the "bottom 20," has been provided in Supplementary Table 1.

Qualitative Results Common Themes Across Disciplines

When the nurses' responses were compared with those of the physicians, 7 common themes were identified across disciplines (Supplementary Table 2). The results were similar in that both disciplines identified that ECG interpretation is clinically imperative and acknowledged the importance of recognizing ECGs that are life-threatening, time-sensitive, indicative of myocardial infarction, or normal. They also highlighted the importance of recognizing ECGs reflecting technical issues such as wrong lead placement, electrical interference, or incorrect machine interpretation. In addition, both nurses and physicians identified the importance of considering the clinical context for an appropriate ECG interpretation.

Themes Unique to Nurses

Nurses emphasized their role as bedside providers who may initially identify ECG changes. They also acknowledged the importance of recognizing reportable ECG findings as an essential nursing skill (Supplementary Table 3).

Themes Unique to Physicians

Both physician groups (cardiologists and emergency medicine) highlighted the importance of using pattern recognition in ECG interpretation as well as the importance of identifying commonly mistaken or confusable diagnoses (Supplementary Table 3). The cardiology physicians emphasized the differences between ECG diagnoses that are commonly mistaken and those that are commonly missed and have a potential for high impact on patient outcomes—life-threatening, time-sensitive, and treatable. They also discussed the importance of differentiating ECG diagnoses that are urgently treatable from those that are less urgent and do not require immediate intervention. In addition, the emergency medicine physicians highlighted the importance of recognizing "actionable" ECGs—those that require immediate intervention.

Discussion

In this mixed-methods study, we used the AHA ECG diagnostic labels to have participants prioritize ECG diagnoses. The ultimate goal was to inform local educators about potential curricular design related to ECG interpretation. The list of 120 ECG diagnoses used in this study comes from a consensus publication of the AHA and is also endorsed by the American College of Cardiology and the Heart Rhythm Society.[14] These 3 bodies are nonprofit medical associations that lead in delineating and disseminating the standards and guidelines for cardiology practice in the United States. Originally published in 2001, the list forms the basis of a more recent 2018 statement from the same organizations.[11]

In this study, all participants prioritized learning about discerning normal ECGs from abnormal ones, especially ECGs that are life-threatening, time-sensitive, or indicative of myocardial infarction. The themes identified by individual disciplines, such as pattern recognition and commonly mistaken/confusable diagnoses, provided additional perspectives. Nurses placed relatively more importance on normal rhythms, including sinus tachycardia and bradycardia, than did the physicians, highlighting their use of the ECG tracing as an early warning signal for monitored patients. As indicated by the nursing participants, "nurses may notice ECG changes first," and, as bedside providers, they should be able to identify abnormal ECG changes that are "reportable" to the provider and require an immediate course of action.

This study provides an initial prioritization of the clinically relevant ECG diagnoses for emergency and acute care settings, using a process that is easily reproducible. This data can be a contribution to inform previously discussed national practice standards (eg, AHA ECG diagnostic labels).[9] Our process of local prioritization and customization of the national lists allows the content of emergency and acute care ECG training courses to match the clinical needs of the patient population served, as recommended by the AHA.[10]

The use of a mixed-methods design provided complementary perspectives on ECG ranking and educational importance. The quantitative ranking process was illuminated by the themes elucidated by the thematic analysis of the interview and focus group transcripts. Addressing a gap in the literature concerning ECG curriculum case selection and case prioritization, we provide emergency and critical care educators a place to start when developing or adapting their own ECG training intervention.

Limitations

A limitation of this study includes differences in data collection procedures between nurses and physicians (individual interviews vs focus groups, respectively). Focus groups may differ from individual interviews in that they may allow participants to express their ideas more freely as well as eliminate personal response biases. However, focus group dynamics are known to foster a bias toward consensus; individual interviews may allow contentious ideas to be probed more deeply, and they are less prone to issues related to group dynamics, such as having 1 participant or a few participants dominate the entire conversation.[15] Despite data collection differences, the quantitative and qualitative results were relatively consistent among the disciplines.

The results are also limited by the fact that the AHA diagnostic labels are only first-level labeling of an individual ECG case; for many ECGs, multiple diagnostic labels would apply. However, our process did allow a relative prioritization of this comprehensive list, and there are relatively few diagnoses that regularly co-occur in a way that would alter these prioritizations. In addition, the quantitative results may have misestimated the importance of myocardial infarction recognition owing to the relatively large number of myocardial infarction diagnoses (listed by all anatomic regions) provided in the AHA list.

The generalizability of our findings should be interpreted with appropriate caution, given that only 1 geographical region is represented, and the sample size was limited. However, this is the only study in this area providing interdisciplinary perspectives that may serve as a guide in the initial consensus process for ECG educational programs' case selection in emergency and acute care settings.

Implications for Emergency Nurses

The results of this study, including comparative ECG rankings by discipline, can assist in curriculum development of ECG learning programs in nursing, medical, or multidisciplinary education in emergency or acute care settings. The themes identified can inform instructional designs as well. Content experts suggest that instructional designers prioritize the actionable diagnoses that are time-sensitive, such as malignant dysrhythmias, in their curriculum. In addition, well recognized was the duality of processes for reasoning through ECG diagnoses: pattern recognition tempered by a systematic "routine" to avoid missing diagnoses.[16] Other suggestions have been less commonly cited. For example, the less specific category of "reportable" ECG was identified as being of greater importance to nurses than was the precise determination of the diagnostic label. As a result, a curriculum designed for the novice ECG learner might be oriented to discriminating between "normal" and "not normal," with an emphasis on danger signs, instead of full integration of the findings into a mechanism-based diagnosis, although an appropriate response to ECG abnormalities—on the basis of the level of training and scope of practice—is a critical element in staff education.[10] A second example is the "confusable diagnosis" theme identified by some of the physicians. They suggested the importance of knowing how to discriminate among specific rhythms that otherwise might be confused,

such as pericarditis and ST-elevation myocardial infarction. They believe that there is an educational necessity in finding confusable exemplars that allow the development of an acceptable level of proficiency.

Emergency and critical care educators (or hospital administrators responsible for staff development) play an essential role in helping nurses and physicians achieve competency in ECG monitoring and interpretation. Adequate ECG training programs should be part of the orientation process and should continue on an ongoing basis.[10] The American College of Cardiology has established guidelines for ECG training for fellows in clinical cardiology, including the training requirements and core competencies to be achieved.[17] However, there are no current guidelines for nursing ECG training that establish minimal competencies, educational standards, or ECG case selection—making nursing ECG education unique to each health care organization, service line, or care unit.[10] A scientific statement from the AHA that includes updated practice standards for ECG interpretation in hospital settings [10] recommends that "the content of electrocardiographic monitoring education needs to match the nature and complexity of the patient population served" (p. e321)—highlighting the importance of this study and future validation studies focusing on ECG case selection for educational programs that are specific to a hospital service or care unit. In response to the AHA's call to customize ECG education to local needs, our study method can be replicated when performing unit- or department-based needs assessment studies to validate ECG training content. Furthermore, consistent with study results, these practice standards make up a list of ECG diagnoses to include in ECG education, including normal rhythms, intraventricular conduction defects, bradyarrhythmias, tachyarrhythmias, premature complexes, and ECG abnormalities of acute myocardial infarction.[10]

It is important to highlight that our study results, including most of the top 20 ECG diagnoses selected across disciplines, correlate with the AHA Advanced Cardiovascular Life Support (ACLS)[18] and Pediatric Advanced Life Support[19] curricula, including normal sinus rhythm, pulseless rhythms (ventricular fibrillation, ventricular tachycardia, and pulseless electrical activity), bradyarrhythmias (heart blocks), and tachyarrhythmias (supraventricular tachycardia, atrial flutter, atrial fibrillation, and wide-QRS tachycardia). Other top 20 ECG rhythms, including those indicative of hyperkalemia and acute pulmonary embolism (pulmonary thrombosis), may also be covered in ACLS courses under differential diagnoses or treatable reversible causes.[20] Although this is significant cross-validation of our process, by ranking all 120 diagnostic statements on the very granular AHA list, we hope to have aided the emergency or critical care educator who is charged with developing and evaluating ECG training programs at a breadth beyond focused courses. National courses (eg, ACLS, Pediatric Advanced Life Support, and imPULSE 3.0) or consensus expert groups (eg, AHA committees) can provide wide-ranging (yet valuable) ECG training courses and recommendations for emergency and acute care ECG curriculum development. Our process lies in the middle ground, allowing transparent multidisciplinary local customization of broad national recommendations.

As represented in this study, ECG curriculum development may be strengthened by using a multidisciplinary approach, including a team of experts who care for the same patient population. ECG learning and evaluation systems that rely on a single educator or on a few educators or program developers to select the cases presented to learners may present a threat to ECG curriculum validity. The perils of having a single educator, no matter how expert, predict which cases are relevant for learners are well described.[21,22] This potential suboptimal prioritization would be exacerbated in local situations where 1 discipline makes selections that would be used by another.

Conclusions

In this study, nurses, emergency medicine physicians, and cardiologists demonstrated considerable agreement in ranking ECG diagnoses regarding their importance in the clinical context. Despite sample limitations, these ratings can provide initial steps in the ECG consensus process when prioritizing the teaching and learning of interpretation skills for various ECG diagnoses. With the continuous growth of ECG learning technologies, emergency and critical

care nursing education may benefit from developing standardized curriculum and evaluation guidelines, which must be informed by more rigorous content validation studies for ECG case selection. More studies like this one are recommended among a larger diverse population of educators and frontline emergency and acute care nurses and physicians.

Acknowledgments

The authors would like to acknowledge the participation of nurses and physicians who invested valuable time away from their primary clinical and faculty responsibilities to participate in this study. We also thank Dr Lisa Altshuler for her help with the focus groups and Ms Greta Elysee and Ms Sidrah Malik for their support of the research.

Author Disclosures

Conflicts of interest: none to report.

This work was funded by the United States Department of Defense Medical Simulation and Information Sciences Research Program (grant number: W81XWH-16-1-0797).

Supplementary Data

Supplementary Table 1. Full Ranking of 120 AHA ECG DiagnosesSupplementary Tables 2 and 3. Qualitative Themes with Examples of Interview Texts

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.11.005.

AHA ECG Labels	Nurses (N = 6)	Cardiology medicine (N = 5)	Emergency medicine (N = 7)	Sum (N = 18)
1. Ventricular tachycardia	6	5	7	18
2. Ventricular fibrillation	6	5	7	18
3. Atrial fibrillation	6	5	5	16
4. AV block, complete (third-degree)	5	5	6	16
5. Normal ECG	6	4	4	14
6. Anterior MI	3	4	5	12
7. Inferior MI	3	4	5	12
8. Atrial flutter	4	5	2	11
9. Supraventricular tachycardia	5	4	2	11
10. Ventricular tachycardia, torsades des pointes	2	4	5	11

11. Second-degree AV block, Mobitz type II	4	2	5	11
12. Posterior MI	2	3	6	11
13. Lateral MI	3	3	4	10
14. Hyperkalemia	3	1	6	10
15. Anteroseptal MI	2	4	3	9
16. Right ventricular MI	3	3	3	9
17. Acute pericarditis	1	4	4	9
18. Acute pulmonary embolism	1	3	5	9
19. Ventricular tachycardia, polymorphous	2	3	3	8
20. Wide-QRS tachycardia	2	2	4	8

Nurses	Total (N = 6)	Cardiology medicine	Total (N = 5)	Emergency medicine	Total (N = 7)
AHA ECG labels	AHA ECG labels	AHA ECG labels	Normal ECG	6	Atrial fibrillation
5	Ventricular tachycardia	7	Atrial fibrillation	6	Atrial flutter
5	Ventricular fibrillation	7	Ventricular tachycardia	6	Ventricular tachycardia

5	AV block, complete (third-degree)	6	Ventricular fibrillation	6	Ventricular fibrillation
5	Posterior MI	6	Sinus tachycardia	5	AV block, complete (third-degree)
5	Hyperkalemia	6	Sinus bradycardia	5	Normal ECG
4	Atrial fibrillation	5	Supraventricular tachycardia	5	Supraventricular tachycardia
4	Ventricular tachycardia, torsades de pointes	5	AV block, complete (third-degree)	5	Ventricular tachycardia, torsades de pointes
4	Second-degree AV block, Mobitz type II	5	Sinus arrhythmia	4	Anterior MI
4	Anterior MI	5	Atrial flutter	4	Inferior MI
4	Inferior MI	5	Second-degree AV block, Mobitz type II	4	Anteroseptal MI

4	Acute pulmonary embolism	5	Sinus rhythm	3	Acute pericarditis
4	Acute ischemia	5	Ventricular tachycardia, unsustained	3	Extremity electrode reversal
3	Normal ECG	4	Second-degree AV block, Mobitz type I	3	Narrow-QRS tachycardia
3	Wide-QRS tachycardia	4	Prolonged QT interval	3	Ventricular tachycardia, polymorphous
3	Left bundle-branch block	4	Anterior MI	3	Ventricular preexcitation
3	Lateral MI	4	Inferior MI	3	Posterior MI
3	Acute pericarditis	4	Lateral MI	3	Lateral MI
3	Brugada abnormality	4	Right ventricular MI	3	Right ventricular MI

3	Digitalis toxicity	4	Hyperkalemia	3	Acute pulmonary embolism

DETAILS

Subject:	Emergency medical care; Educational programs; Life threatening; Atrial fibrillation; Academic disciplines; Curricula; Cardiologists; Focus groups; Content analysis; Electrocardiography; Curriculum development; Physicians; Nurses; Interdisciplinary aspects; Ultrasonic imaging; Medical diagnosis; Critical care; Ratings &rankings
Company / organization:	Name: American Heart Association; NAICS: 813212
Identifier / keyword:	Electrocardiogram; Diagnoses; Nursing; Education; Interdisciplinary education; Curriculum
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	313-320
Publication year:	2021
Publication date:	Mar 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article

DOI:	https://doi.org/10.1016/j.jen.2020.11.005
ProQuest document ID:	2498288374
Document URL:	https://www.proquest.com/scholarly-journals/importance-ranking-electrocardiogram-rhythms/docview/2498288374/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-06-21
Database:	Public Health Database

Document 9 of 61

Asynchronous Testing of 2 Specimen-Diversion Devices to Reduce Blood Culture Contamination: A Single-Site Product Supply Quality Improvement Project: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Objective

Blood culture contamination above the national threshold has been a consistent clinical issue in the ED setting. Two commercially available devices were examined that divert an initial small volume of the specimen before the collection of blood culture to reduce skin contamination.

Methods

Prospectively, 2 different blood culture–diversion devices were made available in the unit supplies to ED clinicians at a single site during 2 different periods of time as a follow-up strategy to an ongoing quality improvement project. Blood samples were collected in the emergency department over a period of 16 months. A retrospective record review study was conducted comparing the use of the 2 specimen-diversion devices with no device (control group) for blood culture contamination rates. The main outcome of monthly blood culture contamination per device was tested using a Bayesian Poisson multilevel regression model.

Results

A total of 4030 blood samples were collected and analyzed from November 2017 to February 2019. The model estimated that the mean incidence of contaminated blood draws in the device A group was 0.29 (0.14-0.55) times the incidence of contaminated draws in the control group. The mean incidence of contaminated blood draws in the device B group was 0.23 (0.13-0.37) times the incidence of contaminated draws in the control group, suggesting that initial-diversion methods reduced blood culture contamination.

Conclusion

Initial specimen–diversion devices supplement present standard phlebotomy protocols to bring down the blood culture contamination rate.

FULL TEXT

Contribution to Emergency Nursing Practice

••What is already known on blood culture contamination is that it has been a consistent clinical issue in the emergency department site.

••The main finding of this paper is that devices used for initial diversion methods. What is already known on blood culture contamination is that it has been a consistent clinical issue in the emergency department site. reduce blood culture contamination.

••Recommendations for translating the findings of this paper into emergency clinical practice include using initial specimen diversion devices as part of a bundle of interventions for sustained reduction of blood culture contaminations in the emergency departments of hospitals with baseline metrics above national blood culture contamination thresholds.

Introduction Available Knowledge

Blood cultures (BCs) are the gold standard for diagnosing sepsis, one of the leading causes of death and readmissions in United States hospitals.[1] False-positive cultures, owing to the contamination of blood samples by the growth of organisms that are not supposed to be present, can jeopardize the usefulness of this important tool. Moreover, it is estimated that the national BC contamination rate (BCCR) ranges from 0.6% to 12.5%.[2] Hospitals are continually struggling to keep the false-positive BC rates below the national benchmark of less than 3%.[3] False-positive results have adverse consequences for patients, such as inappropriate antibiotic use, extended length of stay, and increased diagnostic and consultation expenditures.[4] In addition, false-positive cultures may have an impact on the interpretation of central line–associated bloodstream infections events that are mandatory reportable conditions.[5]

Whereas the national benchmark for the BCCR is less than 3%, many emergency departments have reported rates as high as 11%.[2,3] Up to 50% of all BCs drawn in hospitals originate in the emergency department.[5] This high volume poses a unique challenge because emergency departments have been noted to have higher BCCRs than the intensive care unit and acute care settings.[2] Multiple interventions have been tried and tested in the emergency department to reduce BCCRs, including the use of specific skin antisepsis solutions,[6,7] prepackaged kits,[8] sterile gloves,[9] samples from percutaneous sites,[10] education,[11] and phlebotomy teams.[12] The bundling of these interventions has been shown to reduce BCCRs significantly when obtained by venipuncture or from an intravascular catheter.[13]

Problem Description

A retrospective analysis showed that for the past 10 years, the Central Texas Veterans Health Care System has kept the average hospital BCCR below the national benchmark of 3% and the Veterans Affairs (VA) threshold of 2.5%. However, in our routine quality improvement (QI) process records ([Figure 1]), we noted that the contamination rates for BCs obtained in the emergency department had a BCCR >3%, whereas non–emergency department–obtained BCs were below the benchmark (2.5%).

This facility's emergency department averaged 250 BC collections per month, with BCCR rates at 3% to 4.7%. A multidisciplinary process improvement (PI) team composed of microbiology staff, ED staff, and infection prevention staff were assembled to address this issue by using QI methods, particularly by using a previously reported model improvement framework[14] to reduce the ED BCCRs to below 2.5%. These have included education on best practices for BC collection, use of a transfer device, discarding the first 2 mL to 3 mL of blood by aspiration with a 5-

mL syringe, and cleaning the site with a chlorhexidine solution. A discussion with ED staff indicated that the factors contributing to higher BCCRs in the emergency department include time pressures, phlebotomy during emergent procedures, and high staff turnover.[15]

Rationale

The QI strategies—using a transfer device, discarding initial blood by aspiration, and cleaning the site—were unsuccessful. Repeated attempts to reduce our BCCR in the emergency department using the existing PI procedures failed to reach VA standards.

Our facility's QI team then decided to use an initial specimen–diversion (ISD) technique adopted by Rupp et al[16] This technique was successfully innovated and adapted by Patton and Schmitt.[17] Because the emergency department had previously tested an open diversion system—in which the health care worker was required to manually switch the intravenous line from a sterile diversion tube to a collection tube or culture bottle—that had not been effective, the hospital QI team opted to examine 2 commercially available closed system devices manufactured on the basis of on an invention reported by Patton and Schmitt.[17]

Purpose

The purpose of this project was to replicate the Patton and Schmitt[17] study protocol and intervention at our site, comparing the BCCR when a closed BC diversion device was used with that when such a device was not used.

Methods Design

This QI project was designed to test 2 commercially available devices to reduce the BCCR in our emergency department, replicating the technique described by Rupp et al[16] and Patton and Scmitt,[17] device A and device B. We neither endorse nor oppose either of these products and hence do not identify which one is A and which is B. Device A was available on the unit from November 2017 to March 2018. During this time, 664 samples were drawn with device A, and 761 samples were drawn without a device. Device B was available on the unit from April 2018 to February 2019. During this time, 1312 samples were drawn with device B, and 1293 samples were drawn without a device ([Table]). Blood samples drawn without a device were used as controls to compare the contamination rates.

Context

The site location is a single-center emergency department in an urban 146-bed teaching hospital, with an emergency department that averaged nearly 30 000 visits per year.

Different Devices in Unit Product Supplies as Intervention

Product information on the devices was reviewed by the multidisciplinary team and presented to the clinical product review committee, which granted approval for the trial.

One device (Magnolia Medical Technologies, Seattle, WA) is a manually triggered vein-to-bottle closed system that isolates the first 1 mL to 2 mL of blood from the rest of the sample into a sequestration chamber and then flows through a sterile pathway into the BC collection bottles. The preassembled device kits come with a culture bottle transfer adapter with either an attached butterfly needle or a Luer lock for use with freshly inserted peripheral intravenous catheters, both of which were used in the emergency department.[4] Recently the same company launched Steripath Gen2, which received 510(k) clearance from the Food and Drug Administration on February 28, 2020. However, we used their first product marketed, which was available in 2017.[18]

The other diversion device, Kurin, which received 510(k) clearance from the Food and Drug Administration on December 23, 2016, passively diverts less than 0.15 mL of blood into a U-shaped flash chamber in which the initial sequestered volume of blood is locked. As the BC bottle is attached, the specimen is collected in the bottle through a separate channel. This device, which is also a closed system, consists of a winged needle with flexible tubing and an attached vial adapter.[19]

Data Source

Data were collected from the pathology and laboratory medicine department's microbiology laboratory blood sample records of all adult patients in the hospital emergency department who required BCs for clinical suspicion of infection. Protected health information and VA sensitive information were not collected, and all data were deidentified. Decisions made by the clinical product review committee and the PI team were mutually exclusive, and no author in this project took part in that decision-making body. Monthly feedback was provided by the ED staff during the review process.

Procedures

Training representatives from the manufacturers were on site to provide education and demonstration on the use of the products during the first 2 weeks of implementation. To measure and record whether a diversion device was used, the ED staff were instructed to insert the package label of the device along with the BC specimens sent to the laboratory. Nurse managers monitored this practice. The laboratory quality manual (QM) kept records of the monthly reports, which were used to report on the QI project. BCs received with no package label were considered collected without a device and categorized as a control in this project. The laboratory QM routinely verified any suspected positive samples to identify whether a device was used with it or not. As previously described in the design section, the availability of BC diversion devices in the unit supplies changed by time period.

During the evaluation period, BC collections were completed per facility protocol, with the change being the use of the diversion devices. Venipuncture sites were disinfected with ChloraPrep (BD, Franklin Lakes, NJ); BC bottle tops were disinfected with alcohol pads. The BC set consisted of 20 mL venous blood split evenly between the aerobic bottle and the anaerobic bottle.

BC Contamination Variable

BCs were monitored using the BacTAlert 3D system (bioMérieux, Marcy-l'Étoile, France), with positive bottles being further characterized by Vitek MS MALDI-TOF (bioMérieux, Marcy-l'Étoile, France) and automated susceptibility testing (Vitek 2). The American Society for Microbiology recently released an updated review of BC contamination on the basis of the College of American Pathologists' Q-Probes QI studies, which was used as a guideline to classify contamination: contamination was present if 1 or more of the following organisms was found in only 1 bottle in a series of BC sets: coagulase-negative staphylococci, *Micrococcus,* α-hemolytic viridans group streptococci, *Corynebacterium sp, Propionibacterium acnes,* and *Bacillus sp*.[20] Our QI project changed the use of diversion devices, but no contamination assessment criteria changed during the project period. Our hospital maintains monthly statistics on BCCRs and reports these to the pathology and laboratory QM committee as well as the infection prevention committee. The microbiology laboratory QM collects BC statistics on the basis of accession number and drawing personnel/phlebotomist. They are recorded by subgroup on the basis of who conducted the draw, the laboratory phlebotomist or ED staff. During the trial periods, a record was kept of how the emergency department conducted BC draws, with or without a diversion device. At the end of every month, the microbiology laboratory QM compiles a report on the basis of individual data to provide the monthly total BC contamination numbers of true positives, the number of contaminants, and the contaminant rate/percentage.

Device Variable

As previously stated, the ISD package label was included with the BCs and recorded by the laboratory. BCs received with no package label were considered collected without a device and categorized as a control in this project. Although the ED staff were educated about the use of the devices, there were instances when the devices were not available on the unit owing to periodic automatic replenishment–level issues in the supply chain and when the ED staff chose not to use the device. The reasons for why the ED staff chose not to use the device included the

inconvenient location (storage room in the back of the emergency department) with reference to the point of care.

Statistical Methods

The number of contaminated draws per total monthly draws was modeled as a function of the type of device (control, A, or B), the log of the total draws per month as an offset, and a varying intercept for the month in a Bayesian Poisson multilevel regression model. Prior predictive checks were used to check that the priors specified made clinical sense.[21] A normal (–2, 1) prior was used on the intercept parameter, a normal (0, 0.5) prior on the coefficient parameters, and a half-normal (0, 1) prior on the group-level standard deviation parameter. The results were expressed in incident rate ratios (IRRs) comparing the incident rate of a contaminated sample in a treatment device group with that of the control, and 95% uncertainty intervals for the IRR expressed the uncertainty associated with the estimated IRR in terms of probability. An IRR of 1 indicated the same rate for the control as that for the device, an IRR less than 1 indicated lower rates of a contaminated sample for the device than those for the control, and an IRR greater than 1 indicated increased rates of a contaminated sample for the device compared with those for the control. Details of the model specifications and sensitivity analysis are included in the Supplementary Appendix.

Results Emergency Department with Higher BCCRS

Data from 2012 to 2016 were analyzed by dichotomizing the BCCRs between those drawn by laboratory staff (DBL) and those not drawn by laboratory staff (NDBL; ED staff) as shown in Figure 1. Although the facility met its BCCR goal at 0.8%, the ED BCCR was at 3.5%. BC collections in the emergency department were performed by nurses and emergency technician nurse assistants.

Introducing ISD Devices Reduced the BCCR in the Emergency Department

There were 4030 total BCs drawn by registered nurses and emergency technician nurse assistants from November 2017 to March 2018 (device A) and from April 2018 to February 2019 (device B). Blood samples collected from the comparison group (standard method of venipuncture without a device), device A, and device B were analyzed from November 2017 to February 2019 (Table and Figure 2). During the first 5 months, 761 samples were collected by ED staff without the device (control), of which 17 (2.2%) were contaminated, and 664 samples (Table) were collected using device A, of which 0 (0%) were contaminated. During the next 11 months, 1293 samples were collected without the device (comparison group), of which 67 (5.2%) were contaminated, and 1312 samples (Table) were collected using device B, of which 4 (0.3%) were contaminated.

The model estimated that the mean incidence of contaminated draws per month in the device A group was 0.29 (0.14-0.55) times the incidence of contaminated draws in the control group. The estimated mean incidence of contaminated draws in the device B group was 0.23 (0.13-0.37) times the incidence of contaminated draws in the control group. Thus, conditional on the data in this study and the model and prior specified here, there was a 95% probability that the mean rate of contamination for device A was 45% to 86% lower than that for the control and that the mean rate of contamination for device B was 63% to 87% lower than that for the control. The results of the sensitivity analysis and guidance for determining a sample size for replication are contained in the Supplementary Appendix.

Discussion

Sepsis is one of the oldest and most pressing problems in emergency care. BC is one of the main tools used to confirm an early diagnosis of sepsis.[22] The accurate identification of causative infectious agents, excluding contamination, is therefore of prime importance. BC contamination has been linked to cross-contamination from the patient's skin, supplies used in BC draws, and the immediate environment of the patient, including the hands of the individual collecting the sample.[5] Novel ISD technology reduces the likelihood of contamination from the external environment and is a feasible and effective approach in reducing the BCCR in the emergency department.

In our study, for the first time in the literature, we examined successful applications of 2 main commercial devices

used to reduce BC contamination. Here we show that including diversion devices in the unit product supplies drastically reduced the BCCR, irrespective of the volume of initial diversion. These findings would be of immediate use at the management levels of practice among nurse managers/executives in emergency departments where BC contamination is an ongoing issue.

In agreement with previous studies,[16,17] our data showed that our hospital managed to reduce the BCCR by using a closed-system device using an ISD technique. Both devices reduced the BCCR in our hospital emergency department, irrespective of the different initial volume of sequestration by the device. ISD devices would be an effective solution for sustained reduction of BCCRs in the emergency department. The most common sources of contaminants are the skin flora. However, approximately 20% of the skin microbes are colonized deep in the dermis layer, and they are unaffected by skin antisepsis.[5] Several studies have shown that ISD has significantly reduced false-positive BCs by bypassing deep skin–colonized microbes.[17,20] Most of these studies supported the sequestration of 1 mL to 2 mL of blood before collecting for culture. For the first time, our study examined both closed devices with different volumes of initial sequestration. Our findings also corroborate the results of the recent publication by O'Sullivan and Steere,[23] who reported that an ISD device significantly lowered the BCCR compared with the standard method. In the O'Sullivan and Steere[23] study, 50% of the BCs were collected in the ED setting, emphasizing the importance of the emergency specialty in BCCR QI. It is estimated that the cost of a false-positive BC ranges from $4500 to $10 000.[5]

Figure 3 contextualizes our findings with our site's annual BCCR rates from 2003 to 2018. As we relayed in the problem description section of this paper, the site was previously unsuccessful in targeting the VA 2.5% BCCR threshold goal. In December 2008, a skin disinfectant (ChloraPrep) and the use of a transfer device for BC collections were implemented throughout the facility. In addition, this change in practice was an opportunity to reinforce education on the proper technique for BC collections. This combined strategy decreased the facility's BCCRs from 4% to 2.2% by the end of 2009 (Figure 3). As part of an ongoing QI project, the microbiology laboratory continued to monitor the BCCR rates and communicated the progress to the stakeholders. However, the progress was unsustainable (the BCCR was above the VA threshold from 2014 to 2017), requiring us to investigate the successful diversion device strategy presented in this manuscript.

False-positive BCs incur harmful downstream effects: increased risk for nosocomial infection, improper antibiotic use, prolonged hospital stay, hidden laboratory expenses for unnecessary culture identification, and antibiotic-sensitivity assays with other overheads.[4,5] Because false-positive BCs and downstream effects add to indirect costs, the hospital leadership often emphasizes reducing BC contaminations in the emergency department where most of the BCs are drawn. In our system, gram-positive and gram-negative culture and sensitivity tests cost approximately $20.00 and $40.00 each, respectively, and rapid BC identification costing $136 per sample adds to the cost. We recommend more comparative studies to further our investigation enabling the end clinical users who are involved in device-purchasing decisions in the emergency department to base the decisions on their preference. In addition, more studies comparing the efficacy of both devices side by side would be beneficial in understanding if the ED setting is suitable for the use of each device. Additional study or project replication should be completed in participant samples that include both children and adults.

Lessons Learned

Here, the intent of the QI project was not to compare devices but to explore strategy for reducing the BCCR using ISD technology. The results show that ISD technology greatly reduced (clinically significant) the BCCR in the facility's emergency department. Testing both devices was also intended to increase awareness of, and attention paid to, the issue of the BCCR in the emergency department as well as increase buy-in to the solution. The trending

decline of the BCCRs was reported monthly to the ED staff, and their efforts were affirmed by the QI project team. After the first few days into the study, the QI team noted that product placement and product availability played a key role in use decline. Initially, the diversion devices were stored in an inconvenient location in a supply room at the end of the hall of the emergency department, which required additional time for the staff to obtain BC collection supplies. Once the product was moved closer to the point of care, an increase in use was noted. Although there was a change in ED nursing leadership during the trial period, both nurse managers were supportive of the QI project. Use of the devices did not overlap except in the fifth month of the study ([Table]). This minimized device misclassification and human error. However, because the QI team monitored the stock of devices and checked with the QM of the microbiology laboratory, we speculate that this error would have been kept to a minimum. For QI teams considering replicating this project, we also recommend paying attention to maintaining the device stocks for 24/7 availability.

Implications for Emergency Clinical Practice

Our findings can be used to inform future updates to the relevant Emergency Nurses Association Clinical Practice Guidelines on BC contamination.[24] Our study provides evidence of a successful QI strategy through adding blood diversion devices to the BC collection supplies for hospitals with quality data above the benchmarked thresholds for BC contamination.

For sites considering adding ISD-technique devices, we wish to reiterate the importance of best-practice phlebotomy techniques to draw blood, irrespective of the use of such devices to eliminate BC contamination. It has already been reported nationwide that nonphlebotomists report higher contamination than phlebotomists.[25] However, not all hospitals have phlebotomists servicing the emergency department. In fast-paced, heavy-workload settings such as the emergency department, the ISD technique coupled with the proper aseptic technique is a feasible QI bundle that can result in sustained reduction of BCCRs.

Limitations

The research design may have been limited by a maturity bias. The 2 diversion devices were introduced to the supply chain sequentially, which meant that the staff had familiarity, training, comfort, and experience with the second device that they may not have experienced when the first device was introduced. Another limitation of the study could be misclassification of the device use variable, although the ED leadership conveyed to the staff that the use of the product was required for BC draws. The potential for human error should be taken into consideration for circumstances when the collector failed to include the package insert on the specimen sent to the laboratory even if the device was used. In addition, in an unstable patient or 1 in an active sepsis alert, the timely care the patient required would preclude the extra time needed to gather supplies. Thus, the acuity and timeliness of care interventions may have biased the results. Therefore, selection bias is a key limitation because the clinician may have used the device in more stable patients during which time was less constrained or pressured.

In addition to the aforementioned limitations, causation cannot be inferred from the study design because there was no randomization or blinding. Finally, because patient-level data were not collected, confounders and covariates were not tested that may have increased the risk for BC contamination. Despite these limitations, our findings support the need for further studies in using specimen-diversion methods as an option to address BC contamination.

Conclusion

High incidence rates of false-positive BCs in the emergency department are common. Our QI project using ISD devices was successful in decreasing the BCCRs in our emergency department. We recommend use of the ISD devices as a QI bundle, along with best-practice site preparation and phlebotomy and specimen collection considerations. Our QI project should be replicated in future prospective studies to test the efficacy of each device in the emergency department and in QI studies at sites with both child and adult participants.

Acknowledgments

This work was supported by the resources of the Central Texas Veterans Health Care System (CTVHCS) and reflect the views of the authors and do not represent the views of the CTVHCS, Department of Veterans Affairs, or the US government. We thank Dr Charles Foulks, associate chief of staff for research at the CTVHCS, for his kind contribution on proofreading and constructive edits.

Author Disclosures

Conflicts of interest: none to report.

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.11.008.

Supplementary Appendix MODEL CHOICE

A Bayesian multilevel Poisson model was used in the reported analysis. Poisson models are commonly used for count data. Our data were counts of contaminated blood draws for each month. We modeled this outcome as a rate of contaminated draws per total draws each month by including the log of total draws as a predictor in the model. This is possible because the equation $\log u_x/t_x = B_0 + B_1 x$, is equivalent to $\log u_x = \log t_x + B_0 + B_1 x$. Thus, Poisson regression is a common method used to model counts that are the numerator in a rate.

As in any analysis, there are many choices that can be made as to how to specify the model. For example, a Poisson model assumes that the mean and the variance of the distribution are the same. What about overdispersion?

Overdispersion is often addressed by using the Poisson model. The worse the posterior predictive fits and the higher the Watanabe-Akaike Information Criteria, the poorer the fit, suggesting that the overdispersion parameter is not needed. The summary model results of both the Poisson and negative binomial models are shown in Supplementary Tables 1 and 2.

Group-level effects	Estimate	Est. error	l-95% UI	u-95% UI
SD (intercept)	0.43	0.19	0.07	0.84

Group-level effects	Estimate	Est. error	l-95% UI	u-95% UI
SD (intercept)	0.27	0.20	0.01	0.72

HOW WELL DOES OUR MODEL FIT?

Bayesian models are generative models. If the model is good, then it should be able to generate data from the posterior predictive distribution that look like the real observed data. This is the reasoning behind graphical posterior predictive checks. We show some plots below that demonstrate that our model generates data that look similar to the real observed data. For a full discussion of the posterior predictive checks, see Chapter 6 of *Bayesian Data Analysis* by Gelman et al.**Supplementary Figure 1**Density plot.

Supplementary Figure 1 is a density plot of data from 100 simulations from the Poisson model. The dark blue line shows the

actual observed data for the study, and the light blue lines show each simulation. The model generates data that are reasonably close to the observed data.**Supplementary Figure 2**Density plot of the mean.**Supplementary Figure 3** Density plot of the standard deviation.

Supplementary Figures 2 and 3 show density plots of the mean and standard deviation of simulation data generated from the Poisson model. As can be seen from the plots, the model generates data with means that are very close to the mean of the observed data. The model-generated data also have similar standard deviations as the observed data, although most of the generated datasets from the model slightly underestimate the standard deviation compared with the observed data.

DO OUR PRIORS INFLUENCE THE ESTIMATES?

A non-Bayesian generalized linear mixed Poisson model was also run. The results are shown in Supplementary Table 3. It should be noted that this model did not converge.

Random effects	Variance	SD
Month (intercept)	0.10	0.32

For our analysis, a normal (0, 0.5) prior was used for the coefficients for the effect of the devices. This prior is centered around zero effect, with tails that have approximately 95% of the probability between –1 and 1. Thus, it is conservative when estimating the effect of the intervention. The result for device A is a much more conservative estimate but with a reasonable standard error. The prior was chosen using the following reasoning: let's say as an example that the intercept (baseline contamination rate in the control) is exp(-2) = 0.14, which is plausible but pretty high given that the baseline rate without any intervention is pretty low anyway (the national rate is only 0.03). If the parameter estimate for the coefficient for the device was –1.0, this would mean that the rate for the device group would be exp(–2 + –1) = 0.05 or almost a third of the baseline rate of 0.14, which would be quite a large effect for the device.

However, these priors do influence the estimates toward being more conservative (ie, smaller effect size). We ran the same model as in the Results section with more diffuse priors: normal (0, 20) for the intercept, normal (0, 10) for the coefficients for the 2 devices, and a half-normal (0, 5) for the standard deviation of group-level effects. The results are given in Supplementary Table 4.

Group-level effects	Estimate	Est. error	l-95% UI	u-95% UI
SD (intercept)	0.39	0.2	0.04	0.82

SUMMARY

When the dataset is small, it is important not to overstate large effects. Our dataset was very small, and device A had only 5 months (5 observation points) of data. This particular device also had zero contaminations for all 5 months. However, device B also had a run of 5 months without contamination, but because it included 12 data points there were also some months with contaminants. It thus would not be correct to conclude that device A would have near zero contaminations per month simply on the basis of 5 datapoints. Thus, we believe that conservative

estimates are better in this case. Our use of a normal (0, 0.5) prior, which has 95% of the probability between –1 and 1, is a conservative and regularizing choice of prior for the effect of the device. The resulting estimate is conservative with regard to the effect size. To estimate the effect more precisely, more data and larger studies are needed.

GUIDANCE ON CALCULATING A SAMPLE SIZE FOR REPLICATION

Our retrospective findings can pave the way for prospective studies to evaluate the use of specimen-diversion devices to reduce blood culture contamination. In this study, we compared 4030 samples over a 16-month period to evaluate the impact of the use of such devices in mitigating blood culture contamination. A prospective well-funded study in a multicenter setting with a double blinded sample collection strategy and larger sample size would solidify our findings.

We recommend using a simulation for sample size analysis, where the investigator programs a generative model that simulates data, given the parameters, and then runs the analysis model on the simulated data to obtain effect sizes and standard errors. This program would run iteratively a few thousand times to obtain the average effect and standard error, given the parameters. The investigators in such a scenario should determine the rates of contamination over the last several years at each of their planned study sites, the total number of draws taken during each month, and the variability in the number of draws taken each month. If the investigators wished to use the same analysis model that we did, we recommend using the numbers they found above a range of effect sizes from our study to program a simulation that varies both in sample size and in effect size. Using conservative priors for the treatment effect in the model, our study found the estimated effect of device A to be –1.29, with an estimated standard error of 0.36, and that of device B to be –1.51, with an estimated standard error of 0.28, on the log scale. We would recommend running simulations using effect sizes that range from +2 to –2 standard deviations from these estimates to get a good grasp on the variability of sample size when the effect size varies. The results of the simulations would give the investigators an idea of the range of sample sizes needed for a given effect size. These simulation results would inform the investigators regarding the number of total draws needed per month given their analysis model, the baseline rate of contamination, the variability in draws per month, the chosen effect size, and the prechosen error in the estimated effect that they deemed acceptable. In our opinion, this would provide more useful information than a strict power analysis, and we recommend running a power analysis using the same methods of data simulation and analysis to obtain the sample size, given preplanned power and alpha levels.

NOTES

All analyses were conducted in R version 3.5.3 (The R Foundation for Statistical Computing, Vienna, Austria). The ‘brms’ package was used for all Bayesian models. For Bayesian models, 4 chains were run with 2000 iterations per chain (half warm-up). The mixed model in the Supplementary Appendix was run in the ‘lme4’ package. Posterior predictive checks were visualized in the package ‘shinystan.’

Month	Drawn without a device, n	Contaminant, without a device, n	Drawn with device A, n	Drawn with device B, n	Contaminant, with a device, n
1	110	3	106	0	0

2	98	2	180	0	0
3	108	6	210	0	0
4	211	2	89	0	0
5	234	4	79	32	0
6	85	2	0	149	1
7	79	2	0	199	1
8	74	3	0	176	1
9	79	1	0	150	0
10	165	11	0	92	0
11	182	8	0	107	1
12	129	9	0	86	0
13	133	7	0	64	0
14	28	4	0	192	0
15	169	9	0	40	0
16	170	11	0	25	0

DETAILS

Subject:	Laboratories; Culture; Emergency medical care; Quality management; Control groups; Product reviews; Blood tests; Hospitals; Bayesian analysis; Contamination; Departments; Phlebotomy; Education; Emergency services; Quality improvement
Business indexing term:	Subject: Quality improvement
Location:	France
Company / organization:	Name: Food &Drug Administration--FDA; NAICS: 922190
Identifier / keyword:	Blood culture; Collection; Contamination; False positive
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia

Volume:	47
Issue:	2
Pages:	256-264.e6
Publication year:	2021
Publication date:	Mar 2021
Section:	Practice Improvement
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.11.008
ProQuest document ID:	2498288341
Document URL:	https://www.proquest.com/scholarly-journals/asynchronous-testing-2-specimen-diversion-devices/docview/2498288341/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Mar 2021
Last updated:	2022-03-24
Database:	Public Health Database

Leading and Accelerating Change: JEN

ProQuest document link

ABSTRACT (ENGLISH)

In the final manuscript in our ENA 50th Anniversary celebration, Milbrath and Snyder3 provide a historical analysis of the top 3 policy issues addressed in the ENA's history: (1) provision of care for vulnerable populations, (2) trauma and injury prevention, and (3) patient quality and safety. In the hopes that March of 2021 will mark the date when we can begin to emerge from our isolation to celebrate together once again, I envision that the pandemic can serve as the inflection point marking when ENA progresses from leading change to also accelerating the needed improvements in our health care system.In This Issue of the Journal of Emergency Nursing In addition to our 50th Anniversary celebration article, this issue of Journal of Emergency Nursing (JEN) includes a collection of articles focused on novel technology, coronavirus disease 2019 leadership, and cardiovascular care. Ivanov et al's research begins to bring emergency triage into the advanced digital age by testing the accuracy of a machine learning algorithm for assigning Emergency Severity Index acuity.6 The results tantalize the imagination with a future where patient care is more accurate and precise with human decision-making augmented and supported by real-time supercomputing tools. By relaying how the facility leaders flexibly adapted structures and processes at their site in the face of uncertainty and little previous evidence, the authors provide an important contribution to the literature on considerations for emergency care leadership in future, major infectious disease disasters.

FULL TEXT

For over a year, emergency nurses around the world have been at the forefront of the coronavirus disease pandemic response. The emergency care sector was already at the breaking point, especially in the United States, well before the onset of the pandemic.[1] The pandemic has led to a loss of life among the general population, the loved ones of our emergency nursing community, and our own health care workers. Public outcry about the need to change health care, fueled by problems exacerbated by the pandemic, has created an urgency and priority for care reforms and improvements.

Over 50 years ago, the Emergency Nurses Association (ENA) founders, Anita Dorr and Judith Kelleher, created the organization as a vehicle to advance training and skills among nurses in the emergency care setting and to institute widespread improvements in patient care.[2,3] Our founders' and our own subsequent collective efforts through ENA's first 50 years modeled for us how successfully and adeptly we can envision, create, and accelerate positive and meaningful change. Now, we are responding to the deadliest pandemic since the ENA's inception, which has continuously tested the knowledge, skill, endurance, and dedication of emergency clinicians beyond most human limits. We collectively lift up in solidarity each emergency clinician who has been surrounded by the prolonged physical, mental, emotional, and spiritual devastation and isolation of this global disaster. For some, the severity and scarcity inherent to this pandemic lifted their capabilities to new heights. The challenge awakened their tremendous personal and professional skill, strength, creativity, and tenacity. For many, the challenges of the pandemic have often seemed too much for any one person to bear. Too difficult to endure. Too demoralizing to soldier on.

After taking time to rest, to grieve, and to replenish, let us join together to recalibrate our perspective to envision what possibilities stretch beyond this last year's exhaustion, shortages, needs, and fatalities. We carry the struggles with us, not to be discouraged and dejected by these trials but to rededicate ourselves to the clearly unfinished work to optimize clinical care and patient outcomes in the emergency care setting. Providing emergency nursing care during the pandemic may have left scar tissue physically at infection sites, emotionally through loss, and spiritually as we press through times of potential cynicism and hopelessness. Collectively, one path to healing is finding new meaning and purpose in the challenges we share and overcome in any major disaster.

This editorial is my call that we not give in to cynically accepting the flaws and limitations of the health care system, so clearly evident under the pandemic's demands. Let's not give in to normalizing avoidably poor patient outcomes. Let's not give in to unacceptable working conditions. In the metaphorical ashes and aftermath of the coronavirus disease pandemic, let us dedicate ourselves anew to lifting up one another and accelerating the needed change to better emergency nursing care. It is now up to us to create important ways to honor those we lost in this disaster. It

is up to us to emerge, look for strength within and among us, and dedicate ourselves collectively to continue to push for positive change. It is up to us to ensure a purpose in emergency nursing so that, in the words of Abraham Lincoln, “these dead shall not have died in vain.”

Each emergency clinician can easily generate a list of system and unit changes that can improve their work environments and patient outcomes. Emergency clinicians also have the superb prioritization skills to determine the timeliness and importance of each of these problems, and to focus on the problems most likely to generate an impact. No one is exempt from the responsibility of organizational change and improvement. If every person at every level of a hospital or emergency care system is not leading the change in a positive manner, it is unlikely that any planned change will be sustainable long-term. Even though emergency nurses are often expert at identifying and prioritizing both organizational and patient problems, we often do not have the processes or tools at hand to lead and accelerate change. Kotter’s 8 steps of change is an excellent, shared mental model for leading successful, sustainable change.[4] Briefly, Kotter’s 8 steps to lead and accelerate change are:[4]

••CREATE a sense of urgency

••BUILD a guiding coalition

••FORM a strategic vision

••ENLIST a volunteer army

••ENABLE action by removing barriers

••GENERATE short-term wins

••SUSTAIN acceleration

••INSTITUTE change

I first learned about Kotter’s 8 steps of change as part of a hospital-system-wide TeamSTEPPS communication intervention.[5] A brief ebook is freely available at the author’s website, along with additional tools and learning aids for emergency nurses who wish to apply the process of leading change in their organizations.

We emergency nurses, as part of a professional specialty organization, have a proud and successful history of leading and accelerating change. In the final manuscript in our ENA 50th Anniversary celebration, Milbrath and Snyder[3] provide a historical analysis of the top 3 policy issues addressed in the ENA’s history: (1) provision of care for vulnerable populations, (2) trauma and injury prevention, and (3) patient quality and safety. Many of our in-person 2020 anniversary year celebrations were cancelled and delayed due to the pandemic. I am writing this editorial as vaccination campaigns are just beginning to protect our health care workers and vulnerable lay population. In the hopes that March of 2021 will mark the date when we can begin to emerge from our isolation to celebrate together once again, I envision that the pandemic can serve as the inflection point marking when ENA progresses from leading change to also accelerating the needed improvements in our health care system.

In This Issue of the *Journal of Emergency Nursing*

In addition to our 50th Anniversary celebration article, this issue of *Journal of Emergency Nursing (JEN)* includes a collection of articles focused on novel technology, coronavirus disease 2019 leadership, and cardiovascular care. Ivanov et al’s research begins to bring emergency triage into the advanced digital age by testing the accuracy of a machine learning algorithm for assigning Emergency Severity Index acuity.[6] The results tantalize the imagination with a future where patient care is more accurate and precise with human decision-making augmented and supported by real-time supercomputing tools. As part of an ongoing quality improvement project to reduce blood

culture contamination rates, Arenas et al[7] test the monthly outcomes as new initial specimen diversion devices are introduced into the unit supply chain. The compelling data demonstrate the need for further clinical trials and provide initial evidence to support device use as part of a quality improvement bundle at adult emergency care sites with baseline contamination rates above national benchmarks.

Binder, Torres, and Elwell[8] provide the reader insights into the initial ED leaders' response to the early and emerging pandemic in the United States in a suburb of New York City. The potential for unscheduled staff absences is part of any infectious disease surge capacity disaster planning, and the authors uniquely quantify that up to 18.5% of the scheduled nursing staff called in sick at their March 25, 2020 peak. This may serve as an important percentage for future infectious disease disaster response planning and estimated reserve staffing needs. By relaying how the facility leaders flexibly adapted structures and processes at their site in the face of uncertainty and little previous evidence, the authors provide an important contribution to the literature on considerations for emergency care leadership in future, major infectious disease disasters. Implementing telehealth is an important and noteworthy facility intervention in the Binder et al manuscript. Brown[9] provides an explanation of the policy changes to the Emergency Medicine Treatment and Active Labor Act, or EMTALA, that have been temporarily implemented in response to the pandemic. One crucial area for continued change leadership and change acceleration continues to be the use of telehealth, and specifically telenursing, as an extension or alternative to future emergency nursing services and emergency nursing work redesign.[10,11] Wendt et al[12] describe the patient outcomes associated with awake proning for non-intubated emergency department patients. This project is the subject of two invited commentaries to clarify the potential of occupational back injury and the proning procedure for the clinical reader.

Several manuscripts in this issue of *JEN* have implications for cardiac skills and training in the global emergency nursing workforce. Picard et al[13] measured cardiopulmonary resuscitation compression quality using the CPRmeter 2 device as part of their quality improvement project. The authors' findings indicate that clinicians may be poor judges of the quality of the compressions we deliver, and objective feedback using these devices in education or practice promises to enhance the quality of care delivered during resuscitation. Hight et al[14] tested the time-to-results differences between the point of care and in-laboratory biomarker troponin testing. At this site where high sensitivity troponins had not been incorporated, the point of care troponin result was obtained, on average, 29 minutes faster than when specimens were sent to the laboratory. Penalo et al[15] clarify priority electrocardiograph rhythms for emergency nurse competency, professional development, and orientation education. Their findings can easily be translated into a priority order for cardiac rhythm teaching in the specialty. *JEN* continues to welcome case reviews of rare or unusual presentations associated with cardiac dysrhythmias. Uhm and Jung[16] demonstrate an important area where emergency nurses technically proficient in defibrillator use can contribute to overall hospital nursing care quality. Here, among hospital nurses, only 13.6% had experience using a defibrillator during patient resuscitation, and only 32% reported self-confidence in defibrillator use. In this South Korean setting, deference to the physician's role was an important, potentially contributing factor to the nurses' reluctance to use a defibrillator. The international emergency nursing community is in an important position to model and educate on the knowledge, skills, and behaviors to optimize the independent nursing role during resuscitation and defibrillator use. Aligned with the theme of cardiac dysrhythmia and emergency resuscitation skills, Adams and Adams[17] provide a technical review of transcutaneous pacing procedures while El-Hussein and Cuncannon[18] provide readers with a guide for evaluating patients who present with syncope. Last, the morbidity and mortality found in Hanifi, Rezaee, and Rohani's[19] retrospective cohort study of patients in Iran presenting to the emergency department with a myocardial infarction reminds readers of the importance of emergency nurses' role in population health education. The study's implications remind all emergency nurses around the globe to include discharge instructions for all patients with

cardiovascular risk advising not to delay seeking treatment for cardiac symptoms, provide smoking cessation resources and behavior change interventions, and address hypertension control follow-up.

DETAILS

Subject:	Emergency medical care; Telemedicine; Patients; Leadership; Emergency services; Nursing; Historical analysis; COVID-19; Uncertainty; Health care; Celebrations; Learning; Policy analysis; Anniversaries; Nursing care; Decision making; Triage; Cardiovascular diseases; Imagination; Pandemics; Infectious diseases; Technology; Injuries; Disasters; Disaster medicine
Business indexing term:	Subject: Leadership
Location:	United States--US
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	218-220
Publication year:	2021
Publication date:	Mar 2021
Section:	Editorial
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Editorial
DOI:	https://doi.org/10.1016/j.jen.2021.01.006
ProQuest document ID:	2498288339

Document URL:	https://www.proquest.com/scholarly-journals/leading-accelerating-change/docview/2498288339/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Mar 2021
Last updated:	2023-06-02
Database:	Public Health Database

Document 11 of 61

Prone Positioning of Patients With Coronavirus Disease 2019 Who Are Nonintubated in Hypoxic Respiratory Distress: Single-Site Retrospective Health Records Review: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

In March and April 2020 of the coronavirus disease 2019 pandemic, site clinical practice guidelines were implemented for prone positioning of patients with suspected coronavirus disease 2019 in hypoxic respiratory distress who are awake, alert, and spontaneously breathing. The purpose of this pandemic disaster practice improvement project was to measure changes in pulse oximetry associated with prone positioning of patients with coronavirus disease 2019 infection in adult acute respiratory distress or adult respiratory distress syndrome, who are awake, alert, spontaneously breathing, and nonintubated.

Methods

A retrospective chart review of patients who were coronavirus disease 2019 positive in the emergency department from March 30, 2020 to April 30, 2020 was conducted for patients with a room air pulse oximetry <90% and a preprone position pulse oximetry ≤94% who tolerated prone positioning for at least 30 minutes. The primary outcome was the change in pulse oximetry associated with prone positioning, measured on room air, with supplemental oxygen, and approximately 30 minutes after initiating prone positioning. Median and mean differences were compared with the Wilcoxon signed-rank test and paired *t*-test.

Results

Of the 440 patients with coronavirus disease 2019, 31 met inclusion criteria. Median pulse oximetry increased as 83% (interquartile range, 75%-86%) on room air, 90% (interquartile range, 89%-93%) with supplemental oxygen, and 96% (interquartile range, 94%-98%) with prone positioning (z = -4.48, *P* <.001). A total of 45% (n = 14) were intubated during their hospital stay, and 26% (n = 8) of the included patients died.

Discussion

In patients with coronavirus disease 2019 who are awake, alert, and spontaneously breathing, an initially low pulse oximetry reading improved with prone positioning. Future studies are needed to determine the association of prone positioning with subsequent endotracheal intubation and mortality.

FULL TEXT

DETAILS

Subject:	Intubation; Emergency medical care; Ventilators; Hypoxia; Oxygen; Hospitals; Prone; Chart reviews; Breathing; Oxygen saturation; COVID-19; Positioning; Patients; Pneumonia; Artificial respiration; Pulse oximetry; Pandemics; Respiratory distress syndrome; Clinical trials; Respiratory diseases; Viruses; Health records; Coronaviruses; Psychological distress; Emergency services; Clinical practice guidelines; Clinical medicine
Location:	New Jersey; United States--US; China
Identifier / keyword:	Coronavirus disease 2019; Adult respiratory distress syndrome; prone position
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	279-287.e1
Publication year:	2021
Publication date:	Mar 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.12.006
ProQuest document ID:	24982861 35

Document URL:	https://www.proquest.com/scholarly-journals/prone-positioning-patients-with-coronavirus/docview/2498286135/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-08-23
Database:	Public Health Database

Editorial Board: JEN

ProQuest document link

FULL TEXT

TVM:UNDEFINED

DETAILS

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
First page:	A4
Publication year:	2021
Publication date:	Mar 2021
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal

Language of publication:	English
Document type:	General Information
DOI:	https://doi.org/10.1016/S0099-1767(21)00019-2
ProQuest document ID:	2498286128
Document URL:	https://www.proquest.com/scholarly-journals/editorial-board/docview/2498286128/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Mar 2021
Last updated:	2021-03-08
Database:	Public Health Database

Impact of ED Triage Symptom- and Travel-Screening Strategy: JEN

ProQuest document link

FULL TEXT

Dear Editor:

Thank you for publishing the article entitled “Can you catch it? Lessons learned and modification of ED triage symptom- and travel-screening strategy” by Schwedhelm et al.[1] The authors’ subsequent discussion on a recent Emergency Nurses Association podcast episode provided some additional helpful information (“Behind the Research in November *Journal of Emergency Nursing*,” 2020).[2] The successful efforts to identify, isolate, and inform on patients with potentially communicable exposure, thereby reducing staff exposures, certainly warrant applause. However, certain additional pieces of information may be helpful for organizations discerning whether or not to apply this approach. These include, but are not limited to, clarification of the staffing model, further details regarding the 75% compliance rate, and the observed pre- and postimplementation metrics for (1) door-to-triage times, (2) door-to-provider times, and (3) left without being seen (LWBS) rates, at a minimum.

The article mentioned the use of a 24/7 “greeter nurse.” Was the greeter nurse a distinctly separate person from the nurse performing triage duties? If yes, was a cost analysis done to evaluate the return on investment of this additional role, which is approximately 4.2 full-time equivalents, against the total cost of exposure, which would include time off and potential turnover?

For more than a decade, there has been ongoing discourse regarding what questions belong in an arrival/triage process and what questions should occur later in a visit.[3,4] More recently, the 2020 Emergency Nurses Association General Assembly adopted a resolution to further opine on screening questions during triage.[5,6] Identifying and isolating patients with potentially communicable diseases are certainly crucial. Although the authors discussed potential delays for the patients who had been positively screened, it is also important to note what impact, if any,

occurred on preprovider evaluation times for all patients. Specifically, did the creation of this process lengthen the door-to-provider interval for all patients or have a negative impact on the LWBS rates?
Finally, can the authors further detail the “approximate 75% compliance rate”? Are there separate compliance rates for outpatient clinics compared with the emergency department? Were there any trends observed among the ED patients who did not have the screening completed?
In summary, it would be beneficial if future articles discussing the use of screening questions before provider evaluation also identify the impact of the process, if any, on ED throughput metrics, including, but not limited to, the door-to-provider interval and LWBS rate.—*Nicholas Alen Chmielewski, DNP, RN, CEN, CENP, NEA-BC, FAEN, Senior Managing Consultant, Berkeley Research Group, LLC, Emeryville, CA; E-mail: nchmielewski@thinkbrg.com.* ***ORCID identifier:*** *https://orcid.org/0000-0002-6543-9669*.

Disclaimer

The views and opinions expressed are those of the author and do not necessarily reflect the opinions, position, or policy of his employer or its other employees and affiliates.

DETAILS

Subject:	Emergency medical care; Triage; Medical screening
Company / organization:	Name: Emergency Nurses Association; NAICS: 813920
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
First page:	221
Publication year:	2021
Publication date:	Mar 2021
Section:	Letters To The Editor
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English

Document type:	Letter
DOI:	https://doi.org/10.1016/j.jen.2020.12.001
ProQuest document ID:	2498286116
Document URL:	https://www.proquest.com/scholarly-journals/impact-ed-triage-symptom-travel-screening/docview/2498286116/se-2?accountid=211160
Copyright:	©2021. Emergency Nurses Association
Last updated:	2023-06-12
Database:	Public Health Database

Emergency Nursing Review Questions: March 2021: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Interventions are directed at removing the cause as well as providing supportive care to address dehydration, cardiovascular instability, prevention of renal failure, and restoration of normothermia.1 Correct answer: C When caring for patients with dementia, such as a patient with Alzheimer disease, explain each step in a process or activity such as applying a blood pressure cuff. A classic symptom is extreme pain or tenderness that is out of proportion to the injury's appearance, but this symptom may be blunted in a patient with neuropathy.3 Correct answer: B In the patient with hemorrhagic shock, coagulopathy can be worsened by hypothermia and is detrimental to coagulation, even in the absence of acidosis, which also reduces the ability to form effective clots. Patients may become hypocalcemic after massive transfusions of blood products owing to binding of calcium by citrate used in anticoagulation of blood products.4 Correct answer: A This patient is exhibiting signs and symptoms of bacterial meningitis, which include high fever, severe headache, photophobia, nuchal rigidity, and mental status changes.

FULL TEXT

These review questions are based on the Emergency Nursing Core Curriculum and other pertinent resources to emergency nursing practice. They offer emergency nurses an opportunity to test their knowledge about their practice.

Questions

1. The nurse is caring for a patient admitted to the emergency department with possible neuroleptic malignant syndrome. Which of the following would be an expected assessment finding in this patent?

2. **A.**Flaccid muscles

3. **B.**Hypothermia

4. **C.**Bradycardia

5. **D.**Diaphoresis

2.

An older patient with mild shortness of breath and fever is brought to the emergency department by their spouse. The spouse states that their partner has Alzheimer disease. While triaging this patient, which of the following would be an appropriate intervention while providing person-centered care to this patient?

•**A.**Avoid direct eye contact.

•**B.**Ask open-ended questions.

•**C.**Give step-by-step instructions while placing the blood pressure cuff.

•**D.**When assessing orientation, correct errors in orientation as they occur.

3.

Which of the following patients presenting to the emergency department with a wound has the highest priority?

•**A.**A 70-year-old farmer with erythema around a tick bite discovered 24 hours ago

•**B.**A 6-year-old child who was bitten on the leg by a dog 3 hours ago

•**C.**A 50-year-old construction worker who stepped on a spike that went through his dirty work boot

•**D.**A 65-year-old patient with diabetes who has erythema and crepitation around a laceration sustained 24 hours ago

4.

In a patient with trauma being treated for hemorrhagic shock, the nurse should plan care to address which of the following problems associated with coagulopathy?

•**A.**Alkalosis

•**B.**Hypothermia

•**C.**Hypocalcemia

•**D.**Hyperkalemia

5.

A patient with diabetes with history of an earache for the past week is brought to the emergency department by family. They report that the patient has suddenly developed a fever and a headache. They also report that the patient is sensitive to light and becoming confused. On the basis of this patient's history and presentation, the nurse would anticipate diagnostic tests for which of the following?

•**A.**Bacterial meningitis

•**B.**Subarachnoid hemorrhage

•**C.**Otitis externa

•**D.**Brain abscess

Answers

1. Correct answer: D

Patients with neuroleptic malignant syndrome present with severe muscle rigidity, hyperthermia, and autonomic central nervous system changes. Diaphoresis, elevated blood pressure, and tachycardia are often seen in early stages of the condition. The severe muscle contraction can lead to elevated serum creatine levels and decreased renal function from myoglobinuria. Neuroleptic malignant syndrome is associated with dopamine antagonist medications or rapid withdrawal of these medications. Interventions are directed at removing the cause as well as providing supportive care to address dehydration, cardiovascular instability, prevention of renal failure, and restoration of normothermia.[1]

1. Correct answer: C

When caring for patients with dementia, such as a patient with Alzheimer disease, explain each step in a process or activity such as applying a blood pressure cuff. Communication with patients with dementia, such as a patient with Alzheimer disease, includes both verbal and nonverbal communication. Nonverbal communication begins with approaching the patient from the front and establishing eye contact; a gentle touch is also appropriate. It is important to avoid open-ended questions because short-term–memory issues may make it difficult for the patient to respond to these types of questions. When assessing orientation, if the patient makes an error, rather than correcting them directly, incorporate this information into your conversation with them.[2]

1. Correct answer: D

All these patients need attention. However, the 65-year-old patient may be exhibiting signs of a necrotizing soft-tissue injury (NSTI). NSTIs need immediate evaluation and treatment because this condition can rapidly progress to sepsis. In addition to antibiotics, NSTIs require surgical debridement. NSTIs are rare, and the initial symptoms may be subtle, but they can result in a deep soft-tissue injury called necrotizing fasciitis. Patients at higher risk are those with comorbidities such as diabetes, immunosuppression, alcoholism, or obesity. A classic symptom is extreme pain or tenderness that is out of proportion to the injury's appearance, but this symptom may be blunted in a patient with neuropathy.[3]

1. Correct answer: B

In the patient with hemorrhagic shock, coagulopathy can be worsened by hypothermia and is detrimental to coagulation, even in the absence of acidosis, which also reduces the ability to form effective clots. Calcium and potassium levels are not associated with coagulopathy. However, these levels should be monitored because alterations in acid-base will affect potassium levels, and administration of blood products may affect calcium levels. Patients may become hypocalcemic after massive transfusions of blood products owing to binding of calcium by citrate used in anticoagulation of blood products.[4]

1. Correct answer: A

This patient is exhibiting signs and symptoms of bacterial meningitis, which include high fever, severe headache, photophobia, nuchal rigidity, and mental status changes. The risk factors include compromised immune system, diabetes, otitis media, and dormitory-style living. In this case, the patient's diabetes contributed to the risk of

bacterial meningitis when the infection invaded the meninges. Subarachnoid hemorrhage would not include a fever. Otitis externa would include external symptoms such as ear drainage but is not associated with neurologic symptoms. Brain abscess can be caused by otitis media, but fever is not always present, and the symptoms are more similar to a space-occupying lesion.[5,6]

DETAILS

Subject:	Emergency medical care; Tenderness; Diabetes; Pain; Communication; Blood products; Calcium; Ear diseases; Meningitis; Abscesses; Eye contact; Fever; Potassium; Core curriculum; Peripheral neuropathy; Dementia; Hypothermia; Answers; Patients; Blood pressure; Dehydration; Erythema; Nursing care; Hemorrhagic shock; Injuries; Bacteria; Alzheimers disease; Kidney diseases; Emergency services
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	331-332
Publication year:	2021
Publication date:	Mar 2021
Section:	Emergency Nursing Review Questions
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2021.01.002
ProQuest document ID:	2498285946

Document URL:	https://www.proquest.com/scholarly-journals/emergency-nursing-review-questions-march-2021/docview/2498285946/se-2?accountid=211160
Copyright:	©2021. Emergency Nurses Association
Last updated:	2021-04-09
Database:	Public Health Database

Document 15 of 61

Commentary on “Prone Positioning of Patients With Coronavirus Disease 2019 Who Are Nonintubated in Hypoxic Respiratory Distress”: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Douglas et al turned 6 patients in acute respiratory failure from supine to prone and reported a mean increase in Pao2 of 69 mm Hg without changing any mechanical ventilation parameters such as tidal volume, oxygen concentration, or pressures.3 There was increasing interest in the maneuver as well as research in the decades to follow, but the studies failed to demonstrate important patient-focused outcomes such as improved survival4 until the 2013 Proning of Severe ARDS Patients (PROSEVA) controlled trial.5 In this randomized trial, Guerin et al5 employed long durations of prone ventilation (16 hours or more) in patients with moderate to severe ARDS to reduce the 28-day mortality from 32.8% in patients in the supine group to 16.0% in those in the prone group, resulting in a 16% absolute risk reduction in mortality (number needed to treat: 6 to save 1 life).Flipped Physiology Prone positioning has multiple beneficial effects for both ventilation and oxygenation. Adopting a prone position results in more homogeneous ventilation, decreases shunting, and improves ventilation and perfusion matching by offloading abdominal and cardiac weight from the lung tissues and by switching the dependent area of infiltrates away from the posterior lung tissues.6 More homogeneous ventilation is thought to also decrease lung injury by distributing mechanical force from the ventilator across the lung during inhalation more evenly.6 Evidence from small observational and retrospective studies suggests that prone positioning in nonintubated patients is feasible and associated with improved oxygenation.7-14 To date, there are no published randomized controlled trials that definitively demonstrate a mortality benefit of prone over supine positioning for awake and spontaneously breathing patients with COVID-19. The work by Wendt et al1 crosses boundaries between being a retrospective observational study and a report of a quality improvement (QI) project. Because of these blurred boundaries, the authors may have been well served to have used established reporting guidelines such as Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)19 or Standards for QUality Improvement Reporting Excellence (SQUIRE).20 These reporting guidelines would have ensured that the authors reported in a consistent manner and would have facilitated future comparisons among similar studies. Some studies describe a 1-hour period, repeated 5 times daily,14 whereas others used “as long as tolerated” durations, which resulted in a median duration of 75 minutes (range 30 minutes-480 minutes).13 Contraindications to proning from the literature include clinical or hemodynamic instability and recent thoracic or abdominal surgery.6 Patients with Do Not Resuscitate orders or advanced directives have been excluded from previous research studies on proning, and clinicians should apply proning as individualized comfort or palliative measures indicate for these patients.6 Be aware that cardiac arrests

do occur in the prone position, they may be more difficult to detect,23 and they

FULL TEXT

The impact of the coronavirus disease (COVID-19) pandemic can be felt in all aspects of life, from the daily, mundane “Did I remember my mask?” to the life-changing loss of friends and loved ones. COVID-19 has also had huge impacts on research, with many of the world’s clinicians and researchers focusing their collective powers on addressing the “once in a century” pandemic. In this edition of the *Journal of Emergency Nursing*, we have an example of the work being done by emergency nurses to address COVID-19. Wendt et al[1] submitted the results of a retrospective chart review to determine what effect a practice improvement protocol had on patients. The practice improvement that they evaluated was the effect that prone positioning had on alert patients with hypoxia with presumed COVID-19 infection. This invited commentary recognizes the authors’ great work, notes some restrictions placed on the authors, and provides additional context to the necessarily short background offered by the authors on prone ventilation.

The Genesis of Proning

The act of placing a patient in the prone position can be straightforward. For example, the recovery position is routinely taught in basic first aid and is widely used by laypersons and emergency nurses alike.[2] Most commonly, these positional maneuvers are used to maintain airway patency or facilitate oral and nasal drainage, but in the care of patients with acute respiratory distress syndrome (ARDS) the maneuver improves oxygenation status. Proning first appeared in the critical care literature in the 1970s. Douglas et al turned 6 patients in acute respiratory failure from supine to prone and reported a mean increase in Pao_2 of 69 mm Hg without changing any mechanical ventilation parameters such as tidal volume, oxygen concentration, or pressures.[3] There was increasing interest in the maneuver as well as research in the decades to follow, but the studies failed to demonstrate important patient-focused outcomes such as improved survival[4] until the 2013 Proning of Severe ARDS Patients (PROSEVA) controlled trial.[5] In this randomized trial, Guerin et al[5] employed long durations of prone ventilation (16 hours or more) in patients with moderate to severe ARDS to reduce the 28-day mortality from 32.8% in patients in the supine group to 16.0% in those in the prone group, resulting in a 16% absolute risk reduction in mortality (number needed to treat: 6 to save 1 life).

Flipped Physiology

Prone positioning has multiple beneficial effects for both ventilation and oxygenation. When a person is in the supine position, the abdominal organs displace the posterior diaphragm superiorly, and the weight of the heart compresses posteriorly, resulting in compression of the posterior lung tissues.[6] During supine ventilation, fluid infiltrates, because of gravity, will collect in the posterior aspects of the lungs, impairing the capacity for gas exchange (commonly referred to as shunting). These combined effects lead to heterogeneous ventilation and increased volumes of inspired air being delivered to the apical and anterior lung regions—areas that receive less of the pulmonary circulation. This results in perfusion of poorly ventilated lung regions and persistent hypoxemia. Adopting a prone position results in more homogeneous ventilation, decreases shunting, and improves ventilation and perfusion matching by offloading abdominal and cardiac weight from the lung tissues and by switching the dependent area of infiltrates away from the posterior lung tissues.[6] More homogeneous ventilation is thought to also decrease lung injury by distributing mechanical force from the ventilator across the lung during inhalation more evenly.[6] Evidence from small observational and retrospective studies suggests that prone positioning in nonintubated patients is feasible and associated with improved oxygenation.[7-14]

To date, there are no published randomized controlled trials that definitively demonstrate a mortality benefit of prone over supine positioning for awake and spontaneously breathing patients with COVID-19. This question has resulted in the registration of multiple investigations on the effectiveness of prone positioning in patients requiring low-flow supplemental oxygen (NCT04383613[15] and NCT04402879[16]) and higher-flow oxygen support (NCT04350723[17] and NCT04543760[18]).

A Pragmatic Look at Proning in an Emergency Department

The research by Wendt et al[1] helps address the question of whether prone ventilation offers similar benefits to patients who are hypoxic yet alert and spontaneously breathing as it does for patients with ARDS who have been mechanically ventilated. This practice improvement initiative makes several important contributions to our knowledge base, using a pragmatic and naturalistic approach. Although many scholars may denigrate pragmatic research, it offers a very important perspective on what an intervention might look like when it occurs “in the real world” without the strict inclusion criteria, resources, and support that randomized trials afford. At the time of this invited commentary, it is only the second study to assess the intervention in the emergency department. And, perhaps more importantly to our readers, this paper discusses an intervention that is nurse-initiated and nurse-led.

The work by Wendt et al[1] crosses boundaries between being a retrospective observational study and a report of a quality improvement (QI) project. Because of these blurred boundaries, the authors may have been well served to have used established reporting guidelines such as Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)[19] or Standards for QUality Improvement Reporting Excellence (SQUIRE).[20] These reporting guidelines would have ensured that the authors reported in a consistent manner and would have facilitated future comparisons among similar studies. Similarly, combining research and QI reporting methods from past pragmatic research studies that use QI methods would improve the comparisons among studies.[21] We would have liked to have seen more complete reporting of the outcomes for patients without COVID-19 who were placed prone, as well as an assessment of how the dispositions of proned and nonproned patients compared. Furthermore, the reported demographics in the study seem skewed—only 13% of the patients were women, and 55% were Hispanic—and it is unknown how accurate the data collection was to begin with because we cannot tell how long the average patient remained prone, at 1 time or cumulatively. Their methods make it difficult to tell if the results are biased, and the authors freely acknowledge this as a significant limitation of their work.

Despite this, the results reported are meaningful, especially for emergency nurses. The work by Wendt et al[1] shows clinically relevant improvements in patient condition (improved oxygen saturation and respiratory markers). Their effort, beyond their results, is important because it offers a framework to aid clinicians in identifying who can benefit from prone positioning and administrators in deciding how to implement a similar initiative. They also provide very valuable insight into an ethnic group that may be experiencing a greater COVID-19 burden of illness. We applaud the authors’ commitment to improving care and their courage to persist when most emergency departments would have stopped “nonessential” activities such as QI work.

Who, How, and When Not to Prone

Although there are differences in the inclusion criteria of the available research on awake proning for suspected COVID-19–related hypoxia, typically those who are eligible will be able to protect their own airway, will require supplemental oxygen, will be hemodynamically stable, oriented, and physically capable of assuming the prone position independently (or with minimal assistance for managing attachments such as intravenous lines and catheters).[7-14]

The procedure for getting patients into the prone position is even less well described, with most studies offering little or no explanation describing how clinical staff (presumably nurses) executed the maneuver. The number of staff cited varies from 2 to 5.[22] We instruct our colleagues in the following manner. Preparation for the maneuver requires access to rescue equipment and personnel, physiological monitoring equipment, sufficient oxygen tubing length, and adequate pillows and blankets for positioning. Planning for a period of increased surveillance after the position change is prudent, and having predetermined thresholds for when to turn back and what rescue therapies would be employed is essential. In our experience, a few degrees of reverse Trendelenburg is helpful for patient comfort, and patients who are larger benefit from an inpatient hospital bed with a footboard instead of an ED stretcher if they slide. Our patients have required as many as 5 pillows and as few as 1 pillow to achieve positional comfort, which is the most commonly reported reason for the intervention’s failure.[13] The duration of proning used in the studies is also highly variable and not well reported. Unlike the critical care ARDS literature where the patient was dependent on nurses for position changes, awake patients may change position ad lib or have intervals where position changes are requested by clinical staff. Some studies describe a 1-hour period, repeated 5 times daily,[14] whereas others used

“as long as tolerated” durations, which resulted in a median duration of 75 minutes (range 30 minutes-480 minutes).[13]

Contraindications to proning from the literature include clinical or hemodynamic instability and recent thoracic or abdominal surgery.[6] Patients with Do Not Resuscitate orders or advanced directives have been excluded from previous research studies on proning, and clinicians should apply proning as individualized comfort or palliative measures indicate for these patients.[6] Be aware that cardiac arrests do occur in the prone position, they may be more difficult to detect,[23] and they will require a plan to initiate resuscitation that may or may not include immediately rolling them supine.[24] We recognize that this is an emerging field of research and that clinical practice will be largely dictated by local governance and judgment.

Despite the decades of work that has gone into assessing the benefit of prone positioning for patients with moderate to severe ARDS, there is comparatively little to support the routine use of prone positioning for patients with early hypoxemia. There is likely a strong physiological rationale for the earlier use of prone positioning, and the demands of the COVID-19 pandemic have brought the importance of answering these questions to the forefront. Wendt et al[1] have recognized the importance of answering these questions and have offered insight into what effect it can have. This invited commentary recognizes that the work of Wendt et al[1] is evaluating the important role that emergency nurses play in recognizing and responding to clinical deterioration while recording, analyzing, and disseminating their experience for the benefit of patients and clinicians alike.

DETAILS

Subject:	Emergency medical care; Quality management; Ventilators; Clinical standards; Mortality; Epidemiology; Abdominal surgery; Hypoxia; Number needed to treat; Oxygen; Prone; Abdomen; Palliative care; Do not resuscitate orders; Breathing; Nurses; Advance directives; COVID-19; Positioning; Patients; Artificial respiration; Pandemics; Surgery; Medical research; Individualized; Parameters; Myocardial infarction; Physiology; Coronaviruses; Injuries; Critical care; Psychological distress; Hemodynamics; Clinical trials; Observational studies
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	214-217
Publication year:	2021
Publication date:	Mar 2021
Section:	Invited Commentary
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia

Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Commentary
DOI:	https://doi.org/10.1016/j.jen.2021.01.003
ProQuest document ID:	2498285944
Document URL:	https://www.proquest.com/scholarly-journals/commentary-on-prone-positioning-patients-with/docview/2498285944/se-2?accountid=211160

Copyright:	©2021. Emergency Nurse s Association

Last updated:	2023-08-23
Database:	Public Health Database

The Emergency Nurses Association: 50 Years of Advocacy and Advancement: JEN

ProQuest document link

ABSTRACT (ENGLISH)

To commemorate the 50th anniversary of the Emergency Nurses Association, this article describes the 3 most enduring and impactful policy initiatives in the organization's history. These initiatives were identified through a comprehensive review of the articles published in the *Journal of Emergency Nursing* as well as in other publications of the Emergency Nurses Association, including position statements and press releases. The top 3 policy issues throughout the Emergency Nurses Association's history were identified as provision of care for vulnerable populations, trauma and injury prevention, and patient quality and safety. The Emergency Nurses Association also worked hard to professionalize emergency nursing within the realms of nursing and emergency services during the first half of its history, and since then the Emergency Nurses Association has promoted issues related to the emergency nursing workforce and to ensuring a safe and sustainable environment in which nurses practice. This article includes critical constructs such as the professionalization of emergency nursing; advocating for vulnerable populations such as children, older adults, and people experiencing sexual violence or human trafficking; improvements in trauma care and injury prevention; promoting quality and safety through nursing certifications, efficient and accurate nurse triage, and disseminating best practices in evidence-based care; and supporting the

nursing workforce by championing issues such as workplace violence, ED crowding, and healthy work environments.

FULL TEXT

Introduction

The year 2020 was a historic year for nursing. This year was globally recognized as the Year of the Nurse and Midwife; it was the year of the historic coronavirus disease 2019 (COVID-19) pandemic; and it also marked the 50th anniversary of the Emergency Nurses Association (ENA). The mission of the ENA is "to advance excellence in emergency nursing," and it does so through a variety of initiatives and organizational beliefs.[1] The ENA is committed to collaborating with other health care partners; promoting compassion in emergency nursing; embracing diversity and inclusivity; promoting excellent, high-quality patient and nursing standards; and fostering a culture of inquiry and lifelong learning among its thousands of members worldwide.[1]

As part of this celebration of the ENA and emergency nurses, the ENA commissioned this review of the *Journal of Emergency Nursing* (*JEN*) to highlight some of ENA's most important contributions to nursing and health care over its 50-year history. The purpose of this article was to identify and analyze the publications that have informed the top 3 policy initiatives of enduring and ongoing impact over the 50-year history of the ENA. The objectives were as follows: (1) to identify the top 3 policy initiatives, (2) to analyze these initiatives using a historical framework within the context of their relative importance at the time of ENA's development, and (3) to discover how these initiatives have shaped emergency nursing and health policy over time.

Methods

A combination of qualitative and historical methods was used to identify and analyze ENA's top policy initiatives over the past 50 years. Qualitative methods were used to identify the content areas most frequently published in *JEN* after a comprehensive review of the journal's publications, and historical methods were used to describe and analyze these results within the appropriate historical context over time.[2] The authors of this manuscript were provided with a comprehensive list of every article published in *JEN* since its inception in 1975[3] through articles published in 2019, totaling 4883 articles. The authors were selected because of their extensive experience in historical research and emergency nursing. Together, the authors have more than 40 years of experience in emergency nursing, and both are published nurse historians. One author has been a member of the ENA since 1988 and is a Fellow in the Academy of Emergency Nursing.

Initially, the authors used deductive coding to jointly create a list of codes on the basis of their knowledge of emergency nursing and the ENA. As each article was assessed, the code book evolved with additional codes added as needed during the article review processes. The authors coded collaboratively for 2 hours, covering dozens of articles to develop these codes and establish interrater reliability. The 2 authors discussed each code and how it would be applied to ensure consistency between the reviewers during the coding process. The remaining articles were divided equally between the 2 authors, with 1 author coding articles from 1975 to 1999 and the other coding articles from 2000 to 2019. These codes were organized using a standard electronic spreadsheet containing the title of the article, year published, number of citations, assigned code(s), and any additional notes. During and after the coding process, each author noted articles for full review that would be potentially relevant to the purpose and objectives of this manuscript. Each article was coded with a maximum of 3 codes per article. Codes were applied on the basis of the title of the article. For titles that were ambiguous, abstracts were reviewed to more accurately code the articles. The authors also examined the subject matter of the top 10 most highly cited articles in each decade. This process resulted in 33 codes. The implications for policy of the most frequent and consistent codes were assessed after the coding process. The codes were reorganized, and similar categories were combined into broader themes, resulting in 27 categories reflecting the data. For example, the "Self-Care/Safety" and "ER RN Workforce" codes were collapsed together to form "Nursing Workforce." Once all articles were coded, the total number of codes per category were calculated ([Table]). The authors identified the top 3 most enduring and impactful policy initiatives from the codes with the highest frequency. In addition, 2 highly impactful initiatives that were relevant during the first

and second halves of the 50-year history of the ENA were also included.

The 2009 Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were used when appropriate while refining the sources for inclusion (Supplementary Figure).[4] A total of 354 of the 4883 articles did not fit into any category and were excluded. Articles that were not within the identified top policy areas and articles within the appropriate content area but not relevant to policy or the historical analysis were also excluded. This left 59 articles for the final analysis. An additional 49 sources were included from ENA policy statements, resolutions, practice guidelines, and other publications; ENA archival sources; relevant state and federal legislation; published white papers; ENA General Assembly resolutions; and other relevant documents.

The authors manually reviewed the identified articles and included additional articles that may be relevant given the selected initiatives. Articles from 1970 to 1981 that were not available online or in the authors' libraries were requested from the ENA. The review was somewhat limited, however, owing to archives and libraries being closed because of the COVID-19 pandemic during the research period. The authors reviewed the full texts of these selected articles as primary source information, and additional sources were evaluated to analyze these initiatives within an appropriate historical context. The first 3 boxes of ENA historical archives were accessed during a previous historical review and contributed to this work.

The purpose of this article was to identify and analyze the 3 most enduring and impactful policy initiatives that the ENA has championed in its 50-year history. An initiative was considered to be enduring if it was consistently present within the journal over its 50-year history and has continued to have implications for policy on a national (and sometimes international) level. The impact of an initiative was evaluated on the basis of its ability to influence nursing practice or policy through legislation, position statements, collaboration with other professional organizations, or practice changes. Both of these factors were considered when identifying the top 3 initiatives.

Ethical Considerations

This study used historical research and was a review of publicly available publications and documents. This was not reviewed by an institutional review board because this type of research does not constitute human subjects research.

Results

The Table shows the results of the review of the articles published in *JEN* since its inception. "Special Populations" articles included content related to pediatrics, geriatrics, and people experiencing intimate partner violence or human trafficking. "Professional Development" included articles such as review questions for the Certified Emergency Nurse (CEN) examination, clinical practice guidelines, practice updates, or other articles with the intention of informing the reader on the assessment, management, or treatment of a particular illness or injury. Articles coded with "Nursing Workforce" had content related to compassion fatigue, burnout, staffing challenges, workplace violence, or nurse safety and well-being. The "Education" category referred to articles describing nurse or health provider training, education, or orientation. "Environment of Care," which was more frequent during the last 20 years, described articles regarding the physical space and issues such as boarding patients, crowding, moving patients through the emergency department, and patient satisfaction. "International" referred to articles written by United States–based nurses providing humanitarian aid abroad or articles written about emergency nursing abroad.

After the review, the top 3 most enduring and impactful policy initiatives were identified as the provision of care for vulnerable populations, trauma care and injury prevention, and patient quality and safety. These were selected from the top 6 most frequently used codes. The codes "Professional Development," "Case Studies," and "Medical" were excluded because these types of articles did not have any direct relevance to policy. The development and impact of the selected initiatives will be further explored in the following section and are presented in order on the basis of their frequency of appearance in the literature review. In addition to the 3 policy initiatives, 2 additional ENA initiatives were included as highly impactful but not enduring. The ENA led the charge to professionalize emergency nursing within the realms of nursing and emergency services during the first half of its history, and since then the ENA has promoted issues related to the emergency nursing workforce, ensuring a safe and sustainable environment in which nurses practice. Although professionalization and workforce support did not meet the criteria for enduring policy

initiatives, these topics were some of the most highly impactful during the first and second halves, respectively, of ENA's history. The professionalization of emergency nursing is discussed first because it lays a foundation on which the other policy initiatives have been founded. This is followed by the discussion of the top 3 policy initiatives identified (the provision of care for vulnerable populations, trauma care and injury prevention, and patient quality and safety). Finally, ENA's recent role in addressing emergency nursing workforce concerns is discussed.

Discussion Professionalization of Emergency Nursing

Throughout the mid-20th century, emergency care gained recognition and attention as a necessary part of the US health care system, with hospitals establishing emergency rooms and physicians receiving special training in the care of emergencies. After World War II, physicians began to specialize beyond medicine or surgery, and the supply of general practitioners declined.[5] The 1960s and 1970s were decades of rapid growth toward modern-day emergency services. The 1966 National Highway Safety Act helped to address emergency service improvement and included funding for first responder training courses, spawning modern-day prehospital providers. The American College of Emergency Physicians (ACEP) was formed in 1968 with 2 primary goals: (1) recognize emergency medicine as a specialty, and (2) develop and establish emergency medicine residency programs. The Emergency Department Nurses Association (EDNA) was formed 2 years later as a voice and platform for emergency nursing advocacy and education. When the EDNA was formed in 1970, emergency medical services (EMS) in most communities were lacking or inefficient.[6] To address this need, with the support of the newly formed EDNA, the Emergency Medical Service Systems Act of 1973 provided funding to develop comprehensive EMS systems.[7] Under this act, approximately 4000 nurses were trained, some of them as advanced practice nurses specializing in emergency care.[7]

With the expansion and organization of professional emergency services, demand for these services increased, although patients were seeking nonurgent health care services just as often as emergency services. The 1965 Medicare and Medicaid amendments to the Social Security Act provided health services for older adults and the poor by providing co-payments for their care to hospitals (House Resolution 6675).[8] In the 1970s, approximately half of all patients presenting to emergency departments were using the emergency department as an outpatient care facility[9] because many physicians in private practice did not accept government insurance, and the emergency department was available during off-hours when private practice was closed.[10] However, when Americans went to the emergency department, they often found a nurse rather than a physician as the frontline provider. Finke in 1975 stated, "The demands placed upon emergency departments today as primary care and emergency care facilities mean that to treat the emergency patient as a total person, emergency nurses must be trained as an emergency nurse practitioner, to work in unobstructed cooperation with physicians."[11] It was clear that emergency nurses would need specialized training beyond what hospital nurses typically received owing to the comparative independence and autonomy that nurses experienced in early emergency departments. The first nursing core curriculum skills list included interpretation of laboratory results and x-rays and other skills and decisions normally relegated to physicians, but nurses were performing these skills in the emergency department.[12] Advanced training programs specializing in emergency nursing varied from several months of education in certificate programs to graduate-level programs.[13] Emergency medical technicians functioned as an extension of the emergency department.[5] The 1975 position paper "Roles, Responsibilities and Relationship of EDNA to Emergency Medical Technicians and the System of Prehospital Emergency Care" reflected the EDNA's commitment to the entire emergency health services system.[14] By the early 1980s, emergency medical technicians often supplemented the nursing staff in hospital emergency departments rather than responding to emergency calls in the community.[15]

As the necessity for emergency services continued to grow with more and more nurses and other assistive personnel working in this environment, the ENA further delineated the role of the emergency nurse in the 1994 position statement, "Role of the Emergency Nurse in the Clinical Setting": "Although the primary role of the emergency nurse will continue to be the delivery of direct patient care, increasing emphasis will be placed on coordination and facilitation of care and direction of assistive personnel."[16] In 2011, emergency nursing was formally recognized as a nursing specialty by the American Nurses Association (ANA), and the ANA approved the

"Emergency Nursing Scope and Standards of Practice."[17] The formation of the EDNA, later changed to the ENA in 1985, was critical to the establishment and advancement of emergency nursing as a recognized nursing specialty. The EDNA's early commitment to nursing education, political advocacy, and recognition created a firm foundation on which the ENA has been able to expand its reach, relevancy, and impact for nurses and their patients.

Provision of Care for Vulnerable Populations

In this analysis, the most commonly applied code was "Special Populations," reflecting a strong commitment toward improving care for those most requiring unique attention. These vulnerable groups included children, older adults, and people experiencing sexual violence or human trafficking, among others. Although the ENA has focused on addressing concerns for several special populations, it has also stressed that nurses should stay current on best practices to ensure that all patients receive the best care possible.[18]

Pediatrics

Articles related to the care of pediatric patients have featured prominently in *JEN* throughout its history. Pieces such as "The Preschooler in the Emergency Department," "Salicylate Poisoning in Children," and "Transporting High-Risk Infants" provided timely education to emergency nurses caring for children.[19-21] The number of publications related to pediatric emergency nursing increased dramatically in the 1980s, no doubt owing to nursing recognizing the need for special care for this vulnerable group. In 1987, the ENA created several special interest groups, 1 of which was focused on pediatrics. The goal of this group was to promote pediatric emergency nursing through pediatric programming at the scientific assembly and a list of experts who could be consulted.[22] To increase the competence and confidence of emergency nurses in pediatric care, a special course that focused on the assessment, treatment, and management of pediatric patients was created in 1993.[23] The Emergency Nursing Pediatric Course was initially released in the US, but quickly spread internationally to Australia, New Zealand, and beyond.[23]

The ENA has a long history of collaboration with other organizations vested in the safe care of pediatric patients. For example, "Guidelines for Pediatric Equipment and Supplies for Emergency Departments" was copublished with the National Emergency Medical Services for Children Resource Alliance.[24] Since 2001, the ENA has worked alongside the American Academy of Pediatrics and the ACEP on several joint policy statements promoting the health and safety of children. In 2001, the ENA joined the American Academy of Pediatrics and the ACEP as coauthor of a revision to a joint policy statement—"Guidelines for Care of Children in the Emergency Department"—and has been a part of each revision since then.[25,26] These 3 organizations worked together again in 2014 to create the "Death of a Child in the ED" policy statement[27] and in 2015 to coauthor 2 technical reports on "Patient- and Family-Centered Care" and "Best Practices in Patient Flow for Pediatric Patients in the Emergency Department."[28,29] More recent position statements have focused on "Child Passenger Safety in the United States" and "Pediatric Readiness in the ED."[30,31] The ENA adopted the "Weighing Pediatric Patients in Kilograms" position statement in 2012, to improve safety when administering medications to pediatric patients.[32] As ED crowding and boarding of intensive care unit (ICU) patients in the emergency department has increased, a call for action was issued in March 2020 to address best practices for boarding pediatric patients in the emergency department.[33] Through promoting new research, education, practice guidelines, and political advocacy, the ENA has been a strong voice for pediatric emergency care.

Older Adults

As the US population continues to age and seek care in the emergency department, older adults are a population at high risk of morbidity and mortality. In 1981, a team of researchers sampled EDNA members to assess emergency nurse perceptions on the use of the department by the older population and about their preparation to meet the needs of older adults in the department. Emergency nurses felt that their nursing programs did not adequately prepare them to care for older adults in the emergency department.[34] Throughout its history, *JEN* has continued to disseminate best practices for caring for older adults on critical topics such as triage, assessment, medication safety, pain management, appropriate trauma care, disaster planning, and managing aggressive behavior. A decade after the launch of the Emergency Nursing Pediatric Course, the first Geriatric Emergency Nurse Education program was offered in 2004, addressing the needs of the older population. ENA's activism continued through adopting the

"Specialty Nursing Association Global Vision Statement on Care of Older Adults" in 2011.[35,36] When considering trauma care and injury prevention, the ENA created the Thoughtful Adults Keep Enlightened care program. It covered medication interactions, alcohol use, doctor/patient relationships, and highway safety concerns for older adults (alcohol use and driving, safety belts, and pedestrian safety).[37] Through education and injury prevention efforts, the ENA has been an advocate for best practices in the care of older adults in the emergency department.

People Experiencing Sexual Assault

As early as 1978, the ENA was educating nurses on the complexities of caring for people who experienced a sexual assault. The article by Moynihan and Coughlin[38] shared Yale New Haven Hospital's model program developed in 1974 to provide comprehensive care (medical, emotional, and legal) to victims of sexual assault. A 1991 article detailing the roles and responsibilities of a sexual assault nurse examiner (SANE) prompted members to request more information, and the journal started a resource list of sexual assault programs with a description of each.[39] In 2001, the ENA published highlights from the inaugural National Sexual Assault Response Team Training Conference.[40] In 2010, the ENA authored a position statement on "Sexual Assault and Rape Victims" to guide emergency nurses caring for this specialty group.[41] This statement was updated in 2016 to include adolescent victims of sexual assault and continues to advocate for specially trained SANE nurses to provide the highly specialized care needed for this vulnerable population.[42] In 2019, only 20% of the acute care hospitals had SANE programs, and the ENA has continued to advocate for legislation and support of training programs to increase the number of SANE nurses to care for victims of sexual assault.[43] The May 2020 *JEN* issue was themed "Forensic and Interpersonal Violence," highlighting problem solving and improvements to screening for interpersonal violence, treatment of the victim of sexual assault, and evidence collection, demonstrating a continued commitment to educate emergency nurses to care for these victims.[44]

People Experiencing Human Trafficking

Recently, emergency departments across the US started implementing assessment and screening programs to help recognize and rescue people experiencing human trafficking. Peters educated nurses on human trafficking and encouraged them to "become actively involved at the legislative level by joining a state or national organization dedicated to ending (modern) slavery."[45] The ENA continued to inform and educate emergency nurses on this topic. In 2016, the ENA released the position statement "Human Trafficking Patient Awareness in the Emergency Department Setting" to address the emergency nurse's critical role in recognizing, stabilizing, and referring people who are trafficked to appropriate community resources.[46] ENA's publications continue to educate nurses on signs of human trafficking, techniques to approach victims, and resources to help them, providing emergency nurses with the tools to support people experiencing human trafficking, intimate partner violence, and sexual assault.[47] Education and increased awareness programs for emergency nurses include topics such as sex trafficking, labor trafficking, and domestic servitude,[48] and they empower nurses to take a stand for this special population.

Trauma Care and Injury Prevention

The prevention and treatment of trauma have always been, and will mostly likely continue to be, top priorities for emergency nursing. It was in the setting of a US nationwide focus on trauma that the precursor to the ENA, the EDNA, was formed with a focus on the education of emergency nurses. In 1966, the National Academy of Sciences published a white paper entitled "Accidental Death and Disability: The Neglected Disease of Modern Society," kickstarting a decades-long movement to prevent and improve morbidity and mortality from traumatic injuries.[49] The EDNA collaborated with multiple organizations, including the American Academy of Orthopedic Surgeons and the American College of Surgeons Committee on Trauma (ACSCT) to develop innovative ways of addressing this public health crisis.[23] The first convention, "Challenge to Change: Chimera or Commitment," in 1972, was in collaboration with the University of the State of New York and the ACSCT.[23] However, trauma continued to be the leading cause of premature death in the first 3 decades of life throughout the 1970s.[50] Early guidance in 1976 by the ACSCT provided a list of essential items required to care for patients with trauma,[50] and in 1978 the American College of Surgeons piloted the first Advanced Trauma Life Support course and launched it nationally in 1980.[51] Although initially concerned with physician education, the American College of Surgeons recognized that nursing was a critical

link in the chain of survival for patients with trauma. Emergency nurses were invited to participate in a pilot of a physician-nurse Advanced Trauma Life Support course in Maine in 1982.[50]

Seeing a need for trauma education specific to nursing, the ENA developed the trauma committee with an initial charge to develop a trauma course specifically for nurses. As a result, the first Trauma Nursing Core Course (TNCC) was delivered in 1986.[52] This course, disseminated throughout the US in 1987,[53] prepared all nurses to work with patients with trauma using a systematic approach. By 1992, the ENA was piloting TNCC internationally in Australia and Canada.[23]

The ENA continued to prioritize trauma care throughout the 1990s, revising its guidelines as the science advanced and forming partnerships and interest groups around improving trauma care.[54,55] In 1990, the Trauma Care System Act appropriated $5 million for trauma system development. A new framework, the Model Trauma Care System, was developed to create statewide integrated trauma care systems, with the ENA providing input and reviewing the initial draft.[56] The ENA led emergency nursing education in trauma care through courses, publications, and sessions at each annual conference. After the success of the TNCC, the ENA developed the Course in Advanced Trauma Nursing to teach beyond the basics of trauma care. It debuted in 1995, the same year that the ENA produced the *International Journal of Trauma Nursing*.[23] This journal informed nurses caring for patients with trauma until 2002, when the title changed to *Disaster Management and Response* after the 9/11 terrorist attacks. The journal was retired in December 2007, and its content topics transitioned back to *JEN*.

Although nursing has always been at the forefront of providing quality care to patients who are hospitalized, nursing also recognizes the power of preventing illness and injury. As such, the ENA has always promoted injury prevention as an important aspect of trauma care. Even the 1975 position paper on “Emergency Medical Services Problems, Programs and Policies” discussed the role of emergency nurses and physicians in providing prevention measures to consumers.[57] The ENA’s Government Affairs Standing Committee (established in 1988) helped support topics critical to injury prevention, including the Brady Bill and legislation for mandatory use of seat belts and motorcycle helmets, ED violence, firearm safety, domestic and violent crime, and trauma-funding reauthorization.[23] The ENA assumed responsibility for Emergency Nurses Cancel Alcohol Related Emergencies, Inc, in 1995 to further public education for injury prevention. Initially founded to prevent alcohol-related injuries, the ENA rebranded it into Emergency Nurses Care to encompass all aspects of injury prevention.[23] The name was later changed to the ENA Institute for Injury Prevention in 1999, highlighting issues such as firearm safety, car safety, and bicycle safety.[58]

In 2006, the ENA Institute for Injury Prevention released the National Scorecard on State Highway Laws to reach lawmakers on 5 key issues: a primary enforcement seat belt law, a child passenger safety law, graduated driver licensing, a universal/all-rider motorcycle helmet law, and the establishment of statewide trauma systems for injury response.[59] ENA’s resources complemented the National Scorecard on State Highway Laws with the “Injury Prevention” position statement, the “Injury Prevention/ENCARE (Emergency Nurses Cancel Alcohol Related Emergencies)” program, the “Choices for Living” safe driving education program, and fact sheets on child passenger safety and car seat use.[60] In 2010, the blueprint was revised to advocate for transformative public policy initiatives alongside complementary resources for members. This included position statements on motor vehicle safety; motor vehicle occupant protection; a new alcohol screening toolkit (Screening, Brief Intervention, and Referral to Treatment [SBIRT]); and *The Washington Update,* ENA’s e-newsletter on legislative and regulatory issues of concern.[61] This blueprint provided advocacy guidance for ENA state councils, chapters, and members to create an impact on public policy in their respective states. Starting in 2008, the ENA developed a health care reform platform to evaluate and address congressional health care reform proposals.[62] Two new laws in 2010 supported many of ENA’s priorities, including regionalization of trauma care systems and financial support for trauma centers. Eventually, the Institute for Injury Prevention was combined with the Institute for Quality and Patient Safety to form the Institute for Quality, Safety and Injury Prevention.

Most recently, the ENA supported the “Stop the Bleed” national campaign to educate the public on actions to control a bleeding emergency.[63] In 2018, the ENA approved “The Role of the Emergency Nurse in Injury Prevention,” followed by “Firearm Safety and Injury Prevention and Trauma Nursing Education” in 2019,[63-65] continuing its

tradition as a leader in injury prevention and quality trauma care. The ENA promotes injury prevention through education of the public, media, and state and national legislators. The organization's persistence and progress, measured through its educational programs and legislative successes, have made trauma care and injury prevention 1 of the most enduring and impactful legacies of the organization.

Patient Quality and Safety

Since the formation of the EDNA, defining and implementing a high standard of quality emergency care has been foundational to the organization's mission.[66] Over time, however, this goal has changed on the basis of the state of the specialty and needs of the patients. The ENA has advanced patient quality and safety in 3 major ways throughout its history: professional development of nurses through education and certification, defining and standardizing the role of triage, and supporting and disseminating best practices in emergency nursing.

Professional Development and Certification

ENA's founders, Anita Dorr and Judith Kelleher, recognized emergency nursing practice to be distinct from other types of hospital nursing practice, and as such nurses required specific education and training to be competent. Nurses with specialized training, education, and experience would be crucial to ensure patient quality and safety in the emergency department. The ENA and *JEN* have curated hundreds of different opportunities for nursing professional development through ENA's conferences; continuing education offerings; specialty courses in pediatrics, trauma, and geriatrics; and thousands of journal articles related to emergency nursing practice and proficiency. Kelleher also realized the value of recognizing those nurses who showed competency in emergency nursing through certification.[67] In an article published in the first year of *JEN*, the EDNA identified the need to develop a standard curriculum and certification for emergency nurses to improve knowledge, competency, and health care delivery in the emergency department.[68] The dues were increased by $10 to help raise funds for the certification examination; however, with costs estimated to be nearly half a million dollars, the EDNA was not able to raise enough funds for the examination at that time.[69,70] The certification initiative was revisited in September 1978, with the formation of a separate committee on certification in the summer of 1979. In 1980, the committee established an organization with the sole focus of implementing and maintaining the emergency nursing certification examination. The first CEN examination was given less than 1 year later, in July 1980, to more than 1000 emergency nurses. By September 1983, there were more than 7800 CENs.[70] Although not the first specialty certification in nursing, the CEN examination is the certification for emergency nursing worldwide, with more than 39 000 nurses who hold the specialty certification.[71] In addition, certifications are available for pediatrics, flight nursing, critical care ground transportation, and trauma nursing.[71]

Triage

Nursing has long accepted patient assessment as a foundational aspect of the profession, especially in the emergency care setting. Emergency nurses have always required efficient, accurate assessment skills, especially in those responsible for triage. Appropriate triage is one of the most critical decisions an emergency nurse makes that can influence patient care quality and outcomes. Overtriage can divert necessary resources from more acute patients, and undertriage can result in a dangerous delay of care or underestimation of illness severity. Since the beginning of the ENA, nurses have recognized the importance of a quick, accurate assessment. In 1976, an article described an outline of a rapid (90-second) head-to-toe assessment.[72] Triage nurses were expected to be able to accurately assess a patient's needs as emergent, urgent, and nonemergent, and to refer nonemergent cases to other hospital departments or community resources.[73] By 1979, there were 5 types of triage identified in the literature: nonprofessional, basic, advanced, physician, and team. Triage could be performed by a variety of people, from unlicensed personnel using a book to guide decision-making to physicians or a team of a nurse and a physician.[74] Tips for triage at this time included providing patient privacy and stressed the importance of a focused, nonjudgmental initial interview with the patient about their presenting complaints.[75]

As emergency departments continued to see increasing numbers of patients with both acute and nonacute needs, appropriate triage became a critical piece of an emergency nurse's role; however, processes continued to vary widely. Some emergency departments would refuse to treat or evaluate patients without insurance or even those

with insurance who had a contract with a different hospital, often referred to as “patient dumping.” In response to this unsafe and highly unethical practice, the federal government implemented the Emergency Medical Treatment and Active Labor Act in 1986, essentially requiring that all hospitals that receive federal dollars provide medical screening and stabilization for all patients seeking care.[76] This legislation created universal access to health care for the first time in the US and a huge win for patient quality and safety. That same year, *JEN* started a column entitled “Triage Decisions” in recognition of the importance of triage in emergency nursing.[77] In early 1989, *JEN* published an article educating nurses on how best to comply with these new standards and condemning “financial triage,” where patients would be asked to provide a deposit before seeing a physician.[78]

Triage had become a fundamental and unique piece of emergency nursing. The ENA *Standards of Emergency Nursing Practice, 2nd Edition,* published in 1994, included triage as a standard. Standard VII describes the importance of an emergency nurse triaging all patients to prioritize patient care on the basis of physical, psychological, and social needs.[79] The development, validation, and adaptation of 5-level triage systems such as the Emergency Severity Index (ESI) or the Canadian Emergency Department Triage and Acuity Scale throughout the early 2000s helped standardize triage assessment across the US and around the world.[80,81] In 2010, and revised in 2011 and 2018, the ENA released the “Triage Qualifications and Competencies” position statement, advising that triage nurses have specific experience, training, and evaluation of their triage skills to ensure triage is performed safely, appropriately, and efficiently.[82] In 2019, the ENA acquired the ESI, the most widely used 5-level triage program, promoting the ESI course and offering free triage resources to emergency nurses.[83]

Supporting Evidence-Based Practice

As nursing research has grown in recent years, so have the number and variety of research and quality improvement projects in emergency nursing. Today, evidence-based practice drives practice changes that improve quality and patient safety; however, this is a relatively new phenomenon for emergency nursing. For the first 30 years of *JEN*, only 2% to 4% of the published articles were related to patient quality and safety; however, this jumped to 12% to 13% in the most recent 20 years, with more nurse researchers, more nurses with bachelor’s degrees in the workforce, and a greater national focus on patient safety and quality in health care. From Dorr’s invention of the “crash cart” in her garage in 1967[84] to innovating solutions to the challenges of today’s complex health care system, emergency nurses have created unique solutions to pressing clinical challenges. In the 1990s, research published in *JEN* paved the way in best practices related to family presence during cardiopulmonary resuscitation,[85,86] leading to the publication of an ENA position statement advocating for family presence during resuscitation[87] and an eventual clinical practice guideline, “Family Presence During Invasive Procedures and Resuscitation.”[88] Dozens of other practice guidelines and improvements, including the use of capnography, difficult intravenous access, intimate partner violence screening, orthostatic vital signs, preventing blood culture contamination, and many others were developed.[89,90] These clinical practice guidelines guide emergency nurses and educators to perform nursing duties at the highest standard available. Although the ENA has supported dozens of policy and practice initiatives to improve quality and safety, the authors have chosen to spotlight psychiatric care in the emergency department as 1 example.

Providing quality psychiatric care in emergency departments has been challenging because most emergency departments were designed to provide care for physical emergencies, not necessarily psychiatric emergencies. In the 1970s and ’80s, articles published by *JEN* primarily focused on proper psychiatric assessment and tips for providing care for a patient with suicidal ideation, overdoses, and/or substance abuse, often focusing on the medical aspects of their psychiatric crisis. In the 1990s, emergency nursing began exploring different models for providing psychiatric care, including dedicated crisis teams or specially trained psychiatric nurses in the emergency department.[91,92] As community funding for mental health decreased in communities across the US, emergency departments were often the only access point for care, especially for those without private health insurance coverage.[93] As the volume and complexity of patients with psychiatric illness seeking emergency care increased, emergency nurses and the ENA recognized the need for continued improvements in the quality of care for this population. In 2007, the ENA assembled the Psychiatric Patients Work Team to formulate public policy

recommendations to improve care of ED patients with mental or psychiatric illness. This group advocated for improvements in standardizing guidelines for practice, emergency nursing education, and workforce development, specifically for patients with psychiatric illness, developing systems of community collaboration, and advocating for improved safety and security for patients and ED staff.[94] The ENA also advocated for implementing SBIRT programs throughout emergency departments in the US and cosponsored a national conference.[95] The ENA developed a joint position paper with the International Nurses Society on Addictions, supporting SBIRT programs in emergency departments in 2013 and advocating for nurses to deliver SBIRT programs to decrease the prevalence of alcohol use disorders across the lifespan.[96]

Emergency Nursing Workforce

The ENA has always been dedicated to supporting the emergency nursing workforce; however, in recent decades, this role has shifted from establishing and professionalizing emergency nursing to maintaining an adequate workforce and advocating for safe and sustainable working conditions. For example, most recently, owing to the COVID-19 pandemic, the ENA provided timely educational opportunities and wrote letters to the US Congress advocating for critical personal protective equipment for frontline health care workers, encouraging a substantial public health response to ensure that emergency nurses have the tools they need to protect themselves and their patients.[97] Over the last 25 years, the ENA has advocated for promoting professional resilience, decreasing workplace violence for emergency nurses, and finding creative solutions for crowded emergency departments.

Workplace Violence

Workplace violence in the emergency department has been a concern of the ENA since the early 1990s. A highly cited study published in 2002 revealed that 100% and 82.1% of the emergency nurses surveyed reported experiencing verbal or physical assault, respectively, within the last year.[98] The ENA first developed a position statement about violence in the workplace in 1991 and has revised this statement every 3 to 5 years to reflect the current health care environment. In the statement “Violence in the Emergency Care Setting,” the ENA stated that health care organizations have a responsibility to provide safe environments, and emergency nurses have the right to protect themselves and their patients from violence.[99] The ENA is not the only nursing organization that has concerns about workplace violence against nurses; it has collaborated with other organizations, including the International Council of Nurses and the ANA, to advocate for safe workplaces for nurses and other health care workers. The ENA and the International Council of Nurses have offered proactive guidelines for the protection of staff within the departments, such as mandatory incident reporting, tracking assaults, reviewing the security team’s responsibility, and consistent incident follow-up from leadership.[99]

During the late 2000s, the ENA promoted advocacy for laws to make injuring a health care worker a significant offense.[100] In many cases, these episodes of violence are now considered a felony. A resolution entitled “Supporting Felony Criminal Penalties for Assaults against Emergency Healthcare Workers” was introduced at the 2010 ENA General Assembly, empowering the ENA at the national and state council levels to support felony legislation as a recourse for violence in the emergency department. For example, the Virginia ENA chapter advocated for harsher penalties for people committing violence against health care workers, ultimately resulting in a new law enacted in mid-2011 that “is one of the first workplace violence laws that carries mandatory jail time.”[101]

Professional Resilience

Emergency nurses are often on the front lines of a community crisis, including potentially traumatic events such as natural disasters, mass shootings, terrorist attacks, mass casualty scenarios, and pandemics, which can cause significant psychological stress.[102] Work stress among emergency nurses is associated with symptoms of posttraumatic stress disorder,[103] burnout, and compassion fatigue.[104] Because of an emergency nurse’s high exposure to potentially traumatic events, emergency nurse researchers have paved the way for others in this important workforce issue. At the time of this writing, an article comparing compassion satisfaction, burnout, and compassion fatigue among emergency nurses and other types of nurses had been cited more than 750 times.[104] The ENA supports a healthy work environment for all nurses and advocates for implementing best practices in fostering resilience in staff. This includes supporting a “just culture,” condemning bullying, protecting meal times, and

debriefing after critical events.[105]

Crowding

Crowding has been a policy issue for numerous health care organizations since the early 1990s, including the ENA, the ACEP, and the Institute of Medicine. Crowding in the emergency department is usually a symptom of a larger system-wide problem, resulting from increased ED volumes, nursing shortages, high staff turnover rates, fewer ICU beds, and fewer hospital beds owing to hospital and unit closures.[106] In the 1990s, the ENA developed a position statement related to crowding,[107] which has been regularly updated and revised, indicating the issue's continued importance.[108] In 2003, the General Accountability Office (GAO) completed a landmark study of emergency departments, measuring crowding.[109] In 2005, the ENA made crowding a strategic priority of the organization,[110] and the Institute of Medicine followed soon after, highlighting crowding as a major problem in its 2006 report, "The Future of Emergency Care."[111]

As part of ENA's strategic plan in the 2000s, an ED Crowding Work Team was formed to develop national standards and metrics to measure crowding and develop partnerships with other stakeholders addressing the issue. The work team provided key insights about the emergency nursing perspective to the GAO in its updated report.[111] The new GAO study was published in 2009, and the findings were similar or worse, with ED wait times nationally increasing, often to unsafe levels, on the basis of acuity.[106] Local strategies, including advanced bed requests, improved communication within and outside hospitals and emergency departments, the creation of permanent hall beds, and an increase in staffing[107] were short-term fixes to a national, multifaceted symptom of an overburdened health care system. In 2015, the ENA General Assembly rated improving ED throughput, especially decreasing the time from admission to bed placement, as 1 of the 3 priority issues for the ENA to address.[112] Although hospital and ED crowding continue to plague hospitals across the US, the ENA has consistently leveraged its resources to best inform members and policy makers of best practices and needed reforms to address this issue.

Limitations

The study limitations include that each article was limited to the 3 most relevant codes; however, the 3 most relevant codes were chosen when categorizing the articles. There is the potential that more codes could have affected the outcome of the leading themes. The articles analyzed were provided by the ENA directly on the basis of a database it maintains of the articles published in *JEN*. It is possible that some articles were not included in this list and, thus, were not included in our review. In addition, historical reviews are not meant to be comprehensive reviews of every available resource, and there were many other potential resources that were not included as sources for our historical analysis. The historical thesis as well as the constraints regarding what is archived, collected, and available dictate what sources are, and are not, used. It is possible that with different sources and a different methodology, someone else may have come to a different conclusion because historical research requires the writer to make a judgment and curate sources to support the chosen argument.

Conclusion

From its inception, the ENA has advocated for safe emergency nursing practice through education, position papers, publications, and policy initiatives. Building on the foundation laid by founders Dorr and Kelleher to create a professional emergency nursing organization, ENA's leaders have consistently monitored and addressed emergency nursing concerns. The ENA has grown and thrived. The provision of care for vulnerable populations, trauma and injury prevention, and patient quality and safety were the most enduring and impactful policy initiatives in the first 50 years of the ENA. Most recently, the ENA has promoted strategies to maintain the emergency nursing workforce and ensure a safe and sustainable environment for emergency nurses to practice. The success of the ENA is member-driven. During this historic year of the COVID-19 pandemic and Year of the Nurse and Midwife, the ENA has helped showcase emergency nurses to the world, demonstrating extreme resiliency in a world of uncertainty, determining best practices, and maintaining the health care safety net for the most vulnerable populations.

Acknowledgments

The authors thank Yasra Arshad for her assistance with manuscript preparation. This work is a commissioned

article, selected from proposals and supported by the *Emergency Nurses Association* in commemoration of the 50th anniversary of the Emergency Nurses Association.

Dedication

We dedicate this article to Anita Dorr and Judith Kelleher for their vision for the Emergency Nurses Association and to all the emergency nurses who work tirelessly for their communities, making our founders' dreams a reality.

Author Disclosures

The authors were commissioned by the *Emergency Nurses Association* to write this article in response to a call for proposals.

Conflicts of interest: none to report.

Supplementary Figure

Supplementary Figure Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram. ⁎Articles excluded owing to title/abstract topic being outside of the defined codes. †Articles not within the identified top policy areas were excluded. Articles within top policy areas but not relevant to policy were excluded.

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.11.007.

Category	1975 to 1979, n = 207 n (%)	1980 to 1989, n = 785 n (%)	1990 to 1999, n = 1280 n (%)	2000 to 2009, n = 1276 n (%)	2010 to 2019, n = 1335 n (%)	Totals
Special populations	18 (8.7)	76 (9.7)	158 (12.3)	188 (14.7)	209 (15.7)	649
Professional development	18 (8.7)	67 (8.5)	55 (4.3)	175 (13.7)	235 (17.6)	550
Trauma	36 (17.4)	133 (16.9)	120 (9.4)	145 (11.4)	97 (7.3)	531
Case studies	2 (1.0)	40 (5.1)	175 (13.7)	154 (12.1)	85 (6.4)	456
Medical	40 (19.3)	102 (13)	66 (5.2)	114 (8.9)	85 (6.4)	407
Patient quality and safety	6 (2.9)	21 (2.7)	51 (4.0)	147 (11.5)	177 (13.3)	402
Pharmacology and toxicology	8 (3.9)	66 (8.4)	81 (6.3)	106 (8.3)	115 (8.6)	376
Editorial	5 (2.4)	38 (4.8)	123 (9.6)	75 (5.9)	121 (9.1)	362
Nursing workforce	4 (1.9)	6 (0.8)	63 (4.9)	106 (8.3)	128 (9.6)	307
Law and ethics	25 (12.1)	81 (10.3)	61 (4.8)	62 (4.9)	12 (0.9)	241

Education	4 (1.9)	25 (3.2)	81 (6.3)	55 (4.3)	67 (5.0)	232
Triage	8 (3.9)	17 (2.2)	38 (3.0)	73 (5.7)	87 (6.5)	223
Environment of care	0	0	61 (4.8)	70 (5.5)	82 (6.1)	213
Injury prevention	0	6 (0.8)	34 (2.7)	68 (5.3)	83 (6.2)	191
Leadership	4 (1.9)	51 (6.5)	43 (3.4)	31 (2.4)	44 (3.3)	173
International	0	5 (0.6)	42 (3.3)	54 (4.2)	70 (5.2)	171
Research	2 (1.0)	25 (3.2)	56 (4.4)	36 (2.8)	50 (3.7)	169
Prehospital	12 (5.8)	52 (6.6)	56 (4.4)	22 (1.7)	21 (1.6)	163
Procedures	10 (4.8)	24 (3.1)	52 (4.1)	34 (2.7)	37 (2.8)	157
Policy	1 (0.5)	12 (1.5)	20 (1.6)	81 (6.3)	42 (3.1)	156
Psychiatric	9 (4.3)	24 (3.1)	25 (2.0)	34 (2.7)	46 (3.4)	138
Disaster nursing	3 (1.4)	6 (0.8)	43 (3.4)	48 (3.8)	34 (2.5)	134
Technology	1 (0.5)	8 (1.0)	32 (2.5)	33 (2.6)	28 (2.1)	102
Patient education	2 (1.0)	21 (2.7)	9 (0.7)	10 (0.8)	14 (1.0)	56
End-of-life	5 (2.4)	9 (1.1)	5 (0.4)	16 (1.3)	19 (1.4)	54
Advanced practice nursing	0	5 (0.6)	16 (1.3)	15 (1.2)	16 (1.2)	52
Rural	3 (1.4)	9 (1.1)	6 (0.5)	5 (0.4)	18 (1.3)	41

DETAILS

Subject:	Historical analysis; Emergency medical care; Domestic violence; Workforce; Professional development; Initiatives; Older children; Professionalization; Emergency services; Nursing; Best practice; Nurses; Patient satisfaction; COVID-19; Trafficking; Workplace violence; Policy analysis; Trauma; Associations; Crowding; Injury prevention; Pandemics; Sexual violence; Advocacy; Triage; Workplaces; Trauma care; Archives &records; Older people; Coronaviruses; Injuries; Vulnerability
Business indexing term:	Subject: Professional development Workforce
Company / organization:	Name: Emergency Nurses Association; NAICS: 813920
Identifier / keyword:	Emergency nursing; Health policy; Nursing history
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	224-238.e1
Publication year:	2021
Publication date:	Mar 2021
Section:	Ena 50th anniversary
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.11.007
ProQuest document ID:	2498285931
Document URL:	https://www.proquest.com/scholarly-journals/emergency-nurses-association-50-years-advocacy/docview/2498285931/se-2?accountid=211160

Copyright:	©2020. Emergency Nurses Association
Last updated:	2022-09-22
Database:	Public Health Database

Syncope in the Emergency Department: A Guide for Clinicians: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Syncope is a common presenting symptom to emergency departments, but its evaluation and initial management can be challenging for ED practitioners and particularly urgent in the presence of high-risk features that increase the likelihood of cardiac etiology. Even after thorough clinical evaluation, syncope may remain unexplained. In such instances, practitioners' clinical judgment and risk assessments are critical to guide further management. In this article, evidence-informed strategies are outlined to approach the diagnosis of syncope and provide an overview of syncope clinical decision rules and shared decision-making. By incorporating risk stratification and shared decision-making into syncope care, practitioners can more confidently engage patients and families in disposition decisions to organize appropriate outpatient and follow-up care, observation, or admission.

FULL TEXT

Contribution to Emergency Nursing Practice

••Syncope remains unexplained after ED evaluation, possible cardiac etiologies are crucial to identify because of an increased risk of serious adverse events. Existing guidance on risk stratification is limited and practitioners' risk aversion can lead to unnecessary low-risk admissions.

••A systematic approach to syncope that integrates a patient's history; examination and electrocardiogram; additional testing; risk stratification; and team-based, patient-centered care may help ED practitioners to rapidly and accurately identify patients classified as high risk.

••ED practitioners should be cognizant of the high-risk features of syncope, which increase the likelihood of cardiac etiology. Supplement clinical judgment with risk scores when no serious cause is evident. Engage patients in shared decision-making to arrange appropriate outpatient and follow-up care, observation, or admission.

Introduction

Transient loss of consciousness (TLOC) is a frequent presentation to emergency departments, accounting for 0.6% to 1.0% of ED visits in North America,[1,2] and most commonly manifests in the form of syncope. All classifications of syncope result from cerebral hypoperfusion,[3] but the precise underlying cause can be challenging for ED practitioners to determine. The 3 general classifications of syncope include reflex syncope and syncope due to orthostatic hypotension (OH), which together make up approximately one-third of the ED diagnoses, and cardiac

syncope, which makes up approximately 10% of the ED diagnoses.[3,4] Cardiac etiology is particularly imperative to identify because of an increased risk of death and serious adverse events (SAEs) (eg, life-threatening arrhythmia or bleeding, sudden cardiac death (SCD), acute myocardial infarction, and stroke) and an increased need for procedural intervention.[4-7] Furthermore, even after thorough clinical evaluation, the underlying cause of syncope can remain unexplained in nearly one-third of the cases.[4] In these instances, licensed independent practitioners (including nurse practitioners, physicians, and physician assistants) must integrate clinical judgment and risk assessments to guide further management.

HERERetrospective studies estimate that hospitalization rates for syncope range from 25% to 35% in the United States.[1,8] For patients at low risk of SAEs and in the absence of serious medical conditions, hospitalization may be unnecessary because of its limited diagnostic value and potentially harmful outcomes.[3,6,9,10] Amid risk-averse contexts, varying risk perceptions, and occasional diagnostic uncertainty, ED practitioners are challenged with not only identifying patients at high risk for SAEs but also avoiding unnecessary hospitalizations.[11,12] Accordingly, researchers have called for more standardized and risk stratification–based approaches to syncope evaluation to improve practitioners' diagnostic confidence, decrease unnecessary admissions, and reduce costs associated with testing and hospitalization.[7,12]

Clinical decision rules (CDRs), which supplement risk assessments, and shared decision-making (SDM), which engages patients and families in the disposition decision, are 2 areas of recent innovation that have the potential to improve syncope evaluation and care experiences.[13,14] At a time of crowded emergency departments and disparities in access to primary care, ED advanced practice registered nurses are essential to increase underserved populations' access to, and experiences of, care.[15] The purpose of this article is to empower ED practitioners, and nurse practitioners in particular given their expertise in patient education and health promotion,[16] to incorporate CDRs and SDM into their practice. This article also outlines evidence-informed strategies to approach the diagnosis of syncope and discusses special considerations for older adults, syncope mimics, and rare presentations to augment practitioners' knowledge and clinical judgment.

Pathophysiology

TLOC is a state of real or apparent loss of consciousness characterized by amnesia, motor control abnormalities, and unresponsiveness, with numerous causes ([Figure 1]).[3,17] Syncope is a form of TLOC characterized by rapid onset and spontaneous recovery and specifically results from cerebral hypoperfusion.[3,17] Syncope must be differentiated from nonsyncopal TLOC (eg, seizure and head trauma) as well as mimics (eg, psychogenic pseudosyncope).[3,6]

Presyncope refers to the symptoms preceding syncope (eg, nausea, vomiting, or sweating in reflex syncope, lightheadedness in OH, or palpitations in cardiac syncope).[3] European Society of Cardiology (ESC) guidelines recommend that presyncope be evaluated and managed similarly to syncope because the 30-day risk of SAEs is comparable.[3,18]

The underlying mechanism of all 3 classifications of syncope is that it often starts with low cardiac output and decreased peripheral resistance, resulting in hypotension and cerebral hypoperfusion.[3] Reflex (neurally mediated) syncope has vasovagal or situational (eg, micturition) causes, whereas syncope due to OH can be caused by drugs (eg, vasodilators and diuretics), volume depletion (eg, hemorrhage), and primary or secondary autonomic failure.[3] Treatment for these classifications of syncope usually involves first-line education and lifestyle measures (eg, reassurance and awareness of triggers, situations, and prodromes) but may also extend to pharmacotherapy, drug discontinuation, and other therapies.[3] In cardiac syncope, arrhythmias, structural disease, and other less common causes (eg, acute coronary syndromes, pulmonary embolism, aortic dissection, and cardiac tamponade) are implicated in low cardiac output.[3] Cardiac syncope requires prompt treatment (eg, catheter ablation, device

implantation, or surgical intervention) to address the underlying cause.[3]

Diagnostic Approach

Both ESC and American College of Cardiology/American Heart Association guidelines provide similar recommendations for the initial evaluation of syncope.[3,6] Key elements of the history, physical examination, and electrocardiogram (ECG) assist a practitioner in the diagnosis, risk assessment, and plan of care.

History

The history-taking in syncope has been referred to as history-building to emphasize its mutuality and diagnostic value.[19] The history should include the context of the TLOC, medical history, and family history to enable rapid triage on the basis of the presence of low- and high-risk features (Table 1). Syncope must be differentiated from nonsyncopal TLOC (Figure 1). For instance, features suggestive of seizure include the absence of a trigger; tongue-biting, head-turning, and unusual posturing; duration in minutes; and memory deficit.[3]

If syncope is suspected, the history may help differentiate cardiac syncope from reflex syncope or syncope secondary to OH (Table 2). Practitioners should note the association between the presence of high-risk features and greater likelihood of cardiac syncope.

Clinical Examination

Cardiac and pulmonary examinations should be performed for all patients, with close attention paid to the features that suggest the presence of structural heart disease (eg, murmurs, gallops, or rubs). A basic neurologic examination should also be performed. Because syncope generally presents without focal neurologic deficits, any identification of focal deficits requires further evaluation for cerebrovascular disease (eg, vertebrobasilar or carotid transient ischemic attacks or subclavian steal syndrome).[3,6] Practitioners should be aware that although rare, focal deficits and syncope may coexist; in this instance, treatment after a stroke misdiagnosis would aggravate hypotension.[20]

Electrocardiogram

A resting 12-lead ECG should be obtained for all patients presenting with syncope because of wide availability and utility in pinpointing arrhythmic syncope.[3,6] Practitioners should keep in mind that an arrhythmia may be intermittent or not recognized on an initial ECG and that a normal initial ECG cannot rule out 30-day serious cardiac arrhythmia.[21] High-risk ECG features that suggest a serious condition include abnormalities in rhythm and conduction, ventricular hypertrophy, changes consistent with ischemia, and several syndromes (eg, Wolff-Parkinson-White syndrome, Brugada syndrome, and long QT syndrome).[3]

Further Investigations

If syncope remains unexplained after evaluation, further testing (eg, cardiac imaging and monitoring) may help clarify a diagnosis and prognosis when clinically indicated.[3,6] Routine laboratory testing in syncope is not well supported by evidence; however, recent studies have explored the utility of cardiac biomarkers (eg, B-type natriuretic peptide [BNP], N-terminal pro-BNP [NT-pro-BNP], and high-sensitivity cardiac troponins [high-sensitivity cardiac troponin T {hs-cTnT} and high-sensitivity cardiac troponin I]) in the detection of cardiac syncope and risk stratification.[22-24] Two recently developed CDRs, the Canadian Syncope Risk Score (CSRS) and the FAINT (heart failure, arrhythmia, Initial ECG result abnormal, Elevated NT-proBNP, Elevated hs-troponin T) Score, include cardiac biomarkers as predictors.[25,26]

Special Considerations Comprehensive Geriatric Assessment

Complex interactions exist between syncope and aging, multimorbidity, polypharmacy, frailty, and functional decline.[27] ESC guidelines recommend multifactorial evaluation and intervention for older adults with syncope, including potential discontinuation of hypotensive and psychotropic drugs, cognitive and physical assessments, and following

the approach for unexplained syncope in the presentation of unexplained falls.[3]

Syncope Mimics and Chameleons

Syncope mimics are disorders that can seem similar to syncope, including seizures, metabolic disorders, stroke and transient ischemic attack, and psychogenic pseudosyncope.[28] Syncope chameleons are instances in which true syncope presents atypically, seeming to be similar to other disorders.[28] Chameleons include convulsive syncope, which resembles seizure activity, and syncope that resembles subclavian steal syndrome or subarachnoid hemorrhage. A thorough history and clinical examination are key to identifying life-threatening conditions and differentiating true syncope.

Rare Causes of Syncope

Although uncommon, multiple system atrophy (MSA) and inherited arrhythmia syndromes (IAS) can both cause syncope. These 2 particular causes are discussed here because they illustrate the multifactorial etiology of syncope and encourage practitioners to think critically.

Multiple System Atrophy

MSA is a progressive neurodegenerative disorder thought to result from misfolded α-synuclein and includes both Parkinsonian (MSA-p) and cerebellar (MSA-c) variants.[29] MSA is characterized by autonomic failure and typically presents with early urogenital dysfunction followed by OH.[29] Autonomic studies and neuroimaging are central to evaluation, and management is directed toward addressing symptoms.

Inherited Arrhythmia Syndromes

IAS are genetic disorders that cause mutations in cardiac ion channel genes and may result in life-threatening arrhythmias and SCD.[30] IAS include long QT syndrome, Brugada syndrome, and catecholaminergic polymorphic ventricular tachycardia. Features suggestive of arrhythmic syncope or a family history of SCD, particularly in younger patients, should prompt evaluation for IAS as well as cardiac imaging and testing.[30] Management includes pharmacotherapy (eg, β-blockers), implantable cardioverter-defibrillators, and avoidance of triggers (eg, exercise and stress).[30]

Risk Stratification

Risk stratification involves identifying a patient's risk of SAEs to guide further management.[3,6] By identifying patients at low risk of SAEs, many of whom can safely be discharged and receive outpatient follow-up,[3] health care service use is optimized and patients' quality of life is improved by avoiding unnecessary and prolonged hospitalization. The prospective cohort Intermediate-Risk Syncope study found a low rate of 30-day SAEs in patients classified as being at intermediate risk of SAEs compared with those classified as high risk (0.8% vs 27.8%; *P* 31 Patients classified as being at intermediate risk did not meet all low-risk criteria nor present with any single high-risk feature (eg, family history of SCD, syncope on exertion or while supine, palpitations or chest pain, or marked ECG abnormalities). Notably, patients classified as being at intermediate risk possessed features such as stable cardiovascular disease and potentially related but stable comorbidities (eg, history of stroke or gastrointestinal bleeding, anemia, or Parkinson disease). In risk-averse contexts, these patients might be unnecessarily hospitalized despite being clinically stable. The Intermediate-Risk Syncope findings substantiate that generally, if patient education is provided and appropriate outpatient follow-up is arranged, patients classified as being at intermediate risk can safely be discharged after ED observation.

Clinical Decision Rules

Numerous CDRs have been developed to predict short-term SAEs in patients presenting with syncope. ESC and American College of Cardiology/American Heart Association guidelines underscore that good clinical judgment continues to offer better prognostic yield than CDRs, and thus CDRs should merely supplement practitioners' clinical

judgment.[3,6] Meta-analyses have found that syncope CDRs are limited by varying ECG interpretation and definitions of syncope and arrhythmia; lack of external validation; and, if validated, poor sensitivity and specificity.[32-34] CDRs integrated into information technology systems, such as in clinical decision-support systems, have the potential to assist nurses and all practitioners in triage decision-making and the identification of high-risk conditions.[35] Practitioners should keep in mind that the outcomes predicted by syncope CDRs are fundamentally associated with underlying disorders, of which syncope itself is a symptom.[3] Moreover, CDRs should be only used when no evident serious causes are identified during initial clinical evaluation.[33,36]

San Francisco Syncope Rule

The San Francisco Syncope Rule (SFSR) predicts the short-term risk of SAEs in syncope that remains unexplained after initial ED evaluation.[37,38] There are 5 risk factors that make up the SFSR: history of congestive heart failure, hematocrit 38 Meta-analyses of external validation studies, however, have found lower sensitivity (87%; 95% CI, 79%–93%) and specificity (52%; 95% CI, 43%–62%) for the SFSR.[33,34] Considerable heterogeneity in sample and outcome definition may limit evidence for its generalizability.

Canadian Syncope Risk Score

The CSRS estimates the risk of 30-day SAEs not identified during initial ED syncope evaluation.[26] Nine top predictors ([Table 3]) were identified from an initial list of 43 candidate predictors through statistical analysis and predictive modeling of standardized presentation variables and outcomes during a prospective cohort study across 6 Canadian emergency departments (n = 4030). Importantly, the model was corrected for overfitting and internally validated through bootstrapping. The CSRS separates an abnormal ECG into individual predictor variables and further includes practitioners' diagnostic impression as a category, underscoring the value of clinical judgment. A score greater than or 4 confers a high or very high risk (>12%) of SAEs within 30 days.

The CSRS was externally validated in a prospective cohort study across 9 Canadian emergency departments (n = 3819).[36] The model demonstrated excellent calibration, with no statistically significant difference between predicted and observed risks, as well as excellent discrimination, with an area under the receiver operating characteristic curve of 0.91 (95% CI, 0.88–0.93). In this validation cohort, less than 1% of the patients classified as very low risk and low risk, 20% of those classified as high risk, and 50% of those classified as very high risk experienced 30-day SAEs. At a threshold score of –1 (low risk), CSRS sensitivity was 97.8% (95% CI, 93.8%–99.6%) and specificity was 44.3% (95% CI, 42.7%–45.9%).

Canadian Syncope Arrhythmia Risk Score

The Canadian Syncope Arrhythmia Risk Score (CSARS) is a CDR developed to predict the 30-day risk of arrhythmia unidentified during initial ED evaluation and death.[39] The 8 clinical predictors that make up the CSARS were derived from an additional prospective cohort study at 6 Canadian emergency departments (n = 5010) and are similar to CSRS predictors, although point values differ. Scores for the CSARS range from –2 to 8, with scores greater than or 4 conferring high or very high risk of arrhythmia or death within 30 days. Although the CSARS was internally validated through bootstrapping, it must be externally validated before it can be implemented in clinical settings. Once validated, it may help practitioners identify patients at low risk of arrhythmia who do not require admission, as well as guide follow-up care (eg, outpatient cardiac monitoring).

FAINT Score

The FAINT score is a CDR developed to rule out 30-day SAEs among older adults presenting to emergency departments with syncope.[25] Derived during a prospective cohort study at 11 emergency departments in the US (n = 3177), the FAINT score comprises 5 clinical predictors: history of heart failure, history of cardiac arrhythmia, initial abnormal ECG result, elevated NT-pro-BNP, and elevated hs-cTnT. Practitioners should keep in mind that the NT-

pro-BNP and hs-cTnT assays may not be readily available in all emergency departments, although the researchers anticipate wider availability in the coming years. Although the FAINT score was internally validated through cross-validation, it must be externally validated before it can be implemented in clinical settings.

Shared Decision-Making

SDM is a means to alter power differentials in health care and requires practitioners to continually reflect on their language, communication, and ways of knowing during clinical encounters. In ED settings, SDM involves actively engaging patients and families, to the extent they desire and as clinically appropriate, in mutual information-sharing and consensus when a risk-benefit balance and several reasonable care options exist.[40,41] SDM aims to ensure that patients are well informed about their condition as well as the benefits, risks, and consequences of care options. Barriers to SDM implementation in emergency departments include the high-stakes, time-sensitive clinical situations of ED practice as well as the perceptions that patients would rather that practitioners make all the decisions.[13,41] SDM improves patients' knowledge and care experiences, provided that the proposed care options are well supported by evidence and that a risk-benefit balance exists.[13]

In syncope, SDM benefits patients at low to intermediate risk of SAEs or whose syncope remains unexplained after ED evaluation because multiple care options (eg, discharge with primary care or specialist follow-up vs observation vs admission) are made clear.[14,42] Outpatient management may even be indicated for select patients with suspected cardiac syncope in the absence of serious conditions.[6] For example, outpatient cardiac testing is an underused alternative to inpatient cardiac monitoring despite established safety and convenience.[6]

The disposition decision involves collaboration between a patient and practitioner that weighs the patient's condition, values and preferences, and life context and determinants of health.[14] Practitioners should specifically inquire into a patient's risk perceptions and tolerance, living circumstances (eg, support from informal or formal caregivers), and access to outpatient follow-up care if discharge is appropriate.[14,21] If observation or admission is indicated, a practitioner should inquire into a patient's socioeconomic status and implications of potentially missing work or other responsibilities.

Shared Decision-Support Tools

Shared decision-support tools (SDSTs) are aids (eg, paper- or computer-based tools and videos) that facilitate SDM between practitioners and patients and families.[13] Practitioners should tailor SDSTs to patients and families, which involves consideration of person-first language and patients' life circumstances, access to care, risk perceptions and tolerance, and literacy and numeracy ([Figure 2]). To ensure this, SDSTs may be supplemented to individualize care. For instance, Winokur et al[43] developed pictographs to improve patients' and families' comprehension of discharge instructions (eg, fever in children and gastroenteritis).

An SDST has recently been developed and tested to facilitate SDM in syncope. SynDA (Patient Decision Aid for Syncope) is a paper-based patient decision aid intended to meaningfully engage patients with unexplained syncope judged to be at low to intermediate risk of SAEs—but without any identified serious conditions—in disposition decisions ([Figure 2]).[42] In a randomized controlled pilot trial at 1 emergency department, SynDA demonstrated feasibility and showed promise in improving patients' active involvement in care and optimizing health care use.[44]

Implications for Emergency Clinical Practice

The initial management and risk assessment of syncope challenges many ED practitioners and often leads to unnecessary low-risk admissions, particularly in risk-averse contexts. At the same time, it is imperative that practitioners accurately identify the small but important subset of patients, primarily those with suspected cardiac syncope, at high risk of SAEs. Moreover, syncope can often remain unexplained even after thorough clinical evaluation. In this article, we have presented 2 innovative, complementary, and evidence-informed strategies—risk

stratification and SDM—with which practitioners can supplement their knowledge and clinical judgment to navigate complex clinical presentations of syncope. Practitioners can use the CSRS, a rigorously developed and validated CDR, to predict the risk of 30-day SAEs. To facilitate the disposition decision, the SynDA tool shows promise to engage patients at low to intermediate risk of SAEs in SDM.

Conclusions

TLOC and its manifestation of syncope are complex ED presentations. In this article, we briefly summarized the pathophysiology of syncope. Although reflex syncope and syncope due to OH generally entail a benign course, cardiac syncope confers an increased risk of SAEs. We outlined a diagnostic approach to discern the differential diagnosis of syncope and underscored the importance of a thorough history and clinical examination. When syncope remains unexplained and no serious causes are evident, practitioners' clinical judgment may be supplemented with CDRs to inform risk assessments. Finally, we highlighted the value of SDM in improving patients' active involvement in care decisions. Patient education, risk stratification, SDM, and appropriate follow-up care are pivotal to reduce unnecessary hospitalization as well as to improve outcomes and quality of life for patients with syncope. Incorporating these principles into practice will strengthen practitioners' knowledge and clinical judgment, and further empower them to provide safe, evidence-informed, and comprehensive care.

Author Disclosures

Dr. El-Hussein, associate editor of the journal, had no role in the editorial review of or decision to publish this article.

Assess	Low risk	High risk
Context of TLOC	•Features suggestive of reflex syncope•Prodrome (eg, lightheadedness, warmth, sweating, nausea, or vomiting)•Specific triggers (eg, fear, pain, or unpleasant smell)•Situational triggers (eg, micturition, deglutition, defecation, cough, or sneeze)•Being in crowded or hot spaces•Prolonged standing•Standing from supine or sitting position	•New-onset chest pain, dyspnea, abdominal pain, or headache•Syncope on exertion or while supine•Sudden-onset palpitations preceding syncope
Medical history	•Absence of heart disease•Long history of recurrent low-risk syncope similar to current syncope	•Severe structural heart disease or coronary artery disease (eg, heart failure, low LVEF, or previous myocardial infarction)
Family history	•No family history of SCD	•Family history of SCD
Physical examination	•Normal physical examination	•Unexplained SBP <90 mmHg•Evidence of bleeding (eg, gastrointestinal bleeding)•Persistent abnormal vital signs (eg, bradycardia in awake nonathletes)•Undiagnosed systolic murmur

ECG	•Normal ECG	•Abnormal ECG

Cardiac syncope	LR+, 95% CI*	Reflex syncope	Syncope due to OH
AF	7.3 (2.4-22)	•History of recurrent syncope•Specific triggers (eg, fear, pain, or unpleasant smell)•Situational triggers (eg, micturition, deglutition, defecation, coughing, sneezing, or laughing)•Being in crowded or hot spaces•Pallor, sweating, or nausea/vomiting	•Prolonged standing•Postprandial hypotension•Recent change in vasodepressive medications•Volume depletion (eg, hemorrhage, diarrhea, or vomiting)•Primary or secondary autonomic failure (eg, Parkinson disease, autonomic neuropathy)
Severe structural HD	3.3-4.8	History of HF	2.7-3.4
Age >35 y	3.3 (2.6-4.1)	On exertion	14-15
Supine position	1.1-4.9	Dyspnea	3.5 (1.5-9.1)
Chest pain	3.4-3.8	Palpitations	1.9 (0.86-4.5)
Cyanosis	3.2 (1.6-24)	Absence of prodrome	1.6 (1.0-2.6)

Category	Points
Clinical evaluation	
Predisposition to vasovagal symptoms*	–1
History of heart disease†	+1
Any systolic pressure reading <90 or >180 mm Hg‡	+2

Investigations	
Elevated troponin level (> 99th percentile of normal population)	+2
Abnormal QRS axis (< –30° or >100°)	+1
QRS duration >130 ms	+1
Corrected QT interval >480 ms	+2
Diagnosis in emergency department	
Vasovagal syncope	–2
Cardiac syncope	+2
Total score (–3 to 11)	

DETAILS

Subject:	Health care access; Emergency medical care; Risk aversion; Long QT syndrome; Family medical history; Medical diagnosis; Electrocardiography; Hypotension; Risk assessment; Nurse practitioners; Older people; Cardiology; Stratification; Hospitalization; Etiology; Patients; Stroke; Cardiac arrhythmia; Clinical decision making; Decision making; High risk; Biomarkers; Consciousness; Fainting; Clinical assessment; Emergency services; Group decision making
Business indexing term:	Subject: Risk aversion Risk assessment
Identifier / keyword:	Syncope; Emergency department; Risk stratification; Shared decision-making
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	342-351
Publication year:	2021
Publication date:	Mar 2021
Section:	Heart Matters
Publisher:	Elsevier Limited

Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.11.002
ProQuest document ID:	2498285907
Document URL:	https://www.proquest.com/scholarly-journals/syncope-emergency-department-guide-clinicians/docview/2498285907/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-06-21
Database:	Public Health Database

Board of Directors: JEN

ProQuest document link

FULL TEXT

TVM:UNDEFINED

DETAILS

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2

First page:	A6
Publication year:	2021
Publication date:	Mar 2021
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	General Information
DOI:	https://doi.org/10.1016/S0099-1767(21)00020-9
ProQuest document ID:	2498285889
Document URL:	https://www.proquest.com/scholarly-journals/board-directors/docview/2498285889/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Mar 2021
Last updated:	2021-04-09
Database:	Public Health Database

Improving ED Emergency Severity Index Acuity Assignment Using Machine Learning and Clinical Natural Language Processing: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

Triage is critical to mitigating the effect of increased volume by determining patient acuity, need for resources, and establishing acuity-based patient prioritization. The purpose of this retrospective study was to determine whether historical EHR data can be used with clinical natural language processing and machine learning algorithms (KATE) to produce accurate ESI predictive models.

Methods

The KATE triage model was developed using 166,175 patient encounters from two participating hospitals. The model was tested against a random sample of encounters that were correctly assigned an acuity by study clinicians using the Emergency Severity Index (ESI) standard as a guide.

Results

At the study sites, KATE predicted accurate ESI acuity assignments 75.7% of the time compared with nurses (59.8%) and the average of individual study clinicians (75.3%). KATE's accuracy was 26.9% higher than the average nurse accuracy (P <.001). On the boundary between ESI 2 and ESI 3 acuity assignments, which relates to the risk of decompensation, KATE's accuracy was 93.2% higher, with 80% accuracy compared with triage nurses 41.4% accuracy (P <.001).

Discussion

KATE provides a triage acuity assignment more accurate than the triage nurses in this study sample. KATE operates independently of contextual factors, unaffected by the external pressures that can cause under triage and may mitigate biases that can negatively affect triage accuracy. Future research should focus on the impact of KATE providing feedback to triage nurses in real time, on mortality and morbidity, ED throughput, resource optimization, and nursing outcomes.

FULL TEXT

Contribution to Emergency Nursing Practice

••What is already known: triage is a critical process in the initial identification of patients classified as high risk and in the appropriate allocation of resources to ensure safe and effective care. Combined written case scenarios and retrospective reviews for multicenter studies reported nurse triage accuracy of approximately 60%.

••The main finding of this paper is that KATE, a clinical decision support aid using machine learning and natural language processing, was more accurate in assigning acuity on the basis of the criteria set forward in the Emergency Severity Index Handbook than triage nurses and as effective as expert clinicians, especially in the identification of patients classified as high risk presenting for emergency care.

••Recommendations for translating the findings of this paper into emergency clinical practice include that machine-guided support for triage decision-making may improve triage accuracy. Future research should focus on the impact of KATE's feedback to triage nurses in real time and on KATE's impact on mortality and morbidity, ED throughput, resource optimization, and nursing outcomes.

Introduction

ED use has increased by 35% in the past 20 years, whereas the number of operating emergency departments has gone down by 11%, affecting approximately 145 million visits in 2016.[1,2] Effective triage is critical to mitigating patients' safety and throughput challenges by accurately determining their acuity and resource needs to ensure that they are placed on an optimal clinical workflow path to deliver safe and high-quality care at the lowest possible cost to ultimately improve overall outcomes.

In the United States, the most widely used triage tool is the Emergency Severity Index (ESI), a 5-point scale—with 1 being "emergent" and 5 being "nonurgent"—assigned by a triage nurse and based on the risk of decompensation

and anticipated resource use.[3] In a report in 2012, 70% of the large hospitals and teaching hospitals reported using ESI, whereas a 3-tiered system was still common in community and small hospitals.[4]

Although the ESI classification system uses clear guidelines for acuity assignments (patient vital signs, a unique classification methodology, and expected resource needs), it implicitly leaves room for clinician interpretation. Therefore, accuracy relies heavily on individual triage clinician judgment and experience. It is well documented in medical literature that cognitive biases can impede clinical decision-making.[5-8] These biases include overconfidence, premature closure, the anchoring effect, information and availability bias, and tolerance to risk. Environmental challenges that affect accurate acuity assignment include crowding and boarding, making it difficult to bring patients to a treatment space.[9] Fry and Burr[10] and Chung[11] note that accuracy was affected by interruptions in care delivery, lack of knowledge, and time constraints; it was also reported that triage clinicians manipulated the triage system to speed up or delay care. In other words, triage clinicians respond not just to the patient before them, but also to the environment around them to the potential detriment of the patient.[9] Furthermore, race and gender bias contributed to incorrect acuity assignment, even with dangerous presentations and abnormal vital signs,[12-18] which can lead to suboptimal outcomes.[19]

Nurse triage accuracy measured against that of expert clinicians in various settings was reviewed by Tam et al.[20] In written case scenarios at multiple emergency departments, the nurse average accuracies were 56.2% in Taiwan, 59.2% in Brazil, and 59.6% in Switzerland. In retrospective reviews at multiple emergency departments, the average nurse accuracies were 58.7% in Pennsylvania and 68.3% in South Africa. Some single-center studies demonstrated higher nurse accuracy, which might be attributed to the advancement of technology to assist decision-making in triage.[20] Combined written case scenarios and retrospective reviews for all multicenter studies revealed a triage accuracy of approximately 60%.[20] Challenges to assigning ESI 1 or ESI 2 (resuscitation or emergent, respectively) and ESI 5 (nonurgent) are common, with specific difficulties reported in differentiating between ESI 2 (unstable) and ESI 3 (stable).[21]

Given these challenges, machine learning (ML) approaches have been proposed to aid clinicians in various patient risk assessments. ML has been used to predict in-hospital mortality, critical care (admission to an intensive care unit and/or in-hospital death), and hospitalization (direct hospital admission or transfer) in adults[22-25] and children.[26] ML has also been used to predict hospitalization outcomes[27-29] as well as predict composite risk outcome,[30] defined as an occurrence of mortality, admission to the intensive care unit, or direct transport to the cardiovascular catheterization suite. Rajkomar et al[23] used ML to predict in-hospital mortality, readmission rates, prolonged length of stay, and discharge diagnoses. Other applications of statistical forecasting in emergency departments have been reviewed by Gul and Celic.[31]

Algorithms based on the results of ML predictions of hospitalization, critical care, and mortality have also been developed to predict triage acuity. Dugas et al[30] applied thresholds to predicted probabilities of composite outcome to predict triage acuity. Similarly, Levin et al[32] developed an e-triage algorithm with 3 ML models to predict critical care outcomes, emergent procedures, and hospitalizations and then applied thresholds on these predictions to determine triage acuity.

To the best of our knowledge, no ML model has used ESI triage acuity scores as labels to predict ESI triage acuity and measure model performance. Therefore, it is not known if an ML model can accurately predict ESI triage acuity using only the information available to the triage nurse at the time of triage.

The purpose of this retrospective study was to determine whether historical electronic health record (EHR) data can be extracted and synthesized with clinical natural language processing (C-NLP) and the latest ML algorithms (KATE) to produce highly accurate ESI predictive models.

Methods Study Sites

Site A is a community emergency department in an urban setting in the Western US, with 65000 annual visits. Site B is a level 1 trauma center in an urban setting in the Midwestern US, with approximately 110000 ED annual visits. Nurses at both sites performing triage had received training on ESI and triage processes as part of their employment. The study dataset included 88237 triage records from site A (visits between February 2015 and November 2016) and 77938 from site B (visits between October 2015 and October 2016). Demographics for the triage records are presented in Table 1.

Ethical Considerations Ethics Approval and Consent to Participate

This study was approved as exempted by the Western Institutional Review Board (Office for Human Research Protections/Food and Drug Administration parent organization number: IORG0000432; institutional review board registration number: IRB00000533).

Availability of Data and Material

The datasets generated and/or analyzed during the current study are not publicly available because they contain protected health information from the medical records of the study.

Data Collection and Conditioning

Before data collection, institutional review board exemption was obtained for both sites. All protected health information was redacted from the datasets in accordance with the Code of Federal Regulations (title 45, section 164.514) for deidentifying protected health information to safe harbor standards. Deidentified raw text files were mapped and consolidated to a multihospital hierarchical data model, preserving the differences between the sites. From the initial 166175 triage records, 19123 records were removed for patients aged below 1 year and/or if the following items were missing from the record: ESI acuity, reason for visit, or 4 or more vital signs. This data filtering produced the final dataset of 147052 usable encounters.

Machine Learning Clinical Natural Language Processing

The extraction of clinical terms from patient record free text is a prerequisite to form a complete understanding of each patient and can enhance ML-based clinical decision models.[27] This has been a primary challenge in building ML-based clinical decision support tools for clinicians that leverage clinical raw text evidence. The challenge is to accurately understand the individual's information as documented and then aggregate that understanding across the research dataset. We developed C-NLP technology to accurately extract medical terms from free text.

In C-NLP, we use the following steps to process raw text:

- **(1)** Sentence tokenization
- **(2)** Word tokenization
- **(3)** Text normalization
- **(4)** Part-of-speech tagging
- **(5)** Chunking
- **(6)** Extraction of clinical terms

Steps 1 to 5 are done using the OpenNLP Java library (The Apache Software Foundation). Extraction of clinical terms in step 6 is done using the following steps:

•(1)Noun phrases are extracted from the chunker (step 5).

•(2)Text in each noun phrase is permuted in all combinations for all phrases.

•(3)All text combinations are matched against a Unified Medical Language System (UMLS) dictionary,[33] and clinical terms are extracted on the basis of their matching UMLS terms.

•(4)For each medical term, a unique UMLS code (concept unique identifier) is extracted and used as a feature.

To evaluate C-NLP technology, we randomly sampled 800 medical records. For each medical record, 2 independent trained reviewers evaluated the relevance and accuracy of each tag predicted by C-NLP. The performance of C-NLP is presented in Table 2. A more detailed analysis of C-NLP performance is presented in Supplementary Table 1.
The features extracted for this study from free text using C-NLP are summarized in Table 3.

Feature Engineering

In this study, numeric, categorical, and free text data were used. Numeric data were represented by age, vital signs, blood glucose, pain scores (Primary, Faces, FLACC [face, legs, activity, crying, and consolability], NIPS [Neonatal Infant Pain Scale], PIPP [Premature Infant Pain Profile], and PAINAD [Pain Assessment in Advanced Dementia]), Glasgow coma scale score, and Morse fall scale score. Numeric data were transformed into features after removing implausible values. Categorical data were represented by sex, arrival mode, arrived from, family history, social history, and risk factors such as alcohol and drug abuse. Overall, information that was available at triage was used as a data source. Post-triage data such as laboratory test values or vital signs after triage were not used as a data source. Clinical terms were extracted from the chief complaints and patient histories (medical, social, surgical, and medication data) using C-NLP.
Clinical feature engineering was undertaken to derive new composite features from the existing EHR data and public datasets, which improved the predictive value for ESI triage acuity assignment. The following feature engineering algorithms were applied:

•(1)UMLS dictionaries of clinical terms were used to derive consolidated features on the basis of features extracted from reason for visit using C-NLP. The UMLS is a collection of dictionaries, many of which have a primary term for medical terms.[33] For example, “radiating chest pain” is related to “chest pain.” For each clinical term extracted from reason for visit using C-NLP, relationships were used to derive new features.[33]

•(2)ESI 1 and ESI 2 features were created on the basis of the presence of high-risk presentations referenced in the ESI Handbook.[3]

•(3)Social and environmental risk factors were binned into risk and nonrisk categories.

•(4)Duration of symptoms features was created on the basis of time references in reason for visit (eg, hours, days, and weeks).

•(5)Count of number of features extracted from reason of visit using C-NLP.

•(6)Pain above acceptable level for each patient.

•(7)Count of number of missing values in vital signs.

•(8)Count of number of vital signs in the risk zone.

Features with low frequency were removed from the feature set.

A summary of the feature engineering used to improve the modeling and subsequent clinical accuracy of KATE triage prediction is presented in Table 3. A model feature is equivalent to a clinical data point. For reference, “chest pain,” “denies chest pain,” and “history of myocardial infarction” would represent 3 unique features in KATE.

The concept of time was extracted using regexes, or regular expressions, and binned into the following categories: seconds, minutes, hours, days, weeks, months, and years. For example, “a few days,” “3 days,” or “three days” were all binned into the “days” category. Duration categories were used as features.

ML Algorithms

The open source library, XGBoost, was selected as the ML algorithm used for this study. XGBoost is a method from the gradient tree boosting family. Gradient boosting is a method of sequential building of decision trees in which each subsequent tree is built on the subset of data where previous trees made the most mistakes in classification.[34] XGBoost was designed to have an efficient model training performance for large sparse datasets.[34]

Software

Java 8.0 (Oracle Corporation) and the OpenNLP Java library were used to develop C-NLP. Python 2.7 (Python Software Foundation) was used for pipeline development and ML. XGBoost 0.8 library was used to build KATE. Open source libraries Sklearn and SciPy were used for model evaluation and statistical analysis.

Clinically Verified Training Records

Given the high nurse triage error rate reported in the literature[20,35] and found in this study (see “Results” section below), the triage records were reviewed by 7 study clinicians, all practitioners in emergency health care, to correct potential nurse errors in ESI assignment. The study clinicians were blinded to nurse ESI assignment. Disagreements about ESI acuity levels were resolved using the ESI Handbook. A total of 19652 records were reviewed and relabeled by 1 or more clinicians. Triage records for clinician review were chosen on the basis of disagreement of KATE ESI predictions with nurse ESI assignment from the results of 5-fold cross-validation. Triage records reviewed by the study clinicians were considered verified, whereas the remaining records were considered unverified. For 7970 (40.54%) verified records, the study clinicians agreed with nurse-assigned ESI acuity, and for 11 682 verified records, the clinicians changed ESI acuity (59.44%). A confusion matrix for nurse ESI assignment against verified ESI acuity is presented in Supplementary Table 2. Both verified and unverified records were used as a training set for the KATE model.

To validate the trained model, 3 expert clinicians were chosen from the study clinical team to review an independent gold test set (described in the “Results Validation” section below). The expert clinicians included a doctorally prepared emergency nurse with nationally recognized expertise in ED triage and 2 emergency physicians with an average of 10 years’ experience in emergency health care. We used both physicians and nurses in this process for interdisciplinary expertise and also because accuracy in ESI triage was not substantially different between the 2 groups.[36] The physicians received education about the clinical decision-making process of nurses performing triage and training on the ESI algorithm. Gold records were used as a test set because they have the highest certainty in ESI labels for the evaluation of nurses, the KATE model, and expert clinicians. The results of KATE’s performance on the gold set with and without verified ESI acuity labels are presented in Supplementary Table 3. The use of verified ESI acuity labels significantly improved KATE’s performance on the gold set. Specifically, accuracy on all gold set records improved by 6.75%, and ESI 2 accuracy improved by 17.13%.

Results Validation

To validate the model performance a test set (gold set) was created using random sampling from the overall dataset of 147052 usable encounters. A random sample of 800 records was drawn, with 3.62% margin of error at a 95%

confidence level. Hospital-assigned acuities were redacted from the gold set during this review. Each gold set record was reviewed independently by the 3 expert clinicians trained in ESI methodology. ESI acuity assignments were made prospectively using triage information only. If all 3 clinicians agreed in their acuity assignment, such acuity was determined to be correct for that individual record. For records with disagreements, each case was discussed in a team clinical review, referenced against the ESI Handbook, and a final correct acuity was recorded, or the record was removed from the study gold set (deleted). Of the initial random sample of 800 records, 71 triage records (8.9%) were deleted owing to insufficient triage documentation (missing vital signs, lack of reason for visit, or basic patient assessment), or the study clinical team could not reach consensus (Supplementary Table 4). Triage acuity labels in the remaining 729 triage records from the gold set were isolated from the study's ML training and only used for model testing. The acuity assignment accuracy of KATE, site nurses, and study clinicians were tested against the gold set.

Results Overall Results

KATE demonstrated significantly higher ESI accuracy, measured against the consensus of the expert clinicians supported by the ESI Handbook, than the nurses for all gold records from each study site and for each triage acuity level. The results for KATE, the nurses, and individual study clinicians are presented for the study sites in Tables 4 and 5. Specifically, for across the study sites, KATE's accuracy was 75.7%, which was 26.9% higher than the average nurse accuracy of 59.8% (*P* P P P-values were 0.40, 0.63, and 0.06). Importantly, KATE demonstrated 80% accuracy for the ESI 2/3 triage acuity boundary, whereas the ED triage nurses demonstrated 41.4% accuracy (93.2% improvement over the nurses). This significant improvement in performance did not come at the cost of a high false positive rate on the ESI 2/3 boundary because KATE's ESI 3 overtriage was 6.9% vs the nurses' 7.9% (Table 4). The distributions of triage acuity assignment by the nurses, KATE, and the 3 study clinicians for triage records from the gold set are presented in Supplementary Table 5.

KATE demonstrated significantly higher area under the curve (0.85 vs 0.75, Supplementary Table 6), harmonic mean of precision and recall scores (0.74 vs 0.43, Supplementary Table 7), sensitivity (0.70 vs 0.42, Supplementary Table 8), and precision (0.81 vs 0.49, Supplementary Table 9) than the nurses for all gold records. KATE demonstrated both significantly lower undertriage (9.7%) and overtriage (14.4%) than the nurses (19.8% and 20.4%, respectively, Table 4). Furthermore, the nurses demonstrated a 104% higher rate of undertriage and a 41% higher overtriage rate than KATE. Interestingly, KATE was not significantly different from the study clinical team with respect to undertriage and overtriage (11.8% and 12.9%, respectively). The nurses demonstrated a very high level of undertriage for acuity level ESI 2 (57.9%), whereas KATE and the study clinicians demonstrated a 20% and 23.3% undertriage rate, respectively. Compared with the nurses (77.2%), KATE and the study clinical team demonstrated a lower overtriage rate for acuity level ESI 5 (50% and 49.1%, respectively).

KATE, the nurses, and the study clinicians were evaluated for adult (aged 18 years or older) and pediatric (aged 1 year to 17 years) patients separately. For adult patients, KATE's accuracy was 78.5%, the nurses' accuracy was 61.6%, and the accuracy of the 3 study clinicians was 81%, 78.3%, and 74.8%, respectively (Supplementary Table 10). For pediatric patients, KATE's accuracy was 67.1%, the nurses' accuracy was 53.9%, and the accuracy of the study clinicians was 66.5%, 71.9%, and 60.4%, respectively (Table 5 and Supplementary Table 11).

High-Risk Presentation Results

The performances of KATE and the nurses were also evaluated on high-risk presentations, which may be associated with ESI 1 or ESI 2 presentations (referenced in the ESI Handbook[3]). The results for high-risk presentations that appeared 5 or more times in the gold set are presented in Table 6. KATE demonstrated significantly higher accuracy than the nurses for these selected high-risk presentations.

Discussion

The purpose of this retrospective study was to determine whether historical EHR data could be extracted and synthesized using C-NLP and the latest ML algorithms (KATE) to produce highly accurate ESI predictive models. Accuracy in the initial assignment of ED patient acuity is a critical dependent function that may affect clinical trajectory and resource deployment. Undertriage has been associated with a significantly higher rate of admission and critical outcome, whereas overtriage has been associated with a lower rate of both.[37] Although overtriage can result in the overuse of resources, extending lengths of stay, the pervasiveness of undertriage, seen both in our sample and in other studies, has potentially serious consequences in patient situations owing to delays in care.[19]

This study has demonstrated that using retrospective data to develop highly accurate predictions are feasible. We found that KATE predicted accurate ESI acuities using only the information available to the triage clinician at the time of triage (eg, no final disposition or diagnosis was used) 75.9% of the time in comparison with the nurses (59.8%) and study clinicians (75.3%). KATE outperformed the nurses on all acuity levels for both study sites. KATE also demonstrated superior performance in accuracy compared with nurses for pediatric patients (67.1% and 53.9%, respectively) and adult patients (78.5% and 61.6%, respectively). Further research is required to improve KATE's performance for pediatric patients.

Importantly, KATE's accuracy on the border of ESI 2 and 3 (greater risk of decompensation) was 80% across both sites vs 41.38% for the emergency nurses. Besides high accuracy overall for each acuity level, KATE also demonstrated high accuracy for common high-risk presentations used as examples in the ESI Handbook ([Table 6]). Not only do the emergency nurses in this study demonstrate a 40% error rate on average, but the errors are also clustered for specific presentations, including those that would be high risk.

Individual and environmental factors can influence the perception or accuracy of acuity assignment in triage. Individual factors include knowledge deficits and implicit bias.[14-16,18,37] Ethnicity, socioeconomic status, and geographic data were not used as model features in the design and training of KATE, potentially mitigating these biases. We specifically excluded race and socioeconomic status as factors, both because reliance on these as predictors has been shown to decrease accuracy[14-18] and there is no biological or clinical basis on which to weight these factors.[38]

External or environmental factors such as crowding, chaos, cognitive bias, and time pressure can also affect the ability of the triage nurse to accurately perceive acuity.[3,9,39,40] KATE evaluated each patient individually, and thus ED conditions did not affect the perception of acuity; in a chaotic emergency department, the clinical support provided by KATE may mitigate errors due to interruptions of the triage process.

In addition, there are potential real-time benefits to a clinical decision support aid; researchers report that undertriage by nurses fell from 26.3% to 9.3% after an ESI refresher course was provided.[41] Because KATE could provide real-time feedback on clinical decision-making at triage, the program itself may also be useful as a self-directed educational process, improving nursing accuracy.

To the best of our knowledge, KATE is the first ML model that was trained on patient triage records and uses ESI acuity score as labels to predict ESI. Other approaches that use ML to predict triage acuity, such as Dugas et al[30] and Levin et al,[32] focus on an ML model to predict mortality, admission, or critical care outcome and then apply ad hoc thresholds to determine ESI acuity score. The limitation of these approaches is that although predicted outcomes are correlated with high acuity, there are specific clinical presentations such as a hypoglycemic event, anaphylaxis, or opioid overdose for which this may not be the case; nor do the algorithms evaluate resources explicitly or implicitly, which is important for the distinction among ESI 3, ESI 4, and ESI 5. In addition, cutoff thresholds are not known beforehand, and their optimization is not as efficient and hospital-independent as the ML approach, which was used in KATE.

Valuable information about patient presentation, for example, reason for visit, comes in the form of free text. Extracting relevant clinical information from reason for visit is crucial for any ML predictive model in the emergency department. Several approaches have been applied to extract information from reason for visit. Zhang et al[27] extracted significant words for disposition using the chi-square test. Rajkomar et al[23] used individual words. Hong et al[28] extracted 200 most frequent reasons for visit and used them as categories. Raita et al[25] classified reason for visit according to Reason for Visit Classification of Diseases. Sterling et al[29] used all individual words, paragraph vectors, and topic extraction. KATE extracts medical terms from free text using developed C-NLP technology and exploits them in predictive modeling. C-NLP demonstrates accuracy of 98.47% (F1 score 0.992, sensitivity 0.997, and precision 0.9877) in extracting medical terms from free text (Table 2 and Supplementary Table 1). Extracting medical terms using C-NLP provides a more accurate description of patient presentations and medical history than categorization or simple use of individual words.

Because nurse error rate in triage reaches 40%, it is not possible to accurately validate the performance of ML models on the basis of nurse labels. In contrast to previous studies, KATE was validated on a gold set in which all ESI labels were independently verified by ESI-trained clinicians, providing confidence in KATE's performance results.

Given the importance of accurate triage acuity assignment regarding the patient's clinical trajectory, improvement in triage accuracy has the potential to translate into better allocation of resources, more appropriate patient flow, and, most important, more rapid identification of patients needing immediate care.

Although the main aim of this study was to evaluate the performance of nurses, expert clinicians, and KATE in ESI triage, we also analyzed the distribution of disposition per ESI for the gold set (Supplementary Table 12). Among patients who were admitted to hospital, 36.05% were assigned ESI 1 or ESI 2 by the nurses, 61.63% by the expert clinicians, and 60.47% by KATE. This indicates the promise of KATE in improving patient outcomes by accurately assigning ESI levels for patients classified as high acuity. In addition to model improvements for pediatric patients, further prospective research will focus on the impact of KATE on patient and operational outcomes.

Limitations

This was a retrospective study; thus, the contextual aspects of the triage process were not available for consideration. Another limitation of this study is that individual nurse demographics, in terms of years of nursing and triage experience, were not available. Although formal triage education was standard practice at both sites, records of nurse training, hours of the training, and frequency were not available for analysis. The accuracy of the triage acuity assignments from study sites A and B (64.7% and 54.8%, respectively) are congruent with an average 60% reported in the literature.[20] Other studies report conflicting results on the influence of nurses' number of years since graduation, years of work experience, or years of experience.[22,42-44] The influence of individual nurse personal characteristics and experience on triage accuracy is a subject for future study.

For each individual high-risk presentation, a larger random sample gold set would need to be created to fully analyze KATE's performance on each of these presentations. For the pediatric population, records for children aged below 1 year were not used, and there were not enough records for critically ill children to adequately assess the model performance.

Implications for Emergency Nurses

Triage accuracy is critical to the process of getting patients to resources in a timely manner to ensure safe patient care. Our findings that the triage acuity scores assigned by nurses were often inaccurate suggest that multiple factors impede accuracy in triage. The use of KATE, a clinical decision support aid, may facilitate this process and improve the initial clinical decision regarding acuity.

Conclusion

In this study, the KATE model provided a triage acuity assignment substantially more accurate than that of triage nurses. Importantly, KATE operated independently of contextual factors, potentially mitigating the effects of implicit bias. KATE's acuity score is based on many pieces of information drawn from the patient's medical history, medication history, and documented risk factors, along with vital signs and physiological or psychological complaints. KATE is unaffected by the external pressures that can lead to undertriage and mitigates the racial and social biases that can negatively affect the accuracy of triage assignment.

Future research should focus on the implementation of KATE's providing real-time feedback to nurses in the emergency department. During the real-time implementation, the KATE model needs to be assessed with respect to its impact on mortality and morbidity; ED throughput; resource optimization; and nursing outcomes, including competence, satisfaction, and retention. Another important avenue of further research is the evaluation and improvement of KATE's performance for critically ill children.

Acknowledgments

Acknowledgement and special thanks to Mara Bryant, Patricia Stone RN, MSN, Karen Hansberger, MD., Yana Vaks MD., Michael Jordan RN, MSN, Sharon Correa, Ralf Weissenberger, Christian Burns, Steven Reilly and the teams at Adventist Health and Ascension Health for their contributions and support. This work was conducted and independently funded by Mednition Inc, a private corporation.

Author Disclosures

Conflicts of interest: All authors who are with the Mednition organization are employees. All non-Mednition authors are contract employees of Mednition, with the exception of Robert Dunne. Mednition has submitted a provisional patent for the work related to the study.

Supplementary Data

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.11.001.

Demographics/distribution	Site A	Site B
Total number of records	88 237	77 938
Number of men	38 159	33 482
Number of women	49 420	44 455
Number of pediatric records (patients aged below 18 years)	26 772	14 027
Number of adult records (patients aged 18 years or older)	60 815	63 911
ESI 1, n (%)	191 (0.22)	502 (0.64)
ESI 2, n (%)	8486 (9.62)	10 877 (13.96)

ESI 3, n (%)	37 730 (42.76)	44 565 (57.18)
ESI 4, n (%)	35 531 (40.27)	19 065 (24.46)
ESI 5, n (%)	5715 (6.48)	2929 (3.76)
Missing ESI, n (%)	584 (0.66)	—
Formal education in triage	Yes	Yes

Score	Value
Number of clinical terms	9506
Accuracy (95% CI)	0.9847 (0.9822-0.9871)
F1 score (95% CI)	0.9923 (0.991-0.9935)
Sensitivity (95% CI)	0.997 (0.9957-0.9981)
Precision (95% CI)	0.9877 (0.9853-0.9897)

C-NLP features overview		Count	
Total patient encounters used for model training and validation		147 052	
Total free text words processed		12 158 342	
Total clinical features extracted from free text		1 880 841	
Average free text clinical features per triage encounter		12.79	
KATE features overview			
Category	Description	Number of unique features	Total count of feature values

Total extracted features	All EHR study data, including C-NLP–extracted free-text features as input to feature engineering	45 928	approximately 10.1 billion
Total features after feature engineering	Processing, consolidation, and enhancement of raw data, input to KATE	26 332	approximately 9.9 billion
Total features selected by model	Features selected by model with positive predictive power (eg, nonzero gain)	7 679	approximately 9.1 billion
KATE engineered features	Subset of model features with positive predictive power added through feature engineering	3 554	approximately 3.5 billion

Study feature predictive power (gain) overview

Item	Description	Total gain, %	Average gain per feature, %
All features	Total model-selected features	100	0.0013
Study EHR features	Model features found in raw EHR data	53.7	0.0012
KATE-engineered features	Study team feature-engineered features	46.3	0.0014

Group	Number of triage records	KATE accuracy (95% CI)	Nurse triage accuracy (95% CI)	Clinician 1 accuracy (95% CI)	Clinician 2 accuracy (95% CI)	Clinician 3 accuracy (95% CI)
All records	729	0.76 (0.72-0.79)	0.60 (0.56-0.63)	0.78 (0.74-0.8)	0.77 (0.74-0.79)	0.72 (0.68-0.75)
Site A	368	0.80 (0.76-0.83)	0.65 (0.60-0.70)	0.75 (0.70-0.79)	0.73 (0.68-0.77)	0.72 (0.67-0.76)
Site B	361	0.72 (0.67-0.76)	0.55 (0.49-0.59)	0.81 (0.77-0.85)	0.81 (0.77-0.85)	0.71 (0.66-0.75)
All ESI 1	5	0.6 (0.2-1.0)	0.0 (0.0-0.0)	0.6 (0.2-1.0)	0.6 (0.2-1.0)	0.4 (0.0-0.8)

All ESI 2	145	0.8 (0.72-0.87)	0.41 (0.33-0.49)	0.77 (0.70-0.84)	0.78 (0.71-0.84)	0.76 (0.68-0.82)
All ESI 3	277	0.83 (0.78-0.87)	0.77 (0.72-0.82)	0.83 (0.78-0.87)	0.85 (0.80-0.88)	0.8 (0.75-0.84)
All ESI 4	210	0.76 (0.70-0.81)	0.68 (0.61-0.73)	0.81 (0.76-0.87)	0.80 (0.74-0.85)	0.68 (0.61-0.73)
All ESI 5	92	0.5 (0.39-0.60)	0.23 (0.14-0.32)	0.57 (0.46-0.66)	0.47 (0.36-0.57)	0.49 (0.39-0.60)

Group	Number of triage records	KATE undertriage (95% CI)	Nurse undertriage (95% CI)	Average of study clinicians undertriage	KATE overtriage (95% CI)	Nurse overtriage (95% CI)	Average of study clinicians overtriage
All records	729	0.097 (0.077-0.119)	0.198 (0.169-0.228)	0.118	0.144 (0.117-0.17)	0.204 (0.174-0.233)	0.129
Site A	368	0.098 (0.065-0.128)	0.193 (0.149-0.234)	0.093	0.103 (0.073-0.133)	0.16 (0.12-0.198)	0.178
Site B	361	0.097 (0.067-0.125)	0.202 (0.161-0.244)	0.144	0.186 (0.147-0.224)	0.249 (0.202-0.296)	0.079
All ESI 1	5	0.4 (0.0-0.8)	1.0 (1.0-1.0)	0.467	—	—	—
All ESI 2	145	0.2 (0.131-0.262)	0.579 (0.49-0.655)	0.233	0.0 (0.0-0.0)	0.007 (0.0-0.021)	0.000
All ESI 3	277	0.105 (0.065-0.141)	0.152 (0.105-0.195)	0.124	0.069 (0.04-0.098)	0.079 (0.047-0.112)	0.051
All ESI 4	210	0.052 (0.024-0.086)	0.062 (0.029-0.095)	0.073	0.19 (0.138-0.243)	0.262 (0.205-0.319)	0.167

All ESI 5	92	—	—	—	0.5 (0.391-0.598)	0.772 (0.674-0.848)	0.491

ESI Handbook: ESI 2 criteria	Count in gold set (n = 729)	KATE gold accuracy (95% CI)	Nurse gold accuracy (95% CI)
Significant tachycardia	35	0.97 (0.91-1.0)	0.37 (0.2-0.54)
Altered level of consciousness	25	0.84 (0.68-0.96)	0.36 (0.16-0.56)
Systemic inflammatory response syndrome	24	0.75 (0.58-0.92)	0.42 (0.21-0.63)
Hypotension	10	1 (1.0-1.0)	0.2 (0.0-0.5)
Symptomatic hypertension	10	0.9 (0.7-1.0)	0.8 (0.5-1.0)
Recent seizure	8	0.88 (0.63-1.0)	0.13 (0.0-0.38)
Active chest pain	6	0.83 (0.5-1.0)	0.5 (0.17-0.83)
Suicidal ideation	6	1 (1.0-1.0)	0.83 (0.5-1.0)

Clinical-term type	Number of clinical terms	Accuracy	F1 score	Sensitivity	Precision
Orientation	392	1	1	1	1
Primary pain onset	52	1	1	1	1
Reason for visit	4391	0.9909 (0.9879-0.9936)	0.9954 (0.9939-0.9968)	0.9991 (0.9982-0.9998)	0.9918 (0.9891-0.9943)
Previous illness	687	0.9869 (0.9767-0.9942)	0.9934 (0.9882-0.9971)	0.9883 (0.9782-0.9956)	0.9985 (0.9942-1.0)

Surgeries	1063	0.9454 (0.9304-0.9586)	0.972 (0.9639-0.9789)	0.996 (0.992-0.999)	0.949 (0.9346-0.9613)
Primary pain quality	39	1	1	1	1
Primary pain location	436	0.9954 (0.9885-1.0)	0.9977 (0.9942-1.0)	0.9954 (0.9885-1.0)	1
Level of consciousness	789	1	1	1	1
Affect behavior	33	1	1	1	1
Primary pain location detail	69	1	1	1	1
Before arrival	109	0.9817 (0.9541-1.0)	0.9907 (0.9765-1.0)	1.0 (1.0-1.0)	0.9817 (0.9541-1.0)
Respiratory status	26	1	1	1	1
Triage treatment	370	0.9838 (0.9703-0.9946)	0.9918 (0.9849-0.9973)	0.9838 (0.9703-0.9946)	1
Family history	63	1	1	1	1
Problems	928	0.9698 (0.9569-0.9795)	0.9847 (0.978-0.9897)	0.9956 (0.9901-0.9989)	0.974 (0.9623-0.9838)
Menstrual	47	1	1	1	1
Primary pain radiation location	5	1	1	1	1
Primary pain radiation location detail	2	1	1	1	1
Primary pain aggravating factors	1	1	1	1	1
Primary pain–associated symptoms	1	1	1	1	1
Medical devices	3	1	1	1	1

ESI label	Verified ESI 1	Verified ESI 2	Verified ESI 3	Verified ESI 4	Verified ESI 5	Total count
Nurse ESI 1	117	68	16	9	2	212
Nurse ESI 2	553	1484	484	73	30	2624
Nurse ESI 3	122	4991	4124	700	573	10 510
Nurse ESI 4	8	412	715	1856	2705	5696
Nurse ESI 5	0	30	28	163	389	610
Total count	800	6985	5367	2801	3699	19 652

Group	Number of triage records	KATE accuracy without verified ESI labels (95% CI)	KATE accuracy with verified ESI labels (95% CI)
All records	729	0.711 (0.676-0.739)	0.759 (0.724-0.787)
Site A	368	0.755 (0.709-0.796)	0.799 (0.758-0.834)
Site B	361	0.665 (0.615-0.707)	0.717 (0.665-0.759)
All ESI 1	5	0.2 (0.0-0.6)	0.6 (0.2-1.0)
All ESI 2	145	0.683 (0.6-0.752)	0.8 (0.724-0.869)
All ESI 3	277	0.823 (0.773-0.866)	0.827 (0.776-0.87)
All ESI 4	210	0.757 (0.7-0.809)	0.757 (0.695-0.814)
All ESI 5	92	0.337 (0.239-0.424)	0.5 (0.391-0.598)

Removal Reason	Count (%)

Conflicting documentation	7 (9.86)
Clinical team could not reach consensus	19 (26.76)
Impossible vital signs	2 (2.82)
Insufficient information	31 (43.66)
Missing 4 or more vital signs	7 (9.86)
No reason for visit	5 (7.04)

ESI label	Nurse, n (%)	Gold, n (%)	Clinician 1, n (%)	Clinician 2, n (%)	Clinician 3, n (%)	KATE, n (%)
ESI 1	1 (0.14)	5 (0.69)	3 (0.41)	3 (0.41)	2 (0.27)	3 (0.41)
ESI 2	88 (12.07)	145 (19.89)	129 (17.70)	134 (18.38)	134 (18.38)	144 (19.75)
ESI 3	363 (49.79)	277 (38.00)	293 (40.19)	295 (40.47)	295 (40.47)	308 (42.25)
ESI 4	241 (33.06)	210 (28.81)	238 (32.65)	242 (33.20)	214 (29.36)	213 (29.22)
ESI 5	36 (4.94)	92 (12.62)	66 (9.05)	55 (7.54)	78 (10.70)	61 (8.37)
No ESI label	—	—	—	—	6 (0.82)	—

Group	Number of triage records	KATE AUC (95% CI)	Nurse AUC (95% CI)	Clinician AUC (95% CI)	Clinician 2 AUC (95% CI)	Clinician 3 AUC (95% CI)
All records	729	0.849 (0.828-0.867)	0.749 (0.725-0.769)	0.86 (0.84-0.877)	0.855 (0.835-0.871)	0.822 (0.802-0.841)
Site A	368	0.866 (0.839-0.889)	0.764 (0.73-0.797)	0.83 (0.797-0.857)	0.817 (0.784-0.846)	0.812 (0.778-0.842)
Site B	361	0.823 (0.79-0.849)	0.718 (0.683-0.746)	0.881 (0.856-0.905)	0.882 (0.855-0.906)	0.82 (0.788-0.846)

Group	Number of triage records	KATE F1 score (95% CI)	Nurse F1 score (95% CI)	Clinician 1 F1 score (95% CI)	Clinician 2 F1 score (95% CI)	Clinician 3 F1 score (95% CI)
All records	729	0.738 (0.585-0.802)	0.428 (0.394-0.459)	0.757 (0.606-0.817)	0.74 (0.588-0.797)	0.665 (0.538-0.746)
Site A	368	0.766 (0.714-0.812)	0.56 (0.499-0.614)	0.664 (0.602-0.721)	0.595 (0.542-0.64)	0.631 (0.57-0.683)
Site B	361	0.705 (0.551-0.77)	0.397 (0.345-0.439)	0.799 (0.648-0.863)	0.796 (0.647-0.861)	0.68 (0.543-0.764)

Group	Number of triage records	KATE sensitivity (95% CI)	Nurse sensitivity (95% CI)	Clinician 1 sensitivity (95% CI)	Clinician 2 sensitivity (95% CI)	Clinician 3 sensitivity (95% CI)
All records	729	0.695 (0.573-0.786)	0.417 (0.389-0.445)	0.714 (0.593-0.801)	0.697 (0.577-0.788)	0.626 (0.532-0.735)
Site A	368	0.764 (0.707-0.812)	0.547 (0.488-0.601)	0.644 (0.589-0.693)	0.601 (0.56-0.641)	0.625 (0.573-0.67)
Site B	361	0.657 (0.527-0.752)	0.392 (0.352-0.429)	0.771 (0.654-0.862)	0.768 (0.645-0.858)	0.655 (0.555-0.758)

Group	Number of triage records	KATE precision (95% CI)	Nurse precision (95% CI)	Clinician 1 precision (95% CI)	Clinician 2 precision (95% CI)	Clinician 3 precision (95% CI)
All records	729	0.809 (0.606-0.836)	0.488 (0.446-0.528)	0.83 (0.627-0.854)	0.822 (0.62-0.85)	0.757 (0.544-0.785)

Site A	368	0.769 (0.712-0.818)	0.601 (0.527-0.675)	0.733 (0.65-0.799)	0.687 (0.543-0.825)	0.672 (0.594-0.748)
Site B	361	0.805 (0.598-0.844)	0.507 (0.446-0.562)	0.85 (0.657-0.883)	0.846 (0.639-0.877)	0.761 (0.543-0.796)

Group	Number of triage records	KATE model accuracy (95% CI)	Nurse triage accuracy (95% CI)	Clinician 1 accuracy (95% CI)	Clinician 2 accuracy (95% CI)	Clinician 3 accuracy (95% CI)
All records	562	0.785 (0.749-0.817)	0.616 (0.573-0.653)	0.81 (0.774-0.838)	0.783 (0.747-0.815)	0.748 (0.708-0.783)
Site A	272	0.82 (0.772-0.86)	0.647 (0.588-0.699)	0.783 (0.728-0.827)	0.754 (0.702-0.805)	0.79 (0.739-0.835)
Site B	290	0.752 (0.7-0.797)	0.586 (0.528-0.638)	0.834 (0.79-0.869)	0.81 (0.762-0.852)	0.707 (0.652-0.756)
All ESI 1	5	0.6 (0.2-1.0)	0.0 (0.0-0.0)	0.6 (0.2-1.0)	0.6 (0.2-1.0)	0.4 (0.0-0.8)
All ESI 2	131	0.855 (0.794-0.916)	0.427 (0.343-0.511)	0.786 (0.71-0.855)	0.786 (0.71-0.855)	0.746 (0.669-0.815)
All ESI 3	251	0.841 (0.793-0.884)	0.797 (0.741-0.845)	0.837 (0.789-0.876)	0.849 (0.805-0.892)	0.803 (0.747-0.851)
All ESI 4	129	0.721 (0.643-0.798)	0.62 (0.527-0.698)	0.837 (0.767-0.899)	0.791 (0.713-0.853)	0.721 (0.643-0.791)
All ESI 5	46	0.478 (0.326-0.609)	0.217 (0.109-0.348)	0.674 (0.543-0.804)	0.413 (0.261-0.565)	0.565 (0.413-0.696)

Group	Number of triage records	KATE accuracy (95% CI)	Nurse triage accuracy (95% CI)	Clinician 1 accuracy (95% CI)	Clinician 2 accuracy (95% CI)	Clinician 3 accuracy (95% CI)

All records	167	0.671 (0.599-0.743)	0.539 (0.455-0.617)	0.665 (0.587-0.731)	0.719 (0.647-0.784)	0.604 (0.524-0.677)
Site A	96	0.74 (0.646-0.823)	0.646 (0.541-0.729)	0.635 (0.531-0.729)	0.646 (0.552-0.729)	0.511 (0.404-0.606)
Site B	71	0.577 (0.465-0.676)	0.394 (0.268-0.507)	0.704 (0.592-0.803)	0.817 (0.718-0.901)	0.729 (0.614-0.814)
All ESI 1	0	—	—	—	—	—
All ESI 2	14	0.286 (0.071-0.5)	0.286 (0.071-0.5)	0.571 (0.356-0.786)	0.714 (0.5-0.929)	0.857 (0.643-1.0)
All ESI 3	26	0.692 (0.5-0.846)	0.5 (0.308-0.692)	0.769 (0.577-0.923)	0.808 (0.654-0.923)	0.769 (0.577-0.885)
All ESI 4	81	0.815 (0.716-0.889)	0.765 (0.667-0.852)	0.765 (0.667-0.852)	0.802 (0.716-0.876)	0.605 (0.506-0.704)
All ESI 5	46	0.522 (0.37-0.652)	0.239 (0.109-0.348)	0.457 (0.304-0.587)	0.522 (0.37-0.652)	0.419 (0.256-0.558)

Nurses					
Disposition	ESI 1, n (%)	ESI 2, n (%)	ESI 3, n (%)	ESI 4, n (%)	ESI 5, n (%)
Discharge	1 (0.16)	50 (8.16)	293 (47.80)	233 (38.01)	36 (5.87)
Admit	0 (0)	31 (36.05)	52 (60.47)	3 (3.49)	0 (0)
Expert clinicians					
Discharge	1 (0.16)	88 (14.36)	233 (38.01)	202 (32.95)	89 (14.52)
Admit	4 (4.65)	49 (56.98)	28 (32.56)	3 (3.49)	2 (2.33)
KATE					

Discharge	0 (0)	82 (13.38)	267 (43.56)	205 (33.44)	59 (9.62)
Admit	3 (3.49)	49 (56.98)	32 (37.21)	2 (2.33)	0 (0)

DETAILS

Subject:	Medical records; Hospitals; Learning; Datasets; Morbidity; Contextual factors; Mortality; Decision making; Triage; Bias; Nurses; Optimization; Assignment; Emergency medical care; Clinical decision making; Machine learning
Business indexing term:	Subject: Machine learning
Location:	United States--US
Identifier / keyword:	Emergency Severity Index; Triage; Acuity; Machine learning
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	265-278.e7
Publication year:	2021
Publication date:	Mar 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.11.00 1

ProQuest document ID:	2498285811
Document URL:	https://www.proquest.com/scholarly-journals/improving-ed-emergency-severity-index-acuity/docview/2498285811/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-06-02
Database:	Public Health Database

Time-to-Treatment and Its Association With Complications and Mortality Rate in Patients With Acute Myocardial Infarction: A Prospective Cohort Study: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

Time-to-treatment is one of the most important factors affecting the complications and mortality rate in patients with acute myocardial infarction. The purpose of this study was to determine time-to-treatment and its association with complications and mortality rates in patients with acute myocardial infarction in selected hospitals in Zanjan, Iran.

Methods

This prospective cohort study was performed with 200 patients suffering from acute myocardial infarction in selected educational hospitals of Zanjan from June 2016 to March 2017. Parameters including the interval between pain onset and treatment, myocardial infarction complications, in-hospital mortality, and 30-day mortality after the occurrence of myocardial infarction were collected through a special questionnaire and phone calls. The data were analyzed using descriptive statistics and logistic regression models.

Results

The longest time-to-treatment delay is related to prehospital time (mean, 330.68 [SD=411.55] minutes). Based on the results, the increase in the interval time between onset of pain and treatment (odds ratio: 1.001; 95% confidence interval, 1.000–1.002; $P = 0.01$), hypertension (odds ratio: 2.96; 95% confidence interval, 1.14–7.68; $P = 0.02$), and left coronary artery complete occlusion (odds ratio: 2.78; 95% confidence interval, 1.57–4.94; $P < 0.001$) were mortality predictor factors. Furthermore, the increase in the interval time between onset of pain and treatment (odds ratio: 1.001; 95% confidence interval, 1.000–1.002; $P = 0.03$), current smoking (odds ratio: 5.53; 95% confidence interval, 1.75–17.43; $P = 0.004$), and right coronary artery complete occlusion (odds ratio: 5.87; 95% confidence interval, 1.34–25.82; $P = 0.02$) were highly associated with the occurrence of heart failure.

Discussion

Hypertension, smoking history, and delay in treatment time were highly associated with the occurrence of heart failure and mortality. Therefore, in Iranian society, education on primary and secondary prevention of myocardial infarction is recommended to reduce patient mortality.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current literature on time-to-treatment and its association with complications and mortality rate in patients with acute myocardial infarction indicates that delay in treatment time was associated with the occurrence of heart failure and mortality.

••The main finding of this research is that smoking history and hypertension were highly associated predictor factors with complications and mortality of myocardial infarction. Both risk factors can be modified through patient and community education.

••Key implications for emergency nursing practice found in this article are the need to raise population-level awareness about leading risk factors for myocardial infarction, symptoms, and access treatment as soon as possible.

Introduction

Myocardial infarction (MI) is one of the leading causes of death, especially in the early hours of occurrence.[1-5] According to the American Heart Association guidelines, the treatment of MI should occur within 120 minutes. Early diagnosis and successful intervention play an important role in reducing mortality related to acute MI. Reducing the time-to-treatment depends on the performance quality of therapeutic systems.[6-9]

Two important factors that affect the performance quality of associated therapeutic systems are door-to-needle time (DTNT) less than or equal to 30 minutes and door-to-balloon time (DTBT) less than or equal to 90 minutes.[10] Each 30-minute delay in thrombolytic therapy leads to 7.5% and 8.7% increases in mortality rate and left ventricular dysfunction, respectively, and in addition, each 30-minute delay between the onset of symptoms and performing percutaneous intervention results in an 8% increase in 1-year mortality.[11] Nallamothu et al[12] reported that every 10-minute reduction in DTBT leads to 92% and 94% decreases in the in-hospital mortality and 6-month mortality, respectively. Sim et al[13] performed a study on patients with MI from 2009 to 2012. In the study, the patients were divided into “non-delay” (DTBT 90 minutes) groups. The results indicated a higher rate of mortality in the “delay” group. In 3 other studies, by reducing the average DTBT, no change was observed in in-hospital mortality, 1-month mortality rate, or heart failure.[10,14,15] However, less than 4 hours between onset of pain and treatment was associated with significantly decreased heart failure and mortality rates.[14]

According to the studies performed in Iran and other countries, the average door-to-reperfusion time is more than 2 hours.[4,16-19] One study showed that only 35.7% of patients arrived at the hospital within 1 hour and 7.9% of them attended after 24 hours from starting the symptoms.[18]

The main elements of chest pain-to-reperfusion time delay include lack of timely patient recognition of the severity of symptoms; evaluation, treatment, and transfer to a hospital; the required time for diagnostic evaluations and starting treatment in the hospital; and the onset of treatment until reperfusion.[9,20,21]

Based on previous studies, prehospital delays were more significant than hospital delays.[22,23] The factors affecting prehospital delays included incorrect patient identification of symptoms, patients presenting to primary care centers and general practitioners, patient transit problems, patients residing in rural areas, lack of patient or family history of coronary artery disease, and incorrect provider diagnosis.[16,20,22-26] In 1 study, the most common cause of delay in DTNT was associated with the delay in informing the physician of a patient’s symptoms and electrocardiogram (ECG) by ED staff.[27]

Numerous investigations have reported the association of certain factors (eg, males, high education, patient's perception of the severity of symptoms, and residence in urban areas) with a faster onset of treatment.[23,26]
Population health policy is relevant to the treatment of MI. The Ministry of Health of Iran and its affiliated medical universities are responsible for treatment, health, and medical education. In Iran, the Ministry of Health has issued a code of MI or code 247 to improve the treatment of patients with MI since 2015. Therefore, researchers must investigate the status of prehospital and hospital delays in patients with MI after the implementation of this project in angioplasty service centers in Iran.[28]
Despite numerous studies in this field, there is a need to continuously evaluate community awareness of MI symptoms and its need for timely treatment, as well as examine the quality of prehospital and hospital care services. To the best of our knowledge, there is no study in Iran addressing time intervals between the onset of pain of patients with MI and thrombolytic therapy or angioplasty. Most of the studies in this field only evaluated prehospital or hospital delays, with few of them investigating complications and mortality rates.[11,16,18,23,26] This study aimed to determine time-to-treatment and its association with complications and mortality rate in patients with MI in hospitals with heart services in Zanjan, Iran.

Methods

This hospital-based prospective cohort study was performed with patients with MI in educational hospitals of Zanjan from June 2016 to March 2017.

Study Setting

The Zanjan province is located in the northwestern part of Iran. The capital of this province is Zanjan. It has a population of 1,057,461 with 8 counties and 978 villages. Because Zanjan province is located on the Iran transit route to Europe, its medical centers also provide medical services to people from other provinces. There are 10 hospitals affiliated with Zanjan University of Medical Sciences and 3 other hospitals in Zanjan province. Of these 3 hospitals, 1 is private, the others are affiliated with law enforcement and social security. However, in Zanjan, 2 ValiAsr and Ayatollah Mousavi hospitals affiliated with the University of Medical Sciences provide services for patients with heart disease. In the province, the treatment process for patients with MI patients is performed with code 247. According to the protocol of code 247 policy, as soon as a patient calls emergency medical services (EMS), the telephone triage unit responds to the call. After the ambulance is dispatched, first-aid treatments are performed, and an ECG is taken immediately from the patient and sent to a specialist. With an initial diagnosis of MI, code 247 is activated, and the target hospital and the hospital supervisor are notified. After the patient is delivered to the hospital, in the case of ST- elevation MI or non-ST– elevation MI, the patient will be referred directly to the angiographic unit or an emergency medicine specialist, respectively. Patients with cardiac arrest or ventricular fibrillation are transferred to the resuscitation room and are monitored by an emergency medicine specialist.
The study setting was the Cardiac Health Centers of Zanjan Province, Valiasr and Ayatollah Mousavi Educational Hospitals.

Sampling

We used a convenience sampling design. A total of 50 participants were considered in a pilot study. Because the participants in the pilot study had the same inclusion and exclusion criteria, the results from the pilot study were also included in this study. Considering the pilot study and based on the time-to-treatment variable and the distance of a SD of 137 **Inclusion and Exclusion Criteria**

Patients who were referred to cardiac treatment centers with typical and atypical symptoms of MI at the time of our study were included in the study if an ECG and elevated cardiac enzymes indicated ST-elevation MI. In addition, patients who were admitted to the hospital with ventricular fibrillation or cardiac arrest were included in the study if

they had cardiopulmonary resuscitation and survived. Another inclusion criterion was the willingness of patients to participate in the study. Patients who had secondary MI owing to other diseases such as hemorrhage were excluded from the study. We did not include patients who died in the prehospital or emergency department setting without successful resuscitation in the emergency department.

Ethical Consideration

The present study was conducted after approval of the ethics committee of Zanjan University of Medical Sciences (ZUMS.REC.1395.68). Written informed consent was taken from all patients or, if necessary, from their guardians.

Data Sources and Instruments

Data were collected by research nurses who recorded direct observations, reviewed the medical record, completed a questionnaire for each patient participant during the hospital stay, and completed telephone follow-up for 30-day mortality with patients or persons who accompanied them to the hospital. Prehospital and hospital delays and their effective factors (sex, age, lack of patient or family history of coronary artery disease, pain intensity and patient identification of symptoms, residence in rural areas, referral source to the hospital with cardiac services, transit problems, and incorrect provider diagnosis), complications, and mortality rates were gathered by direct observation as well as patient records.

The data collection instrument of this study was a questionnaire designed to capture demographic data and factors from time of pain onset until treatment (Supplementary Table 1). Sex, age, risk factors for cardiovascular disease (diabetes, hypertension, hyperlipidemia, smoking, drug use),[29] pain intensity (0-10), referral source to the hospital with cardiac services (EMS, personal vehicle, public vehicle, referral by ambulance from other medical centers), type of MI, percent coronary artery blockage, and type of treatment were included in this questionnaire.

The interval between the onset of pain and the patient's contact with EMS or referral to a treatment center, the onset of pain until the first ECG in an ambulance or noncardiac treatment center, the onset of pain until arrival to the hospital with cardiac services, the interval between the arrival to the hospital with cardiac services and the first physician visit, the arrival to the hospital with cardiac services until the first ECG, the arrival to the hospital until a treatment order, and the arrival to the hospital until treatment implementation were also assessed.

A checklist was also used to investigate any MI complications (Supplementary Table 2).[30] These included cardiac dysrhythmia, cardiogenic shock, heart failure, aortic valve rupture, coronary dissection, pulmonary edema, unstable angina, gastrointestinal bleeding, and brain stroke.

Both tools were developed from information in the published literature.[16,31,32] Moreover, to determine their validity, the designed tools were submitted to 10 critical care nursing professors, and the necessary corrections were made on the basis of their feedback. Moreover, the reliability of the study was determined using the evaluation of inter-rater agreement. Accordingly, 2 researchers filled the designed questionnaire for 10 patients. The 99% Cohen's kappa coefficient obtained through these questionnaires showed a high agreement between the results of the 2 researchers.

Variables

The variables of this study included demographic variables, risk factors related to atherosclerotic heart disease, factors related to prehospital and hospital time-to-treatment, coronary artery involvement based on angiographic results, complications, and mortality.

In this study, heart failure owing to MI was determined on the basis of the results of the ECG and the ejection fraction (EF) of the patients. The degree of left ventricular dysfunction correlated well with the extent of acute infarction. Hemodynamic compromise becomes evident when impairment involves 20% to 25% of the left ventricle, and cardiogenic shock or death occurs with involvement of the left ventricular muscle of 40% or more.[33] Therefore, in

this study, an EF of 35% and less was recognized as heart failure.

In this study, the mortality rate owing to the complications of MI was assessed in the hospital and also 30 days after hospitalization. To find cardiac mortality, all patients were followed up to 30 days after hospitalization. If mortality occurred within 30 days of hospitalization owing to MI, patients' medical records were reviewed to determine the cause of cardiac mortality.

Hypothesis

This study examined the following hypothesis in patients with MI: Demographic variables, delay in treatment, risk factors of cardiovascular disease, and complete occlusion of coronary artery are associated with complications and mortality ([Figure]).

Data Collection Procedures

Data were collected from June 2016 to March 2017 on a 24-hour basis by 2 nurses with bachelor degrees working at the emergency department, cardiac care unit, and cardiology ward.

Attempts were made to collect data at the appropriate time and place by interviewing the patients or, if necessary, the emergency contact support person who accompanied the patient to the hospital. The 30-day mortality rate was obtained through contact with the patients or the emergency contact support person who accompanied them to the hospital.

Data Analysis

Statistical analyses were performed using SPSS version 16 software. To analyze the data, quantitative variables were presented in the form of SD and mean, whereas qualitative variables were presented as frequency and percentage. The predictor factors of time, individual and organizational delays associated with the occurrence of complications, and mortality were determined using a logistic regression model.

Backward stepwise logistic regression was performed for 30-day mortality predictor factors in 8 steps and for heart failure (as the most common complication) predictor factors in 9 steps. This analysis started with all variables in step 1; that is sex, age, diabetes, hyperlipidemia, hypertension, smoking, drug use, previous heart disease, time between onset of symptoms and beginning of treatment, 100% left anterior descending (LAD) coronary artery obstruction, 100% right coronary artery (RCA) obstruction, 100% left circumflex artery (LCX) obstruction.

At each step, the variable with the largest *P* value (the least statistically significant) was removed automatically, and this process was repeated until no further variables could be deleted without a statistically insignificant loss of fit and finally a reduced model that best explained the data was found. The remaining statistically significant variables for 30-day mortality in step 8 are age, hypertension, drug use, previous heart disease, time between onset of symptoms and beginning of treatment, and 100% LAD obstruction. The remaining statistically significant variables for heart failure in step 9 are smoking, drug use, time between onset of symptoms and beginning of treatment, 100% RCA obstruction, and 100% LCX obstruction. A *P* value of equal to or less than 0.05 was considered statistically significant.

Results

Of the eligible participants, 9 patients declined to participate in the study or to continue collaborating by telephone and were excluded from the study. Two participants were admitted to the hospital with cardiac arrest and entered the study after resuscitation.

Of the 200 patients who participated and were eligible, 159 (79.5%) were male. The mean age of the patients was 60.77 (SD = 13.97) years. The most common risk factor for MI was current smoking (41.5%), followed by hypertension (36%) ([Table 1]). Only 26 of the patients contacted EMS, and their ECG was taken in an ambulance according to code 247.

In this study, the most common type of MI was inferior(28%). Moreover, the LAD (40.5%) and the RCA (20%) were the most common arteries that underwent angioplasty, respectively. Of the 19.5% of the patients who received thrombolytics, in more than half of them drug administration was started in the emergency room ([Table 1]).

Mean DTNT was 64.83 (SD = 47.66) minutes, and mean DTBT was 89.43 (SD = 213.06) minutes. The total time from pain onset until reperfusion therapy (thrombolytic therapy or angioplasty) was 405.53 (SD = 465.82) minutes (330.68 [SD = 411.55] minutes prehospital time and 75.10 [SD = 181.64] minutes door-to-reperfusion-time) ([Table 2]). Only 18.5% of patients underwent reperfusion therapy in less than 120 minutes (the golden time for initiating cardiac ischemia treatment).

In total, MI complications were observed in 25% of the patients. The most common complication was heart failure (9%) followed by ventricular tachycardia (3%). Of the 200 patients, death occurred in 14.5%. In regard to death distribution, 5% of the patients died in the fourth week, 3.5% in the third week, 3% in the second week, and 3% in the first week after MI ([Table 1]). As for the location where the death occurred, 11% of the patients died at home, 2.5% in the CCU and 1% in the cardiac ward.

The results of the logistic regression showed that prolonged chest pain-to-reperfusion time, hypertension, and 100% obstruction of LAD were the statistically significant predictors of 30-day mortality ([Table 3]). It also showed that prolonged chest pain-to-reperfusion time, smoking, and 100% obstruction of RCA were the statistically significant predictors of heart failure ([Table 4]).

Discussion

The purpose of this study was to determine time-to-treatment and its association with complications and mortality rates in patients with acute MI. According to the results of this study, delay in time-to-treatment was highly associated with the occurrence of heart failure and mortality. The results of this study demonstrated that prehospital delay was more significant than hospital delay ([Table 2]). A 30-day mortality was associated with prolonged chest pain-to-reperfusion time, hypertension, and 100% obstruction of LAD ([Table 3]). Heart failure (with EF 35% or less) was associated with prolonged chest pain-to-reperfusion time, smoking, and 100% obstruction of RCA ([Table 4]).

In the present study, a large proportion of the delay in the onset of treatment related to the time interval between the onset of pain and the arrival to cardiac hospitals. Although most of the foreign studies mentioned in this article align with the findings of the current study, the prehospital delay in Iran was mostly because of a delay in the recognition of symptoms by patients (61%) and then being away from the hospital (22%) was more than that in other countries.[22-25,27,34] For example, the mean time from pain onset until performing angioplasty or thrombolytic therapy, according to Beig et al[22] and Björklund et al[35] who conducted a study in India (250 minutes) and Sweden (165 minutes), respectively, was much lower than the results obtained in Iran (507 minutes).[23]

In Iranian society, chronic diseases such as atherosclerotic heart disease are on the rise.[36,37] For this purpose, the Ministry of Health of Iran has set the National Document for Prevention of Non-Communicable Diseases from 2016 to 2026. In this document, conditions such as poverty, level of health literacy, and access to service centers in Iran are mentioned as barriers to preventing diseases such as heart disease.[31] One of the goals of this document for preventing noncommunicable diseases such as heart disease is to provide community-based responsive medical science education. Therefore, according to this document, health service managers and health staff should provide necessary training about the risk factors for heart disease, symptoms of heart disease, and how the patient and his or her family deal with these symptoms.[28] Therefore, to assess the achievement of the goal of prevention at the third level and to reduce complications in cardiac patients, the prehospital delays of cardiac patients at 5-year intervals until 2026 should be investigated.

In our results, limiting the provision of treatment services to patients with MI in only 2 health care centers delayed the

referral of patients with MI. Because Zanjan has some impassable areas, access to these medical centers is restricted. Therefore, emergency care leaders should take measures to reduce the prehospital delay time of cardiac patients and facilitate access to health care centers where transportation may be challenging because of the geography.

In our study, an increase in pain onset-to-treatment time was highly associated with 30-day mortality, which was consistent with that of Ho et al[14] in China. The results of studies by Sim et al[13] and Yamada et al,[38] which were conducted in Asia, and those of Nallamothu et al[12] in the United States, indicated an increase in mortality rate by increasing the time from entry to the hospital until treatment. Menees et al[10] performed a study in the US and showed that despite improvement in DTBT from 2005 to 2009, no significant changes were observed in in-hospital and 30-day mortality. Elsewhere, Peng et al[34] conducted a study in China and indicated that an increase in prehospital delay led to an increase in mortality rate. Most studies demonstrated that an increase in pain onset-to-treatment time led to a higher mortality rate.

A limited number of studies showed the relationship between pain onset-to-treatment time and common complications of MI. The results of our present study were consistent with those of Ho et al[14] in China. A delay in treatment increased the infarction area and the possibility of heart failure.[39]

In this study, major risk factors of MI had a greater role in mortality and complications than prehospital delay. In this study, hypertension and smoking were identified as one of the predictors of mortality and heart failure in patients with MI, respectively ([Tables 3] and [4]). Studies by Lacey et al,[40] Gupta et al,[41] Lewington et al,[42] and Rojas et al[43] showed that hypertension was associated with increased mortality owing to cardiovascular disease. Gopal et al[44] also indicated that smoking was associated with an increase in heart failure, and according to the studies by Shah et al[45] and Ahmed et al,[46] smoking cessation was associated with increased cardiac function. The results of all 3 studies are consistent with the present study. Therefore, the results of this study indicated that in Iranian society, the focus should be on primary prevention rather than secondary prevention with appropriate training to reduce the mortality and complications of MI.

Limitations

A major limitation of this study was that it relied on the patients to recall times, which was especially challenging for senior patients. Researchers tried to focus on important times such as adhan (this is the call to prayer) and news, as well as reviewing the events of that day, as far as possible, to accurately record the time and factors affecting the prehospital delays.

Patients who died in the emergency room because of dysrhythmia or other comorbidities were not investigated; it was not possible to obtain information because of their family's mental and emotional status. The results of this study may have changed with the inclusion of these patients. Therefore, it is recommended that future studies use this type of information to obtain more reliable results on prehospital and hospital delays and other risk factors in predicting complications and mortality of patients with MI in Iran. Owing to the descriptive nature of this study and the specific conditions of the Zanjan province, the results of this study may have limited generalizability to other communities. Not all possible complications of MI may have been captured by the methods used. Unlike international studies where government death records or indices can be linked to measure nonhospital mortality, this study relied on communication with family members after discharge, which may not have recorded all postdischarge deaths.

Implications for Emergency Nurses

Key implications for emergency nursing practice from this research are the need to raise population-level awareness about leading risk factors for MI, symptoms, and access treatment as soon as possible. Emergency clinicians can

integrate prevention into patient teaching and discharge education. Adequate prevention and control of hypertension and smoking cessation can be included in patient education and discharge instructions for all at-risk patients to prevent subsequent MI, regardless of the reason for a present ED visit.

Conclusion

The results of the present study showed that smoking history and hypertension were highly associated with complications and mortality. Both risk factors can be modified through community education. Therefore, the authorities should aim at raising awareness about the leading risk factors for MI, symptoms, and the need for treatment as soon as possible.

Changing people's lifestyles by guiding them to self-care can prevent atherosclerotic heart disease. Conducting training courses for at-risk populations (such as the older people or people with diabetes or hypertension), as well as public education through national media, social networks, and popular publications can be good ways for primary and secondary prevention of heart disease. In contrast, training during the discharge of patients with MI and periodic home visits of patients with MI can reduce the complications of MI.

In addition, the results of our study determined that prehospital delay was more significant than hospital delay, and these delays were identified as the statistically significant predictors for heart failure and mortality. The presence of experienced emergency medical personnel and the rapid and proper performance of emergency physicians and nurses are important factors in timely treatment, which can reduce the complications and mortality of the disease. To enhance the performance quality of the health care team, it is important to regularly evaluate their knowledge and performance and provide them with retraining courses if needed.

Acknowledgments

The authors thank Zanjan University of Medical Sciences, which financially supported this research.

Author Disclosures

Conflicts of interest: none to report.

This study was conducted with A-11-148-19 sponsored by Zanjan University of Medical Sciences.

Supplementary Data

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.05.013.

Variables	Number	%
Sex		
Male	159	79.5
Female	41	20.5
Age		
>60 y	105	52.5

<60 y	95	47.5
Risk factors		
Smoking	83	41.5
Hypertension	72	36
Drug addiction	41	20.5
Hyperlipidemia	39	19.5
Diabetes mellitus	33	16.5
Prior heart disease	53	26.5
Pain severity (0–10)		
>8	138	69
<8	62	31
Mode of transport		
Personal vehicle	94	47
Referral from other centers	78	39
Call to the emergency medical services	24	12
Public vehicle	4	2
Myocardial infarction type		
Inferior	56	28
Anterior	51	25.5
Extensive	34	17
100% obstruction of arteries		
Left anterior descending	81	40.5
Right coronary artery	43	21.5

Left circumflex artery	12	6
Reperfusion therapy		
Angioplasty	141	70.5
Thrombolytic therapy	31	15.5
Complication		
Heart failure	18	9
Ventricular tachycardia	6	3
30-d mortality		
First wk	6	3
Second k	6	3
Third wk	7	3.5
Fourth wk	10	5

Variable	Mean (SD)	CI
Prehospital intervals		
Onset of pain until decision to call EMS or go to a health center	100.31 (172.06)	0–1,070
Onset of pain until first ECG in ambulance	8.6 (15.05)	6–22
Onset of pain until arrival to hospital with cardiac services	330.68 (411.55)	10–4,320
Hospital intervals		
Arrival to the hospital until first visit	8.36 (9.02)	0–55
Arrival to the hospital until first ECG	10.44 (12.35)	0–95
Arrival to the hospital until the treatment order	62.54 (180.47)	0–2,160

Arrival to the hospital until the reperfusion therapy	75.10 (181.64)	3–2,160
Onset of pain until treatment	405.53 (465.82)	15–4,325

Variables	β	SE	OR (95% CI)	P value
Age	0.35	0.19	1.035 (0.997–1.075)	0.07
Hypertension	1.08	0.49	2.956 (1.137–7.683)	0.03
Previous heart disease	0.97	0.57	0.381 (0.124–1.172)	0.09
100% LAD obstruction	1.02	0.29	2.781 (1.566–4.938)	< 0.001
Time-to-treatment	0.001	< 0.01	1.001(1.000–1.002)	0.01

Variables	β	SE	OR (95% CI)	P value
Smoking	1.71	0.59	5.528 (1.753–17.434)	0.004
100% RCA obstruction	1.77	0.76	5.873 (1.336–25.821)	0.02
100% LCX obstruction	−1.38	0.71	0.252 (0.063–1,003)	0.05
Time-to-treatment	0.001	< 0.01	1.001 (1.000–1.002)	0.03

Demographic and factors related to delay in treatment questionnaire
Hospital name:□Vali Asr□Ayatollah Mousavi
Sex:□male□female
Age:
Weight:

Education degree:□Analphabetic□Less than diploma□Diploma□College education
Job:□Worker□Employee□Housewife□Retired□Self employed
The number of family members
Monthly income:
Living with:□Alone□Spouse□Children□Family
Insurance status:
Medical history:□Diabetes□Hypertension□Hyperlipidemia□Unstable angina□Myocardial infarction□Gastrointestinal disease□Family history of myocardial infarction□Smoking□Drug abuse
Hospital history:□Yes□No
Hospital history due to cardiac disease:□Yes□No
Location during onset of symptoms:□Less than 10 kilometers of cardiac hospitals in the city□more than 10 kilometers of cardiac hospitals in the city□Out of the city
Symptoms type:□Chest pain□Left hand pain□Right hand pain□Shoulder pain□Neck pain□Stomachache□Vomiting□Nausea□Dyspnea□Dizziness□Fainting□Sweating
Your definition of symptoms:□Cardiac disease□Gastrointestinal disease□Common cold□Other definitions
Which of the following medications did you take at the onset of symptoms?□Aspirin□TNG Perl□Stomach syrup□Herbal medicine□Drugs□Other medications□None
Have you taken aspirin in the last 7 days?□Yes□No
If your symptoms appeared as pain, how severe was it? 10 9 8 7 6 5 4 3 2 1 0
Which of the following did you visit before going to the cardiac hospital?□Private clinic□General clinic□Private hospital□Other center□None
Why did you visit the above center?□Accessibility of the center□Low center costs□I didn’t think my illness was important
Who did you consult first after the onset of symptoms?□Spouse□Children□Friends□EMS□None
Did you call EMS before going to the health centers?□Yes□No

Time of your symptoms onset (exactly)?
Time of your calling EMS (exactly)?
Time of arriving EMS (exactly)?
Why did you decide to go to the cardiac hospital?□My symptoms got worse□Based on my background and information, I guessed it was a heart attack□Based on the doctors recommendations□Based on EMS consultation□Based on others' advice
How did you get to the hospital?□By personal vehicle□By public transport□EMS□Referral by ambulance
The degree of the person accompanying you?□Analphabetic□Less than diploma□Diploma□College education (medical field)□College education (non-medical field)
How were your symptoms when you arrived at the hospital?□Reduced□Relieved□Increased□No change
Did you have any new symptoms when you arrived at the hospital?□Yes□No
Were you referred to the triage unit at the beginning of admission?□Yes□No
The exact time of arrival at the hospital?
With whom was your first visit?□General practitioner or non-cardiac resident□Cardiac resident□Specialist
The exact time of first visit?
Possible diagnosis on the first visit?□Unstable angina□Myocardial infarction□Ischemic heart disease□Other diagnosis
Blood pressure at the admission time?
Heart rate at the admission time?
The first ECG time?
Was there ST segment elevation in the first ECG?□Yes□No
What was the diagnosis after the first ECG?□Inferior MI□Anterior MI□Posterior MI□Anteroseptal MI□Inferolateral MI□Extensive MI□Right ventricular MI□Left bundle branch block□Other diagnosis
Was there an increase in biomarker enzymes?□Yes□No
The exact time of the reperfusion therapy order?

The exact time of thrombolytic injection?
The exact time of angiography?
What was the result of angiography and coronary artery occlusion percentage?
In which ward was thrombolytic therapy done?□Emergency department□CCU
From which ward were you transferred to the angiography ward?□Emergency department□CCU
How was the thrombolytic provision done?□Available in the ward□From another ward□It was prepared by the patient’s companion
Prehospital time (arrival time)?
Door to needle time or door to balloon time?
Symptoms onset time to reperfusion therapy (PCI or thrombolytic therapy)

Complications of myocardial infarction	YES	NO
Post MI angina		
Re-infarction		
Pulmonary edema		
Heart failure		
Cardiogenic shock		
Mitral regurgitation		
Left ventricle aneurism		
Cardiac rupture		
PVC		
VT		

VF		
PSVT		
Sinus Brady arrhythmia		
Junction Brady arrhythmia		
AV block grade 1		
AV block grade 2		
Complete AV block		
Brain stroke		
Peripheral emboli		
Pericarditis		
Mortality (if so, please write down the exact time)		
In the emergency department		
In CCU		
In the cardiac ward		
At home after discharge		
In the re-admission		

DETAILS

Subject:	Emergency medical care; Pain; Family medical history; Secondary prevention; Mortality; Heart failure; Electrocardiography; Risk factors; Questionnaires; Hospitals; Cohort analysis; Acute; Complications; Patients; Hypertension; Smoking; Cardiac arrhythmia; Angioplasty; Heart attacks; Coronary vessels; Cardiovascular disease; Confidence intervals; Parameters; Myocardial infarction; Mortality rates; Education
Location:	Iran
Identifier / keyword:	Myocardial infarction; Time-to-treatment; Complication; Mortality
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia

Volume:	47
Issue:	2
Pages:	288-298.e4
Publication year:	2021
Publication date:	Mar 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.05.013
ProQuest document ID:	2498285809
Document URL:	https://www.proquest.com/schola rly-journals/time-treatment-association-with-complications/docview/2498285809/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2021-03-08
Database:	Public Health Database

Proning Pains: Recognizing the Red Flags of Body Mechanics for Health Care Workers Involved in Prone Positioning Techniques: JEN

ProQuest document link

ABSTRACT (ENGLISH)

The practice of placing a patient with COVID-19–associated ARDS in the prone position has become part of the routine treatment because this position allows for greater expansion of the posterior portion of the lungs, resulting in more efficient removal of pulmonary secretions and, ultimately, improved oxygenation of the patient.1,2 From a health care clinician's standpoint, however, this positioning technique can be quite labor-intensive because several health care clinicians and direct care aides are required to safely transition the patient from a supine position to a prone position, all the while maintaining hemodynamic and oxygenation stability.3 Even more concerning is the recognition that placing a patient in the prone position greatly increases the health care worker's risk for musculoskeletal low back injury4 (Figure), resulting in negative consequences for the injured worker, the staffing needs of the organization, and the overall health care pandemic response. With the bed or gurney raised to working hip height (recognized as a consensus among health care workers of approximately the same height)6 to midthigh as discussed later in the article, at least 2 team members are needed to reach across the patient to the opposite side; this movement places the nurse in a position of extension for the lumbar spine,5,7,8 which is the first red flag for musculoskeletal injury. Typically, health care workers generate this force from the muscles of the lower back or from the arms and shoulders.10 Although the force exerted for smaller-statured patients may not pose a significant risk for injury among multiple health care workers, an increased force is required if the number of staff members is reduced or the patient is larger in mass.4 From here, the patient's body weight is held and supported by the team members, while another team member places a draw sheet or lifting straps.

FULL TEXT

It is without doubt that the coronavirus disease (COVID-19) pandemic has significantly affected the emergency and critical care communities in how health care professionals treat patients, both ventilated and nonventilated, with acute respiratory distress syndrome (ARDS). The practice of placing a patient with COVID-19–associated ARDS in the prone position has become part of the routine treatment because this position allows for greater expansion of the posterior portion of the lungs, resulting in more efficient removal of pulmonary secretions and, ultimately, improved oxygenation of the patient.[1,2] From a health care clinician's standpoint, however, this positioning technique can be quite labor-intensive because several health care clinicians and direct care aides are required to safely transition the patient from a supine position to a prone position, all the while maintaining hemodynamic and oxygenation stability.[3] Even more concerning is the recognition that placing a patient in the prone position greatly increases the health care worker's risk for musculoskeletal low back injury[4] ([Figure]), resulting in negative consequences for the injured worker, the staffing needs of the organization, and the overall health care pandemic response.

Although Wendt et al[2] examined responsive patients who were able to primarily reposition themselves with assistance to a prone position, not all patients who would benefit from the prone position are able to reposition themselves and the health care team must perform the position change. Whether manually positioning or using a mechanical lifting device, the harsh reality remains that placing a patient in the prone position requires significant physical handling. In basic terms, initiation of the prone position means that the patient is transferred to 1 side of the bed, rotated into a lateral side-lying position, then carefully transitioned downward onto the abdomen and into the prone position. Such movements necessitate a well-coordinated team effort that can safely and efficiently manage the patient physically and medically, while also promoting proper body mechanics and musculoskeletal preservation of the health care team performing the movements. The biomechanical findings of previous research indicate that the tissues of a health care worker's lumbar spine fail at a higher rate when in a flexed position, specifically at a position greater than 22.5° flexion.[5] Although such positioning is difficult for the health care worker to avoid altogether, it must be limited to protect the overall musculoskeletal health of the worker's lower back.

Although seasoned health care workers perform countless patient positioning movements during any given shift at

work without giving them much thought, each portion of these common movements places the worker at risk for a musculoskeletal injury. We advocate for conscious attention and respect of musculoskeletal movement and potential for injury during patient positioning. The first step in preparing a patient for prone positioning is to place a draw sheet or lifting straps under the patient.[3] From a lumbar spine protection perspective for the clinician, having 1 of these placed before the patient is placed on the bed or gurney would be ideal. To do this, members of the team first flank the patient. With the bed or gurney raised to working hip height (recognized as a consensus among health care workers of approximately the same height)[6] to midthigh as discussed later in the article, at least 2 team members are needed to reach across the patient to the opposite side; this movement places the nurse in a position of extension for the lumbar spine,[5,7,8] which is the first red flag for musculoskeletal injury. Ideally, 1 member grips the patient's shoulder and hip, while the other member grips the patient's upper thighs and midtorso, creating an interlocked force with the first team member.[9]

On a count of 3, the 2 team members will generate the force required to rotate the patient into a lateral or side-lying position[4] (musculoskeletal injury red flag 2). Typically, health care workers generate this force from the muscles of the lower back or from the arms and shoulders.[10] Although the force exerted for smaller-statured patients may not pose a significant risk for injury among multiple health care workers, an increased force is required if the number of staff members is reduced or the patient is larger in mass.[4] From here, the patient's body weight is held and supported by the team members, while another team member places a draw sheet or lifting straps. At this point in time, we recommend that any slide boards being used are placed under the patient as well.[11] After rotating the patient back into a supine position, the procedure is then repeated from the opposite side of the bed to facilitate the correct and complete placement of the draw sheet or lifting straps.

The next phase of placing a patient into the prone position involves rolling the patient into a lateral position again and transferring them to the opposite edge of the bed[3] (musculoskeletal injury red flag 3). For this, some members of the team will use a pulling motion of the draw sheet/lifting straps, while those on the opposite side work to support the patient in this side-lying position. Pulling motions typically involve the use of the worker's lower back muscles; starting in a position of extension, the worker reaches forward to grip the load, then moves to a position of flexion, often with a rapid motion.[4,7] This rapid movement from extension to flexion uses the muscles of the lower back to complete the movement rather than those of the legs (as recommended), thus increasing their likelihood for injury.[4] Having a slide board or friction-reduction device under the patient takes up to 70% of the load away from those pulling the patient,[11] which is why such devices are highly recommended, if not altogether required.

The final phase of prone positioning involves lowering the patient to their abdomen.[3] This motion requires team members on 1 side to push and support the weight of the patient, while those on the other side implement pulling movements to support the weight of the patient[4] (musculoskeletal injury red flag 4). Here, all team members find themselves in positions of extension while they work to support the weight of the patient as the patient is gently lowered into the prone position. Final repositioning with pillow placement and limb positioning occurs at this point, and the prone positioning technique is successfully completed.[3]

As emphasized here, although prone positioning techniques have demonstrable benefits for patients with COVID-19–associated ARDS who are poorly oxygenated,[2] when the health care team must perform the position change there are greater risks for musculoskeletal injury associated. Despite an evident reduction of weight-bearing load associated with the use of overhead lifting devices, many emergency departments simply are not outfitted with this type of lift equipment. Furthermore, manual lifting, turning, and repositioning of the patient can never truly be eliminated. Even when using overhead lifting devices, the health care worker must still manually reposition the patient so that the lifting straps can be placed.

Despite the lack of access to overhead lifting equipment in many emergency departments, best practice continues to indicate the use of these and friction reduction devices whenever available. These devices provide a significant reduction in patient load,[12-14] thus reducing the force on the lower back and shoulders of the worker using them. The principles of basic body mechanics also continue to remain important[15]: our recent research advances the science to consider the bed height should be positioned at approximately midthigh for the shortest member of the lifting team.

This allows all participants to get into a squatting position for the lift. Lifters should aim for neutrality of their spine when possible, which may require the lifter to grip the sheet further away from the patient.[15] A neutral spine and squatting position best allows the lifter to generate force for the movement with their arms and legs rather than their lower back.[16] Furthermore, when gripping sheets, it is recommended that the lifter use an underhand grip, which best allows the shoulders to remain in proper alignment throughout the lift,[4] resulting in less strain on the joint and surrounding tissue.

Although lifting in these recommended positions does not completely eliminate the risks of musculoskeletal injury for health care workers, it does greatly reduce such risks.[15] Learning to recognize the red flags ([Figure]) of body mechanics among those involved in prone positioning of patients with COVID-19 can only help to better protect the safety of our patients, our workforce, and our health care organizations as we continue our fight in providing effective care during this time of pandemic.

Author Disclosures

Conflicts of interest: none to report.

DETAILS

Subject:	Positioning; Lifting; Flags; Workers; Health care; Arms; Care assistants; COVID-19; Pandemics; Prone; Medical personnel; Lungs; Teams; Mechanics; Staffing; Coronaviruses; Injuries; Patient positioning; Muscles; Shoulders; Body weight; Hemodynamics; Emergency medical care
Business indexing term:	Subject: Workers
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	211-213
Publication year:	2021
Publication date:	Mar 2021
Section:	Invited Commentary
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966

Source type:	Scholarly Journal
Language of publication:	English
Document type:	Commentary
DOI:	https://doi.org/10.1016/j.jen.2021.01.001
ProQuest document ID:	2498285693
Document URL:	https://www.proquest.com/scholarly-journals/proning-pains-recognizing-red-flags-body/docview/2498285693/se-2?accoun tid=211160
Copyright:	Copyright Elsevier Limited Mar 2021
Last updated:	2021-04-09
Database:	Public Health Database

Response to Chmielewski Letter: JEN

ProQuest document link

ABSTRACT (ENGLISH)

The greeter nurse also handles incoming phone calls from clinics or private offices wanting to move individuals who need a higher level of care to the emergency department, thereby reducing the burden on the charge nurse in the emergency department and enabling them to focus on ambulance traffic and overall clinical care. Having a registered nurse in the role of a greeter nurse act as the first contact of any patient presenting to the emergency department improves patient safety and serves as a structured risk mitigation strategy for the registration staff. [...]the coronavirus disease pandemic further reinforces the critical importance of rapidly identifying and isolating patients with potential highly hazardous communicable diseases to mitigate hospital-based exposure events.—Michelle M. Schwedhelm, MSN, RN, Executive Director, Emergency Management &Clinical Operations, Co-Executive Director, Global Center for Health Security, Nebraska Medicine, Omaha, NE; Jocelyn J. Herstein, PhD, MPH, Research Assistant Professor, Global Center for Health Security, Department of Environmental, Agricultural, and Occupational Health, College of Public Health, University of Nebraska Medical Center, Omaha, NE, E-mail: jocelyn.herstein@unmc.edu; Suzanne M. Watson, RN, Nurse Manager, Emergency Services, Nebraska Medicine, Omaha, NE; Amy L. Mead, RN, Associate Nurse Manager, Emergency Services, Nebraska Medicine, Omaha, NE; Leo Maddalena, MS, Applications Sr Analyst, Enterprise Clinic, Nebraska Medicine, Omaha, NE; Devon D. Liston, MPH, Applications Sr Analyst, Enterprise Clinic, Nebraska Medicine, Omaha, NE; and Angela L. Hewlett, MD, Associate Professor, Internal Medicine Infectious Diseases, University of Nebraska Medical Center, and Medical Director, Nebraska Biocontainment Unit, Nebraska Medicine, Omaha, NE.

FULL TEXT

Dear Editor:

We would like to thank Dr Chmielewski for his comments on our article “Can you catch it? Lessons learned and modification of ED triage symptom- and travel-screening.”[1] Dr Chmielewski raises some important clarifying points that we hope will be addressed below.

The first set of questions posed by Dr Chmielewski is related to the use of a greeter nurse, available 24-7, who screens each patient as they present to the emergency department. The greeter nurse role was implemented at our hospital several years ago to optimize a quick clinical visual scan and collection of chief complaints to identify those needing immediate care (eg, chest pain and stroke symptoms) as well as to enhance overall patient and family experience. The greeter nurse also handles incoming phone calls from clinics or private offices wanting to move individuals who need a higher level of care to the emergency department, thereby reducing the burden on the charge nurse in the emergency department and enabling them to focus on ambulance traffic and overall clinical care. The greeter nurse performs triage duties only when the ED volume is low (between 3 am and 7 am); at all other times, 1 to 2 other triage nurses perform triage functions. With the ongoing coronavirus disease pandemic, the greeter nurse (donned in an N95 respirator and face shield) now also serves the role of relaying expectations related to the visitors of those seeking emergency care. As Dr. Chmielewski notes, the position requires additional full time equivalents. Anytime additional full time equivalents are considered, a cost benefit analysis should be performed. However, the role of greeter nurse can and has absorbed additional routine tasks and is multifactorial, from screening patients on arrival to reducing burden on the ED charge nurse by coordinating incoming calls to optimizing overall patient and family experience. Smaller hospitals with less ED volume and demand looking to replicate this model can be creative in adapting front end spaces to include the greeter nurse. This creative flexibility might translate into the triage nurse being out front and serving as both the greeter and triage nurse. Having a registered nurse in the role of a greeter nurse act as the first contact of any patient presenting to the emergency department improves patient safety and serves as a structured risk mitigation strategy for the registration staff.

The implementation of the detailed screening process did not lengthen the door-to-provider interval for all patients or otherwise have a negative impact on the left-without-being-seen (LWBS) rates; in fact, the creation and implementation of this process improved most ED metrics. Adverse safety events in the ED waiting room were reduced to near zero owing to the immediate visual assessment, chief-complaint analysis, and appropriate triage. Immediate masking on arrival and symptom assessment mitigated exposures for other patients and families as well as health care workers. Metrics such as LWBS and door-to-provider rates improved. Several strategies contributed to having a less than 1.58% LWBS rate and 16.8-minute median door-to-provider rate during the current fiscal year; the greeter nurse not only had a significant impact on the timed ED metrics, but also on overall patient satisfaction scores.

The final clarifying point to make is in regard to the stated 75% compliance rate. Screening compliance is a report defined in the electronic medical record. A spot check or routine screening can be automated and monitored over time, and the electronic medical record can analyze data from any location where screening is expected (eg, clinics, immediate care sites, and diagnostics locations). A 75% compliance rate in the emergency department may be best explained in moving some individuals quickly to the emergency department for care or for those unable to be screened who are clinically compromised and arrive by ambulance. No other trends were noted.

We hope we have satisfactorily responded to Dr Chmielewski’s letter to the editor. We agree with the author that it is important to assess and understand the impacts of symptom- and travel-screening processes on ED throughput metrics; however, as detailed here, the development and implementation of the described screening process at our hospital improved most ED metrics as well as overall patient satisfaction scores. Moreover, the coronavirus disease pandemic further reinforces the critical importance of rapidly identifying and isolating patients with potential highly hazardous communicable diseases to mitigate hospital-based exposure events.—*Michelle M. Schwedhelm, MSN, RN, Executive Director, Emergency Management &Clinical Operations, Co-Executive Director, Global Center for Health Security, Nebraska Medicine, Omaha, NE; Jocelyn J. Herstein, PhD, MPH, Research Assistant Professor, Global Center for Health Security, Department of Environmental, Agricultural, and Occupational Health, College of*

Public Health, University of Nebraska Medical Center, Omaha, NE, E-mail: jocelyn.herstein@unmc.edu; Suzanne M. Watson, RN, Nurse Manager, Emergency Services, Nebraska Medicine, Omaha, NE; Amy L. Mead, RN, Associate Nurse Manager, Emergency Services, Nebraska Medicine, Omaha, NE; Leo Maddalena, MS, Applications Sr Analyst, Enterprise Clinic, Nebraska Medicine, Omaha, NE; Devon D. Liston, MPH, Applications Sr Analyst, Enterprise Clinic, Nebraska Medicine, Omaha, NE; and Angela L. Hewlett, MD, Associate Professor, Internal Medicine Infectious Diseases, University of Nebraska Medical Center, and Medical Director, Nebraska Biocontainment Unit, Nebraska Medicine, Omaha, NE.

DETAILS

Subject:	Medical records; Emergency medical care; Public health; Hospitals; Occupational health; Emergency services; Mitigation; Patient satisfaction; COVID-19; Patient safety; Stroke; Medicine; Clinics; Pandemics; Charge nurses; Associate nurses; Infectious diseases; Coronaviruses; Electronic mail systems
Location:	Nebraska; United States--US
Company / organization:	Name: University of Nebraska; NAICS: 611310
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	222-223
Publication year:	2021
Publication date:	Mar 2021
Section:	Letters To The Editor
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English

Document type:	Letter
DOI:	https://doi.org/10.1016/j.jen.2020.12.002
ProQuest document ID:	2498283811
Document URL:	https://www.proquest.com/scholarly-journals/response-chmielewski-letter/docview/2498283811/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-08-01
Database:	Public Health Database

Document 23 of 61

CE Earn Up to 10.5 Contact Hours: JEN

ProQuest document link

FULL TEXT

TVM:UNDEFINED

DETAILS

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
First page:	359
Publication year:	2021
Publication date:	Mar 2021
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing

ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	Engl ish
Document type:	Instructional
DOI:	https://doi.org/10.1016/S0099-1767(21)00037-4
ProQuest document ID:	2498283801
Document URL:	https://www.proquest.com/scholarly-journals/ce-earn-up-10-5-contact-hours/docview/2498283801/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Mar 2021
Last updated:	2021-04-09
Database:	Public Health Database

Emergency Care EMTALA Alterations During the COVID-19 Pandemic in the United States: JEN

ProQuest document link

ABSTRACT (ENGLISH)

The coronavirus 2019 pandemic has affected almost every aspect of health care delivery in the United States, and the emergency medicine system has been hit particularly hard while dealing with this public health crisis. In an unprecedented time in our history, medical systems and clinicians have been asked to be creative, flexible, and innovative, all while continuing to uphold the important standards in the US health care system. To continue providing quality services to patients during this extraordinary time, care providers, organizations, administrators, and insurers have needed to alter longstanding models and procedures to respond to the dynamics of a pandemic. The Emergency Medicine Treatment and Active Labor Act of 1986, or EMTALA, is 1 example of where these alterations have allowed health care facilities and clinicians to continue their work of caring for patients while protecting both the patients and the clinicians themselves from infectious exposures at the same time.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current literature on the Emergency Medicine Treatment and Active Labor Act, or EMTALA, indicates that although the statute has existed in US law since 1986, many health care practitioners are unfamiliar with the

requirements of the Act and how they apply to them.

••During the 2020 coronavirus pandemic, changes to EMTALA and its enforcement have been enacted by the Department of Health and Human Services/Centers for Medicare and Medicaid Services, but many clinicians are unaware of how this affects their daily practice in emergency care.

••To practice to the best of our ability, knowledge of how emergency clinical practice, law, and regulation interact is critical, and this article gives a concise update for those in this clinical practice area.

The coronavirus disease 2019 (COVID-19) pandemic has affected almost every aspect of health care delivery in the US, and the emergency health care system has been hit particularly hard while dealing with this public health crisis. In an unprecedented time in our history, health care systems and clinicians have been asked to be creative, flexible, and innovative, all while continuing to uphold the important standards we trust in our US health care system. To continue providing quality services to patients during this extraordinary time, care providers, organizations, administrators, and insurers have needed to alter longstanding models and procedures to fit the contextual dynamics of the pandemic. Although there have understandably been some errors and confusion, there has also been some pivotal assistance from leaders during this upheaval. Provisions disseminated by the government issuing guidance regarding the Emergency Medicine Treatment and Active Labor Act of 1986 (EMTALA) are 1 example where quickly enacted changes assisted the US health care system in carrying on the business of caring for patients while ensuring safety in the middle of a worldwide health catastrophe.[1]

The History of EMTALA and Emergency Medical Care in the US

In 1986, as part of the Omnibus Spending Act passed by Congress into law, EMTALA began to ensure patients were afforded protections when seeking care at emergency departments.[2] Under EMTALA, all persons seeking emergency care must be evaluated and stabilized by the health care team.[3] Before this landmark legislation was enacted, persons presenting to the hospital for emergent reasons were routinely turned away and denied proper care, often based on financial motivations.[4] In this much needed statute, lawmakers attempted to provide a threshold at which all patients would be entitled to emergent care when needed.[2] This administrative law was the first federal statute in the US to provide for an affirmative right to health care, irrespective of a patient's ability to pay for that care. In addition, the use of the term "duty to treat" became irrevocably tied to ED care in the US, whereas earlier there existed wide latitude afforded to providers in choosing who to see and who not to. In EMTALA, a clear exception to the "no-duty principle" was established for cases of emergency medical care, mandating that a duty to treat a patient does exist for emergency health care providers and facilities for all patients who present for care, regardless of prior relationship or ability to pay for services.[4]

The so-called "dumping" of patients based on their demographics or insurance has become a practice of the past, and health care entities and providers face stiff penalties if care is refused to anyone who meets the criteria under EMTALA.[5] Specifically, provisions were put into the application of the law to clearly identify what constituted an emergency medical condition and what qualified as seeking care. Persons were deemed to be able to decide for themselves if they needed to go the emergency department for care, with the prudent layperson standard stating that a "reasonable person with no medical training to devise that the situation is emergent, and care is needed" was sufficient.[4] In addition, the comes-to test was applied liberally in this new legislation, indicating that patients desiring medical evaluation who travel near, not just to the emergency department, should be considered under this rule.[2]

Historical EMTALA Requirements

Since 1986, EMTALA has required that a medical facility's responsibility to a person presenting to the emergency

department for care is twofold: a qualified medical screening examination must be provided and treatment given must be sufficient to achieve stabilization of the patient's presenting condition.[4]

Medical Screening Examination

Any patient presenting to the emergency department for what they have deemed to be an emergency, under the prudent layperson standard, must receive an appropriate medical screening examination by a clinician.[2] Generally, the examination must be performed by a licensed, independent health care provider denoted as a "qualified medical professional" or QMP (usually a physician, nurse practitioner, or physician assistant), and registered nurses, paramedics and other personnel are restricted from performing this duty based on their scope of practice.[1] There are no clear rules in the statute about what this examination must consist of, and so they may be cursory and lack any additional diagnostic evaluation, but the edict is clear that provider screening of any person who comes to the emergency department for care is mandatory.[4] There are many avenues to minimize impact of this requirement, but this burden must be met, as for facilities and clinicians this is a common foundation of EMTALA investigations from the Department of Justice.

Stabilization of the Patient

If an emergent condition is identified during the medical screening examination, there is an obligation to treat the patient to the point of stabilization before discharge or transfer.[2] Under the provisos of EMTALA, sufficient treatment must be given before advising a patient to seek care elsewhere or continue self-care at home. To clarify, the law does not state that any presenting condition must always be treated in the emergency department to a point of resolution; just stabilization is required.[5] Transfers to another location or facility are particularly tricky under EMTALA, and require stabilization of the patient and certifying the medical necessity of the transfer to the receiving facility, or the burden of the statute has not been met by the provider.[4]

EMTALA in the Age of COVID-19

During the COVID-19 public health crisis in the US, deviations to standard practice became necessary to provide care to patients. The current pandemic emergency challenges health care systems to balance the need for extraordinary measures to ensure patient and staff safety and the desire to preserve the delivery of exemplary patient care.[3] Individuals and systems have struggled to balance their 2 primary goals during this emergency: protecting patients and staff from the risk of infection and continuing to ensure each person receives safe, prompt care.[6]

1135 Waivers

Early on in the pandemic in the US, official guidance on how to relieve some of the mounting pressure on US emergency departments came from the Department of Health and Human Services (HHS)/Centers for Medicare and Medicaid Services (CMS).[1] As a result of emergency declarations made by the US President and Section 1135 of the Social Security Act, a waiver to lighten restrictions historically imposed by EMTALA on facilities and providers was possible.[3] In a directive distributed to the health care community in March of 2020, CMS announced "aggressive actions [in] exercising regulatory flexibility" surrounding the requirements for compliance with EMTALA during the COVID-19 emergency.[7] These 1135 waivers, as they are known, are broad and can apply to many other legal statutes, including Stark and Stafford laws, and have ramifications for almost every aspect of patient care in various types of facilities. This waiver is termed a "blanket" and thus applies to all US emergency departments, and facilities do not have to apply individually for these protections.[1] These exceptions to EMTALA do not nullify the responsibility of facilities and providers with regard to patients seeking emergent care, but they do alter what constitutes providing a qualifying examination and stabilizing treatment to satisfy EMTALA responsibilities.[3]

How EMTALA has been Altered

The 2 major traditional provisions in EMTALA that were altered during this time are: (1) the ability to redirect individuals to on- or off-site alternative locations for their mandated medical screening examination and (2) allowance to transfer patients who are not medically stabilized fully.[7] In addition, and of note, during this time under the emergency order, CMS waived the necessity for a Medicare or Medicaid patient to be under the direct care of a physician, encouraging the use of "other practitioners to the fullest extent possible," which is a monumental step forward for advanced practice providers in the US.[1,7] Physician assistants and nurse practitioners are suitable QMPs according to CMS, and with this loosening of the oversight requirement, their ability to function as an invaluable part of the emergency department is enhanced.[6]

Changes to Medical Screening Examination

To the first point, the allowance to defer the immediate medical screening examination of a person seeking care at an emergency department "for the direction or relocation of an individual…to an alternate location" was included in this publication by CMS.[7] Under this change, patients may be directed prior to entering the emergency department to present elsewhere to begin their evaluation and the alternative location can be on- or off-campus from the emergency department itself.[1] During a time of very scarce health care resources, such as during this pandemic, focusing on patients who necessitate emergency management, and triaging those who do not to alternative locations, maintains quality delivery of care while prioritizing safety of everyone involved.[3] Facilities can encourage the community to use settings other than a hospital for screening under this policy alteration to decrease ED use, but CMS does encourage facilities to plan how to handle more emergent cases that present to these locations inappropriately.[1] Posting signage and advertising that directs individuals to go to these alternate locations for screening and treatment is allowable, but should not create unreasonable barriers for patients seeking care. Specifically, under this statutory change, as long as the medical screening examination is performed by a QMP and care is given accordingly, persons presenting to the physical facility of the emergency department need not be seen at that time/place.

In addition, telemedicine, which, in the past, has been less used in the emergency department, was also clearly emphasized as an option for evaluation and treatment of patients during COVID-19.[1] QMPs may be on- or off-location while providing telehealth services and, as long as they act within their scope of practice, they will be able to bill at full, appropriate E/M CPT codes. Telemedicine is described, in a situation such as this pandemic, as being an "electronic Personal Protective Equipment," providing an efficient and safe alternative means to evaluate patients.[6]

Alterations in Stabilization/Transfer Plans

Secondly, changes to the process of transferring patients, which includes discharge from the facility, was altered under the waiver for EMTALA in 2020.[4] Traditionally under EMTALA, this transfer requirement mandates that persons seeking care in the emergency department must be given sufficient treatment to stabilize them from likely deterioration of their condition. However, under this new, revised statute under the COVID-19 alterations, this does not have to be the case.[5] What in the past may have been deemed an inappropriate transfer would now be acceptable under EMTALA provided the discharge or transfer is necessary based on the current declared emergency situation, as long as the facility is operating in compliance with local/state emergency plans.[1] Care still needs to be taken to ensure risks to the patient (or unborn child) are minimized as much as possible; however, transfer of an individual who has not yet been stabilized medically is potentially allowed.

Limitations on EMTALA Waiver

It is important to remember that the term blanket waiver refers to the edict affecting the entire country as a whole and covers all health care entities and providers.[1] This blanket waiver allows all facilities to make changes to their practice and procedures without applying to CMS directly for individual variances. It does not indicate, however, that

there is a wholesale suspension of EMTALA or protection against prosecution for unlawful violation of this statute. In fact, most of the requirements of the law remain in force. For example, an unlawful violation would involve creating signs or public posts that create real or perceived barriers to seeking care.[7] Further, aligning alternative plans for patient care with current state and local emergency actions is critical to remain in compliance.[7] Entities must still be very careful to ensure they are providing the required medical screening examination by qualified professionals to protect themselves from possible investigation and/or litigation. The 1135 waivers are only intended to allow extra flexibility with providing the required screening examination and services to patients during this time of national emergency.[1]

The EMTALA Waiver in Practice

Since the publication of the HHS COVID-19 Guidelines in March of 2020, health care facilities have used the flexibility provided in this document to creatively sustain patient care during the pandemic. Many examples can be found in the current literature of how this newfound flexibility has allowed creative, potential solutions to the crisis in our emergency departments to be implemented.

Example 1: On-Site Alternative

One example of this flexibility is the Surge Clinic designed by Massachusetts General Hospital.[8] In this plan, an alternate area was designed, adjacent to but separate from the existing emergency department, to handle evaluation and treatment of noncritical patients. Often these persons arrived at the request of primary care providers, and if inclusion criteria were met upon discussion with a staff provider, limited testing and discharge could be accomplished in the ambulance bay without traditional ED management. This model, highlighting the use of an alternate on-site location for providing the medical screening examination to patients, has worked optimally to serve patients while limiting the possible infectious exposure of the main ED patients and staff.[1]

Example 2: Telehealth Services

Another example of using the EMTALA waiver in the emergency department is from Baylor Scott and White Medical Facilities in Texas. Here, the facility employed telemedicine to screen presenting ED patients.[9] Whereas in the past, telemedicine was used to overcome a physical barrier between provider and patients, here it was harnessed to provide a physical barrier and protection against COVID-19 exposure. Because of the expansion CMS allowed specifically for ED clinicians to bill for telehealth services in the EMTALA waiver announcement, this method of protecting against infection by avoiding face-to-face interaction was possible. In this example, once isolated by staff, high risk patients can be evaluated by a clinician remotely via videoconference on an iPad, thus satisfying the requirement for both audio and video components of the visit to allow for full E&M billing.[1]

Example 3: Off-Site Alternative

Finally, diverting patients to a separate off-site setting for care has become an option during our current health care crisis.[3] In a novel idea for delivery of patient care under the EMTALA waiver, members of the American Dental Association have suggested partnerships with local dental facilities to see patients presenting to the emergency department with isolated dental issues. As a result of the exception carved out by HHS during COVID-19, the 79% of patients with dental emergencies who initially present to the emergency department could be, immediately and legally, diverted to a local oral health provider. Situations such as the 1 described here would need additional approval by CMS, unless the 2 entitles are owned or operated by the same company, but it is another example of resourcefulness during this pandemic.[7] Redirecting patients who meet criteria to such off-campus options will decrease consumption of valuable ED time and resources and will minimize the risk of nosocomial exposures for the patient.[3]

Conclusion

In the midst of a global pandemic, and resulting toll on health care in the US, it is unclear how long the need for measures such as the COVID-19 emergency declaration and its related waivers will exist. The current legal and regulatory provisos will remain active at least until any emergency order currently in place in the US is allowed to expire.[7] Thus far, the emergency declarations and waivers have provided much needed relief to emergency departments, allowing flexibility and creativity with plans to continue providing high-quality care to patients while protecting those same patients and their own workforce.[1] EMTALA is a landmark piece of legislation, providing legal protections to citizens who were often neglected or purposefully overlooked, and has stood up to challenges since its passage in 1986.[4] However, during the COVID-19 pandemic public health crisis we are in currently, appropriate relaxations of some of the provisions of the statute have allowed facilities and clinicians to continue their work of caring for patients with protection from infectious exposures.

DETAILS

Subject:	Patients; Emergency medical care; Health care; Medicaid; Public health; Clinical medicine; Health care policy; COVID-19; Pandemics; Nursing care; Emergency services; Medical personnel; Waivers; Medical screening; Departments; Coronaviruses; Medicare; Health care delivery; Telemedicine
Business indexing term:	Subject: Medicaid Medicare
Location:	United States--US
Company / organization:	Name: Department of Health &Human Services; NAICS: 923120; Name: Centers for Medicare &Medicaid Services; NAICS: 923120
Identifier / keyword:	Emergency Medicine Treatment and Active Labor Act; Coronavirus disease 2019; Emergency medicine; Telemedicine
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	321-325
Publication year:	2021
Publication date:	Mar 2021
Section:	Advanced Emergency Clinician's Corner
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia

Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/1 0.1016/j.jen.2020.11.009
ProQuest document ID:	2498283761
Document URL:	https://www.proquest.com/scholarly-journals/emergency-care-emtala-alterations-during-covid-19/docview/2498283761/se-2?accountid=211160

Copyright:	©2020. Emergency Nurses Association

Last updated:	2022-05-23
Database:	Public Health Database

Factors Affecting Attitudes Toward Defibrillator Use Among Clinical Nurses in South Korea: A Cross-Sectional Study: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

Nurses are often first responders to in-hospital cardiac arrests. However, many nurses do not perform defibrillation even when required. Nurses' attitudes toward defibrillator use are influenced by social and psychological context. This descriptive, cross-sectional study explored factors affecting attitudes toward defibrillator use among nurses in South Korea.

Methods

A total of 280 nurses with a minimum of 6 months' clinical experience were included. The data were acquired through a self-administered questionnaire. Regression analysis was used to determine factors significantly associated with attitudes toward defibrillator use.

Results

Only 13.6% of the participating nurses had experience with defibrillator use in a cardiopulmonary resuscitation

situation, whereas 94.6% of the nurses had received training on defibrillator use. Attitudes toward defibrillator use accounted for 37% of variance in measures of self-confidence, image, and job fit.

Discussion

To improve clinical nurses' attitudes toward defibrillator use, improving their self-confidence, image, and job fit through ongoing assessment and retraining on defibrillation is required. In addition, relevant institutional support and systematic guidelines should be provided.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current state of scientific knowledge indicates nurses in the hospital are cardiac arrest first responders.

••The main finding of this research is nearly all nurses have been trained in defibrillator use, but only 13.6% have used a defibrillator.

••Key implications for emergency nursing practice from this research are that confidence, image, and job fit affect nurses' attitudes toward defibrillator use.

Introduction

In hospitals, 21% of cardiac arrests are caused by shockable rhythm such as ventricular fibrillation or pulseless ventricular tachycardia.[1] When defibrillation is delivered within 3 minutes of the onset of a cardiac arrest that occurs because of these causes, neurological damage can be prevented. Moreover, 33% of patients treated under such circumstances have been reported as discharged alive.[1,2] This evidence suggests that early defibrillation by witnesses is important to improving the survival rate associated with a sudden cardiac arrest caused by ventricular fibrillation or pulseless ventricular tachycardia. Defibrillation is a safe and effective method of removing shockable rhythms with minor side effects.[3]

Within hospitals, nurses are often the first responders to emergencies such as cardiac arrests.[4] Therefore, nurses should be able to recognize cardiac arrest and perform life-saving measures such as defibrillation.

However, nurses are unlikely to use a defibrillator even when required. The main reasons for this reluctance are lack of relevant experience, low confidence, fear of causing harm, legal liability, anxiety, workload-related tension, and perception of a nurse's role as a doctor's assistant in several international settings.[5,6] These attitudes are influenced by social and psychological environments.[7] The social and psychological determinants of defibrillator use among nurses remain unclear, and related studies in South Korea have been few.

This study examined factors affecting clinical nurses' attitudes toward defibrillator use, general characteristics of respondents and cardiopulmonary resuscitation (CPR)–related characteristics, a psychological (self-confidence) variable, and social (image and job fit) variables within a conceptual framework ([Figure]).

Methods Design

This was a cross-sectional, descriptive study.

Participants and Setting

A convenience sample of clinical nurses was recruited from 7 general hospitals (each with more than 100 beds) from an urban setting in South Korea. Inclusion criteria was registered clinical nurses with more than 6 months of experience. The researcher contacted the directors of seven general hospitals to obtain permission for recruitment. Participation was both voluntary and anonymous. Questionnaires were mailed to clinical nurses who agreed to take part in this study. Questionnaire packages with cover letters were distributed with a return envelope addressed to the researcher. To determine sample size, we performed a power analysis, using G Power 3.1.2 for multivariate

regression analysis. The desired sample size for computation of test power (1 − β) of 0.95 with 13 predictors was 277, with an effect size of 0.10 and an α of 0.05.

Measurements

The questionnaire consisted of 5 sections: general characteristics, CPR-related characteristics, self-confidence (psychological variable), image and job fit (social variables), and attitudes toward defibrillator use. To ensure reliability and validity of the measurements in the present study, data collection involved previously validated tools.[8-11] Before the present study launch, we also consulted 3 qualified experts as the basic life support (BLS) training center faculty to verify the suitability of the measurements used; a pilot study (n = 20) was conducted.

- **(1)** General demographic characteristics: General characteristics of interest included sex and education level.

- **(2)** CPR-related characteristics: CPR-related characteristics included on-site CPR experience, experience of chest compression during an on-site CPR, experience of defibrillator use, training experience on defibrillator use, having received a BLS-health care provider (BLS-HCP) certificate, total career duration, and current workplace setting.

- **(3)** Self-confidence: Self-confidence in this study was developed on the basis of a previous study.[8] The Content Validity Index of the scale was 0.87. The final questionnaire comprised 14 items after a pilot test (n = 20). Each item was rated on a 5-point Likert scale, ranging from “strongly disagree” (1) to “strongly agree” (5). High scores indicated higher levels of self-confidence to perform defibrillation. Cronbach’s alpha for this scale in the present study was 0.94.

- **(4)** Image: Image was measured with a scale developed by Baek et al.[9] The questionnaire comprised 4 items, and each item was rated on a 5-point Likert scale, ranging from “strongly disagree” (1) to “strongly agree” (5). High scores indicated higher levels of one’s image in one’s social system. Cronbach’s alpha for this scale in the previous study[9] was 0.86, whereas it was 0.85 in the present study.

- **(5)** Job fit: Lee[10] developed a questionnaire called job fit. The questionnaire comprised 5 items, and each item was rated on a 5-point Likert scale, ranging from “strongly disagree” (1) to “strongly agree” (5). High scores indicated higher levels of job fit. Cronbach’s alpha in the previous study[10] was 0.86, whereas it was 0.90 in the present study.

- **(6)** Attitudes toward defibrillator use: Attitudes toward defibrillator use was developed by Kim and Lee.[11] The questionnaire comprised 5 items and each item was rated on a 5-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (5). High scores indicated a positive attitude toward defibrillator use. Cronbach’s alpha in the previous study[11] was 0.97, whereas it was 0.95 in the present study.

Data Collection

Data were collected from October 2016 to July 2017. The principal investigator met the director of the nursing department in each hospital to obtain permission to address potential participants before launching the study.

Ethical Consideration

This study was conducted in accordance with the principles of the Declaration of Helsinki. This study was approved by Daejeon University’s institutional review board (1040647-201609-HR-001-03). All participants provided written consent ahead of enrollment. Participants were informed that they could withdraw their consent at any point during this study without consequences.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics for Windows, version 22.0 (SPSS Inc, Chicago, IL). Statistical

analyses included descriptive statistics and hierarchical multiple regression analysis. The hierarchical multiple regression models were computed on the antecedents of attitude toward defibrillator use. For independent variables, we used dummy coding (education level, current workplace, experience of defibrillator use, and being a BLS-HCP certificate holder) used in the regression models.

Results

A total of 320 questionnaire packets were distributed, and 280 responses were included in the analysis (approximately 87.5% response rate).

Descriptive Statistics

Most of the respondents were female (96.1%), and the average career span was 6.94 years. Most worked in either a medical/surgical unit (54.3%) or a special care unit (35%). Most of the respondents (67.1%) had experienced on-site CPR more than once, and more than half of the respondents (59.6%) had no experience with chest compressions during CPR. Concurrently, few respondents (13.6%) had experience with defibrillator use during CPR. Most of the respondents (94.6%) had received training on defibrillator use, and one third of the respondents (31.8%) were reported BLS-HCP certificate holders ([Table 1]).

Factors Associated With Attitudes Toward Defibrillator Use

Multicollinearity among independent variables was confirmed as follows. The tolerance range was 0.70 to 0.92, which was above 0.1. The Variance Inflation Factor range was 1.11 to 1.71, which was below 10. The Durban-Watson statistic was 1.83, and the assumption of normality of the residuals' distribution was satisfied, given the lack of self-correlation between the error terms of the model. First, in the regression analysis, education level (β = 0.14, *P* = 0.03) was significantly associated with attitudes toward defibrillator use. Second, the addition of a psychological variable (self-confidence) to model 1 resulted in 22% of variance in attitudes toward defibrillator use explained (*F* = 9.69, *P* F = 16.12, *P* Table 2).

Discussion

In this study, on-site CPR experience rate (67.1%) was lower than that reported in the previous study (72.1%).[12] However, the rates of experience with chest compressions during CPR and training experience on defibrillator use reported in this study were consistent with the results of previous studies.[12,13]

The high training rate (>90%) in the present study might be due to the accreditation program for health care organizations in Korea, in which a hospital certification system was implemented in 2015 to improve the quality of medical services provided to the public.[14] One of the evaluation items requires that all hospital staff receive CPR training, including defibrillator use, once a year.[15] Nevertheless, in the present study, the rate of direct experience with defibrillator use during CPR was lower than that in a previous study.[7] There are several reasons for this result. First, BLS-HCP certificate course received by most nurses participating in this study only provides training on automated external defibrillator (AED) use. Second, most hospitals have defibrillators with an automatic and a manual function, but most facilities encourage the use of the manual function to reduce costs in South Korea. Although the reasons for not using defibrillators were not investigated in this study, previous studies[16,17] have reported that clinical nurses are reluctant to use defibrillators because of the perceived complexity of the process, which is seen as the physician providers' task. Most importantly, because the incidence of cardiac arrest is higher in the emergency department and intensive care units (ICU) than in the general ward/unit (internal/surgical unit) and other wards/units (outpatient department and so on), nurses working at clinical areas who rarely see cardiac arrests except in the emergency department or ICU should receive AED training/education.[18] Although there are no legal regulations in South Korean hospitals, AEDs are installed on major routes of patients such as the outpatient department and laboratory rooms for emergency situations. Further research is needed to determine the differences

between emergency nurses and nurses in other specialties.

Given the scarcity of previous studies on the contextual factors affecting the use of defibrillators among nurses, comparisons are difficult. Nevertheless, self-confidence reported in the present study was low compared with previous studies that measured self-confidence at performing CPR or respiratory-assisted therapy[17] in emergency circumstances. These results might be related to the electrocardiogram (ECG) reading process involved in using a defibrillator with a manual function. Concurrently, the mean score on the measure of image was higher than that reported by Baek et al[9] but slightly lower than that reported by Kim.[15] Among Korean nurses, the image of a nurse as obedient and assisting physicians rather than leading in emergency situations persists.[19] The mean score on the measure of job fit was higher in the present study than in the study by Kwon and Kang.[20] The mean score on the measure of attitudes toward defibrillator use in the present study was higher than that in the study by Yun[21] but lower than that in the study by Lee and Jung.[13]

In the present study, the hierarchical multiple regression analysis revealed that self-confidence, image, and job fit are significant factors associated with attitudes toward defibrillator use. Among these variables, self-confidence was found to have a greater influence than did image or job fit.

High self-confidence among nurses could result in a defibrillator being used quickly with patients who require an electric shock. A previous study[6] reported that clinical nurses are reluctant to use a defibrillator because of low self-confidence. Self-confidence at defibrillation may affect the difficulty of ECG reading because of defibrillators with a manual function and the lack of knowledge and use experience of a defibrillator.[5,16] Self-confidence is related to first-hand experience. Nurses should be able to assist physicians and perform defibrillation on their own.[22] Self-confidence can be improved through training based on emergency situations such as team-based intensive education, simulation education, and virtual reality, among others, which should be proposed to nurses. Individual characteristics related to CPR should also be considered.[23]

The concept of image refers to nurses' beliefs, values, and self-confidence, which can increase job satisfaction.[24] Job fit can have a positive effect on job-related attitudes, when it is suitable.[10] Therefore, when nurses consider defibrillator use as part of their role, a more positive attitude toward defibrillator use among nurses can be expected. A previous study[7] has reported that attitudes toward defibrillator use among nurses were influenced by physicians' and institutions' support, including training and policy encouraging defibrillator use. During a cardiac arrest, nurses' positive attitudes toward defibrillator use are important to improve patients' survival rates.[21] Hospital managers and leaders should be aware of multiple factors affecting positive attitude toward defibrillator use. In addition, emergency situations such as cardiac arrest not only require individual knowledge and CPR skills but also a variety of psychomotor skills, clinical decision making, and teamwork behavior.[25] Kim et al[26] reported that clinical nurses lacked the opportunity and training to make decisions about what to do in a cardiac arrest rather than the knowledge of dealing with emergencies. Nurses working in the ICU and emergency department, when compared with those in the general medical/surgical unit and others, have more opportunities to treat cardiac arrest patients. Therefore, defibrillator education and training should be composed of in-hospital–oriented scenarios including the ECG reading process that reflect the actual situation to strengthen problem-solving ability using a team approach. Hospitals should also provide clear guidelines on the scope of a nurse's role in the context of defibrillator use.

Limitations

One of the limitations of this study was that the study sample was not fully representative of clinical nurses in South Korea, as we only selected participants from one urban area of South Korea. The results of this study might not generalize to all South Korean clinical nurses. Future studies should include a more diverse range of hospitals. Second, this study was a cross-sectional study; any conclusions regarding causality between the antecedents of

nurses' attitudes toward defibrillator use should be interpreted with caution. Longitudinal studies are needed to confirm the present findings.

Implications for Emergency Nurses

The present findings provide evidence for the development of a clinical-oriented education program to improve self-confidence, image, and job fit, which may contribute to increasing patient survival rate by improving nurses' positive attitudes toward defibrillator use. In addition, the program should reflect the cultural considerations, characteristics of the working ward/unit, and interdisciplinary role clarity, teamwork, and communication with physicians.

Conclusions

The results of this study suggest that self-confidence, image, and job fit influenced attitudes toward defibrillator use among clinical nurses in one urban area of South Korea. Almost all of the respondents in this study had received training on using a defibrillator, but only 13.6% of respondents had experience with defibrillator use during CPR. Most hospitals in South Korea use manual defibrillators, so enhancing their self-confidence, image, and job fit through ongoing assessment and retraining with instruction on the ECG rhythm that requires defibrillation is needed. Further research is needed on the differences between emergency nurses and nurses in other specialties. Finally, defibrillator use should be considered within the nursing scope of practice, and clear guidelines should be developed in South Korean hospitals.

Author Disclosures

Conflicts of interest: none to report.

Variables	Category	Frequency	%	Mean	SD
General characteristics					
Sex	Male	11	3.9		
Female	269	96.1			Education level (highest obtained)
Some college	104	37.1			Bachelor
176	62.9			CPR-related characteristics	
Total career, y	≤3	99	35.4	6.97	7.35

4–6	75	26.8			≥7
106	37.9			Current workplace, ward/unit	Medical/Surgical
152	54.3			Special (ICU/ED)	98
35.0			Others	30	10.7
		On-site CPR experience, count	no	92	32.9
		1–5	125	44.6	
	≥6	63	22.5		
Experience of chest compression during on-site CPR, count	no	167	59.6		
1–2	64	22.9			≥3
49	17.5			Experience of defibrillator use	no
242	86.4			yes	38
13.6			Training on defibrillator use, count	no	15

5.4			1	147	52.5
		≥2	118	42.1	
	BLS-HCP certificate	no	191	68.2	
	yes	89	31.8		
Self-confidence				3.70	0.63
Image				3.52	0.70
Job fit				3.39	0.62
Attitudes toward defibrillator use				3.62	0.61

Factors	Model 1				Model 2				Model 3			
B	SE	Beta	P	B	SE	Beta	P	B	SE	Beta	P	General/CPR-related characteristics
2.92	0.22		<0.001	1.77	0.24		<0.001	0.86	0.24		<0.001	Education level* (ref = BSN)

0.14	0.06	0.14	0.03	0.01	0.06	0.01	0.91	−0.01	0.05	−0.01	0.88	Total career
0.06	0.04	0.08	0.20	−0.01	0.04	−0.02	0.75	−0.01	0.04	−0.02	0.77	Current workplace* (ref = special unit)
0.02	0.08	0.02	0.80	0.00	0.07	0.00	0.99	0.01	0.06	0.01	0.82	On-site CPR experience
−0.01	0.06	−0.01	0.90	−0.06	0.05	−0.07	0.31	−0.02	0.05	−0.03	0.67	Experience of chest compressions during on-site CPR

0.07	0.06	0.08	0.28	−0.03	0.06	−0.04	0.56	0.00	0.05	0.00	0.98	Experience of defibrillator use* (ref = yes)
0.15	0.11	0.08	0.20	0.10	0.10	0.06	0.33	0.00	0.09	0.00	0.96	Training on defibrillator use
0.10	0.06	0.10	0.11	0.09	0.06	0.08	0.13	0.04	0.05	0.04	0.41	BLS-HCP certificate* (ref = yes)
−0.03	0.08	−0.02	0.72	0.00	0.07	0.00	0.99	0.01	0.07	0.00	0.94	Psychological variable
												Self-confidence

				0.49	0.06	0.50	<0.001	0.25	0.06	0.26	<0.001	Social variables
												Image
								0.22	0.05	0.25	<0.001	Job fit
								0.30	0.06	0.31	<0.001	R^2
0.06				0.24				0.40				Adjusted R^2
0.03				0.22				0.37				F(p)

DETAILS

Subject:	Emergency medical care; Confidence; Regression analysis; Training; Questionnaires; Hospitals; Nurses; Likert scale; Retraining; Rescue workers; Cardiopulmonary resuscitation; Onsite; Statistics; Institutional aspects; Cardiac arrhythmia; Professional training; Attitudes; Variables; Cardiopulmonary resuscitation--CPR; Data collection; Myocardial infarction; Defibrillators; Nursing; Clinical nursing; Clinical experience; Education; Defibrillation
Business indexing term:	Subject: Training
Location:	South Korea
Identifier / keyword:	Attitude; Defibrillation; Image; Job; Self-confidence
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	305-312
Publication year:	2021

Publication date:	Mar 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.07.001
ProQuest document ID:	2498283751
Document URL:	https://www.proquest.com/scholarly-journals/factors-affecting-attitudes-toward-defibrillator/docview/2498283751/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2021-03-08
Database:	Public Health Database

Providing a Safe Haven: Staff Response to a Simulated Infant Relinquishment in the Emergency Department: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Every state in the United States has established laws that allow an unharmed newborn to be relinquished to personnel in a safe haven, such as hospital emergency departments, without legal penalty to the parents. These

Safe Haven, Baby Moses, or Safe Surrender laws are in place so that mothers in crisis can safely and legally relinquish their babies at a designated location where they can be protected and given medical care until a permanent home can be found. It is important for health care professionals to know about and understand their state's law and how to respond should an infant be surrendered at their facility. No articles were found in the peer-reviewed literature that describe a method to evaluate nurse competency during infant relinquishment at a Safe Haven location. This article will describe commonalities and differences among these Safe Haven Laws, responsibilities of the hospital and staff receiving a relinquished infant, and 1 hospital's experience when running an infant relinquishment drill in their emergency department.

FULL TEXT

DETAILS

Subject:	Parents &parenting; Parental rights; Emergency medical care; Relinquishment; Health care; Age; Infants; Hospitals; Medical personnel; Child welfare; Law; Surrender; Child abuse &neglect; Mothers; Nurses; Postpartum period; Babies; Emergency services; Maternal and infant welfare; Newborn babies
Location:	Texas; United States--US; New York; Illinois
Identifier / keyword:	In situ simulation, Infant relinquishment, Newborn abandonment, Safe Haven Law, Baby safe haven, Competency
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	352-358.e2
Publication year:	202 1
Publication date:	Mar 2021
Section:	Nurse Educator
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal

Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.12.005
ProQuest document ID:	2498280311
Document URL:	https://www.proquest.com/scholarly-journals/providing-safe-haven-staff-response-simulated/docview/2498280311/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-05-15
Database:	Public Health Database

Commentary on “Syncope in the Emergency Department: A Guide for Clinicians”: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Many of the clinical decision rules do not incorporate the historical features of the event itself; rather, they reveal the underlying clinical conditions of the patients, such as heart failure.2 The adult and pediatric literature diverge in this regard, highlighting that the malignant causes of syncope differ across age ranges.3 The authors correctly identify the difficulty generalizing 1 approach to syncope. Probst et al performed a robust prospective, multicenter trial evaluating older adults presenting to the emergency department with syncope looking at 30-day all-cause mortality or serious cardiac outcomes.15 They derived the FAINT score including the following: history of heart failure, history of cardiac arrythmias, initial abnormal ECG, elevated pro–B-type natriuretic peptide, and elevated high-sensitivity troponin. Many ED observation pathways focus on the patient with syncope; however, even if admitted to the hospital, another event would be unlikely in the next 24 to 72 hours.17 Admission to the hospital, which is sometimes used as the final protective action for the emergency provider in the case of syncope, not only fails to prevent sudden death but is expensive and a waste of resources.18 Is the answer shared decision-making instead of clinical decision rules?

FULL TEXT

Syncope is an important cause of ED visits. It is a potential life-threat, frightening for the patient and family, uses health care dollars and resources, and yet, most of the time, has a benign cause. The authors El-Hussein and Cuncannon[1] address the approach to the patient with syncope in the ED patient population in their recent manuscript entitled “Syncope in the Emergency Department: A Guide for Clinicians.” This diagnosis epitomizes the emergency-licensed independent provider’s primary duty—to sort the nonthreatening from the malignant in a single patient encounter. The authors synthesize the existing guidance around the patient with syncope and simplify this

approach for the reader.

"The history taking in syncope has been referred to as history *building* to emphasize it's mutuality and diagnostic value" per the authors.[2] This sentence embodies the construct of the approach to the patient with syncope and illustrates that the relevant clues are often found in the history. Many of the clinical decision rules do not incorporate the historical features of the event itself; rather, they reveal the underlying clinical conditions of the patients, such as heart failure.[2] The adult and pediatric literature diverge in this regard, highlighting that the malignant causes of syncope differ across age ranges.[3] The authors correctly identify the difficulty generalizing 1 approach to syncope. The history should be taken carefully and questions asked to those that witnessed the event: considerations such as prodrome, exertion, syncope related to recent medications, position of the patient during the event—supine or during sleep indicating a more malignant cause. The history should involve asking for sudden death in any family members or a history of uncontrolled seizures, near drowning, and single vehicle car crashes.[4] Bystanders will often describe the event as seizure-like. We have previously shown that patients presenting with syncope versus seizure were 10 times more likely to get an electrocardiogram (ECG) in the emergency department, despite seizure being a common presentation of malignant syncope.[5] ED patients by definition have inherent selection bias; these patients were very concerned about this event, enough to present to an emergency department rather than wait for their primary provider's office to open.[6]

The physical examination clues such as facial trauma should alert the clinician that the patient did not have time to catch themselves--that there was no prodrome.[7] Tongue biting or incontinence may suggest seizure over syncope, although seizure may be the first presentation of an inherited sudden death condition.[8] A murmur could indicate aortic stenosis or hypertrophic cardiomyopathy, which alone has significant morbidity and mortality associated with it. The physical examination, with emphasis on the location of injury to the patient, should not be ignored, as described by the authors.[9] The physical examination, however, may be unrevealing because many ED patients present well-appearing after the concerning event.

Syncope caused by cardiac events portend the highest mortality and have resulted in an abundance of research in this arena. The single most important diagnostic test obtained by the emergency provider in the setting of syncope, including convulsive syncope, is the 12-lead ECG.[10] The ECG should be interpreted in the setting of syncope instead of chest pain. This distinction is important; the provider should obviously not miss ischemia but should be more concerned for subtle findings indicating conduction system abnormalities such as heart block or inherited channelopathies such as long QT syndrome or Brugada syndrome.[11]

Patients with dilated cardiomyopathy and arrhythmogenic right ventricular cardiomyopathy[12] also have characteristic ECG findings that should alert the provider to the younger person with a malignant cause of syncope.[13] The reason most clinical decision rules incorporate acute coronary syndrome or previous myocardial infarction is that patients with damaged myocardium are more vulnerable to scar-inducing ventricular tachycardia.[14] Age ranges for ECG commonly missed abnormalities are difficult to identify in the emergency department, which is why the story plus the ECG in this population are so vital in distinguishing malignant from benign.[6]

Older patients with syncope should be considered with a different lens than younger patients presenting with syncope. The "FAINT" score, one of the more recent syncope clinical decision scores that has not been externally validated yet, is mentioned in El-Hussein and Cuncannon's article. Probst et al performed a robust prospective, multicenter trial evaluating older adults presenting to the emergency department with syncope looking at 30-day all-cause mortality or serious cardiac outcomes.[15] They derived the FAINT score including the following: history of heart failure, history of cardiac arrythmias, initial abnormal ECG, elevated pro–B-type natriuretic peptide, and elevated high-sensitivity troponin. A point was associated with each of the categories. A FAINT score of 0 was associated with a 96.7% sensitivity for excluding death in the next 30 days.[15] Thus, the older patient with syncope warrants a more comprehensive approach, as the authors pointed out. The history should include preceding events, a medication reconciliation, history of falls, and reasons for underlying orthostasis. Although we have shown that abnormal orthostatic vital signs in the emergency department do not predict 30-day mortality in the elderly, it is still an important cause of syncope and preventable falls in this population.[16]

The problem is not in identifying a high-risk population that can be safely discharged from the emergency department, the problem is identifying those that may have had aborted sudden cardiac death. Many ED observation pathways focus on the patient with syncope; however, even if admitted to the hospital, another event would be unlikely in the next 24 to 72 hours.[17] Admission to the hospital, which is sometimes used as the final protective action for the emergency provider in the case of syncope, not only fails to prevent sudden death but is expensive and a waste of resources.[18]

Is the answer shared decision-making instead of clinical decision rules?[19,20] The authors make a solid case for this approach, which is particularly relevant for this syncope diagnosis.[1] Shared decision-making was meant for a common ED complaint that could happen again remote from the ED visit, affect other members of the same family, and cause sudden death. This conversation involves discussion of the relevant parts of the history, physical examination, ECG, and ancillary test findings. The shared decision-making must encompass the risk of inherited sudden cardiac death conditions, highlighting the need for a detailed and extended family history and emphasizing the need for subspecialty follow-up if indicated. The provider and the patient and patient's family must engage in a discussion around the real and perceived risks of the first faint, and the possibility of this faint being a warning signal. The shared decision-making discussion can walk through the clinical decision rules of their choice but highlight that admission to the hospital is not the way to prevent downstream bad outcomes.[21] Rather, this discussion should emphasize the specific next steps and the importance of the after-visit instructions because syncope can herald sudden death in not just the patient but the entire family.

DETAILS

Subject:	Patients; Heart failure; Clinical decision making; Mortality; Malignant; Decision making; Electrocardiography; Cardiomyopathy; Older people; Age differences; Patient admissions; Sudden death; Hospitalization; Emergency services; Emergency medical care; Group decision making; Ultrasonic imaging; Pediatrics; Fainting
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	208-210
Publication year:	2021
Publication date:	Mar 2021
Section:	Invited Commentary
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing

ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Commentary
DOI:	https://doi.org/10.1016/j.jen.2020.12.012
ProQuest document ID:	2498280306
Document URL:	https://www.proquest.com/scholarly-journals/commentary-on-syncope-emergency-department-guide/docview/2498280306/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-03-28
Database:	Public Health Database

Use of the Donabedian Model as a Framework for COVID-19 Response at a Hospital in Suburban Westchester County, New York: A Facility-Level Case Report: JEN

ProQuest document link

ABSTRACT (ENGLISH)

The purpose of this facility-level case report was to describe our facility's leadership process of applying the Donabedian model to structure an early response to the coronavirus disease pandemic relative to emergency care. Using the Donabedian model as a guide, both structure and process changes were implemented to maintain high-quality clinical outcomes as well as ED staff safety and engagement. Rapid changes to the model of care, both architecturally and through the expansion of universal precautions through personal protective equipment, created the foundation for what was to follow. Clinical, service quality, and staff safety outcomes were evaluated to demonstrate that the collaborative changes that follow a known process improvement model can be used to address the coronavirus disease pandemic. Further study is needed to compare the outcomes of this facility-level case study with those of others to evaluate the success of the measures outlined.

FULL TEXT

Contribution to Emergency Nursing Practice

••Current literature on emergency department response to coronavirus disease demonstrates that widespread screening and infection control measures are necessary for controlling viral spread.

••The main finding of this paper is that pandemic response can be structured using a known quality model to seek patient and staff safety outcomes.

••Key measures for emergency department leadership to include in clinical practice are to identify modifiable structure and process measures which can result in improved safety.

Background

In January 2020, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified as the novel coronavirus responsible for the cases of pneumonia in the Hubei province of China earlier reported to the World Health Organization (WHO).[1] In the following weeks, outbreaks of the virus were reported in Iran, Italy, Spain, and finally the United States. New York was among the first states to report a positive case of coronavirus disease (COVID-19) and as of June 2020 remained the US state with the highest number of confirmed cases.[2] In this manuscript, we present a single-facility case report of the leadership's application of the Donabedian model[3] to guide the modifications made to a high-volume nonteaching emergency department in Westchester County, NY, during the first wave of patients seen during the COVID-19 pandemic.

Problem Description

Westchester County is home to a diverse population of nearly 1 million residents,[4] including those who work in the county and those who commute to the boroughs of New York City. White Plains Hospital serves a large portion of lower Westchester County, in addition to parts of Bronx, New York City. The hospital's emergency department is the highest-volume emergency department in Westchester County, surpassing 65 000 ED visits in 2019. The nature of the region dictates that public health issues affecting the greater metropolitan area have a direct impact on the county and its inhabitants. Public transportation is commonly used to travel into and out of Manhattan. It is reasonable to assume that the geographic proximity of New York City to Westchester County had a significant impact on the rate and severity of the cases seen.

Westchester County reported its first positive case of COVID-19 on March 2, 2020. Positive cases peaked on March 25, 2020, surged again on April 8, 2020, and began to decline steadily after April 15, 2020.[5] The initial outbreak in Westchester occurred 9 miles from White Plains, in New Rochelle, NY. Hundreds of community members were exposed at a synagogue in New Rochelle, many of whom lived in the neighborhoods adjacent to White Plains that are served by White Plains Hospital.

Available Knowledge

Peer-reviewed literature was emerging and notably scarce during this facility's initial response to the COVID-19 pandemic. Publications and updates from the Centers for Disease Control and Prevention (CDC) and the WHO were the primary sources of information used by this facility's ED leadership team during the initial outbreak. Available evidence in the literature supported the use of infection control strategies such as the addition of anterooms to care areas for donning and doffing of personal protective equipment (PPE); designated areas for patients at high or low risk for COVID-19; and refresher education for staff on the application and removal of PPE,[6] surface decontamination, and frequent cleaning practices.[7] The successful response strategies employed during the Middle East respiratory syndrome pandemic for routine infection control measures, including the use of PPE, handwashing, and contact tracing for exposed employees, were also considered.[8]

Rationale

As leaders at the facility, we sought a shared mental model to structure our facility's pandemic response. We evaluated the Donabedian, Systems Engineering Initiative for Patient Safety 2.0, and Plan-Do-Study-Act models. The Plan-Do-Study-Act model[9] demonstrated the ability to test the changes made but was not applied in real time because the changes in the department occurred too rapidly to evaluate the outcomes of each intervention. Although the Systems Engineering Initiative for Patient Safety 2.0 model[10] exhibited the capacity to clearly stratify the factors in the work environment that affected outcomes, the elegant simplicity of the Donabedian model was used here as the best fit for the crisis situation of the pandemic response.

The Donabedian model[3] has been used as a framework for health care quality since 1966.[11] The model describes structure, process, and outcome measures as having synergistic relationships, each important to the evaluation of health care quality. Structural measures are described as characteristics of the space where care occurs, including architecture and availability of equipment; process measures include delivery of care to patients and the workflows encompassed therein; and outcome measures describe the effects of health care on populations.[12] The Donabedian model has been used to evaluate ED triage processes and has successfully validated the relationship between structure and process measures.[13] Another study[14] described the specific structure, process, and outcome measures as either barriers to or enablers of quality of care. Although the body of research surrounding SARS-CoV-2 was not yet established, we postulated that the structure and process measures would provide a framework to enable a comprehensive pandemic response, as well as to further research the demonstrating enablers of positive patient and staff outcomes.

Specific Aim

The purpose of this facility-level case report was to describe our facility's leadership process to apply the Donabedian model to structure the COVID-19 pandemic response relative to emergency care. The desired outcomes identified by the ED leadership during the initial outbreak at the facility site included the safety of patients and staff, the provision of quality care to all patients presenting to the emergency department, including those solely seeking COVID-19 tests, and the continuous availability of PPE for staff protection.

Methods Design

A facility-level case report of the application of the Donabedian model was used to retrospectively evaluate structure, process, and outcome measures. As a quality improvement project, this project was not considered human subjects research at this facility.

Context

White Plains Hospital is a 292-bed nonprofit medical center located in lower Westchester County, NY. From March 2020 through April 2020, this emergency department was challenged by the nearby threat of increasing illness burden and death being faced by the health systems in nearby New York City as the pandemic surged. As infection rates rose, nearly 30 000 people tested positive for the virus in Westchester County. This resulted in more than 1000 deaths, stretching the health system beyond its capacity and presenting an enormous challenge to hospitals countywide.

Interventions

The creation of innovative systems during the pandemic response was necessary to care for the volume and acuity of patients presenting to the emergency department at the time. The pandemic response interventions implemented at the facility's emergency department are described in detail according to the Donabedian model, classifying the changes as structural, process, or outcome. For clarity, these interventions will be described chronologically, with a further breakdown of the measures using the Donabedian model in supplementary charts. The interventions

included initial screening and triage changes, capacity management, expanded screening and capacity interventions, addressing staff safety and morale, testing and surveillance, and telehealth. The team involved in making high-level decisions for the initial response included the physician director and assistant director of the department, the registered nurse (RN) nurse manager, and the RN clinical quality analyst, all of whom are leaders in the department and, in addition, provide direct patient care. Given the rapidly evolving and fluid nature of the pandemic response interventions, we have made our best efforts to describe the risks considered acceptable in the context of this crisis situation and the countermeasures employed to negate them.

Study of the Interventions

The Donabedian model was used to conceptualize, plan, and evaluate the facility's pandemic response interventions (Figure 1). Extended measures, such as complications, were not included in this evaluation because the field of COVID-19 response measures was in its infancy, and the disease's complications were not yet well documented.

Measures

The measurements that may reflect the staff safety outcomes include the number of staff sick calls, number of staff who contracted COVID-19, and quantity of available PPE. Service quality is reflected in the overall number of patients who received care in the emergency department, the percentage of these patients who received a COVID-19 diagnostic test, and the percentage of patients who left the emergency department without being evaluated.

For this quality evaluation, the measures collected were those able to be analyzed retrospectively from administrative data. Daily sick calls were recorded in real time in the facility's staff scheduling system and were queried later for analysis. ED patient census, patients who left without being evaluated, and the percentage of patients receiving a COVID-19 test were tracked using real-time analytics software. The software used was populated by the electronic medical record system, recording the number of patients registered daily as well as their disposition and the procedures performed. Our department was unable to retrospectively analyze PPE quantity; therefore, this measure was not quantified in this analysis.

Analysis

Descriptive analytics were applied to the aforementioned data to create the charts in Figures 2, 3, and 4. The data gathered allowed our team to identify and demonstrate when patients and staff were most affected by illness during the initial pandemic surge.

Results Phase 1: Initial Screening and Triage Changes

The hospital began screening all patients for exposure to SARS-CoV-2 on February 28, 2020. In early March 2020, the hospital confirmed its first cases of COVID-19. The ED leadership team immediately recognized the potential for infectious spread in the care areas and set about to mitigate the risk to noninfected patients and staff members. Under normal operations, patients and families were quick-registered and then seated in the waiting room before being triaged. Patients classified as infectious and those classified as noninfectious sitting alongside one another without the opportunity to implement social distancing demonstrated potential danger.

Recognizing that a waiting room nurse could potentially expedite care for patients at clinical risk,[15] a "quick-look" RN was implemented on March 10 to perform the initial screening of patients and visitors. This RN, installed in the waiting room wearing full PPE, was tasked with screening all patients and visitors who presented to the emergency department by measuring oral temperature and asking 2 screening questions. The initial screening questions were an inquiry about travel to affected countries (Figure 5, question 1) and about the presence of fever and cough.

Changes to screening occurred almost daily in the following days. On March 17, community spread in our area was recognized, prompting the CDC as well as local and state health departments to provide guidance for process changes, including suggested screening measures and goals of mitigation strategies.[16] Early in our surveillance of

COVID-19 cases in the emergency department, we observed multiple exposures of patients and staff to patients who initially screened negative but later tested positive for COVID-19. The screening of patients at the time of presentation was not always effective. During their visit, many patients with symptoms such as abdominal pain or diarrhea were found to have pneumonia on chest radiographs; these patients then tested positive for COVID-19. For each situation in which the initial screening failed to capture a patient classified as positive, dozens of staff were exposed. Notifying the exposed staff added to the workload of the leadership team as well as contributed to the fear and anxiety expressed by the frontline staff at daily team meetings. Healthy patients and their family members were also exposed to SARS-CoV-2 during the screening in place at the time. The screening questions were progressively pared down to the chief complaint and presence of fever or cough; this made screening more efficient and captured patients requiring investigation for SARS-CoV-2 as well as prevented staff exposures.

As an additional measure to mitigate staff and patient exposures as well as to provide support to the community, our hospital operated a COVID-19 hotline to provide information about symptoms, exposures, and testing. The phone number for the hotline was publicized in local government communications, and community members calling in were able to be triaged over the phone by ED physicians and redeployed nurses from nonclinical areas. The ED director oversaw the hotline staff and developed the hotline screening and referral procedures in collaboration with the local department of health. This ED prearrival contact helped to provide the earliest possible warning of patients who may present for testing so that the staff could take appropriate precautions when receiving the patient into the facility. From March through May 2020, the hotline received more than 20 000 calls from community members, with nearly half of those speaking with a staff member, whereas the other half heard a recorded message. This service provided an educational resource to the community and may have prevented countless ED encounters that threatened to overwhelm the health care system ([Figure 2]).

In consideration of the risk to visitors, visitation was limited in the emergency department beginning when we first placed patients under investigation for COVID-19 (PUIs). Visitation was limited to 1 person per patient beginning March 9 in the emergency department and throughout the entire facility on March 10. On March 16, visitation was eliminated by the facility except for pediatric patients arriving with a caregiver. These decisions were supported by the CDC[17] and later by the Department of Health; on April 10, the state announced that hospitals were required to suspend visitation.[16]

On March 15, the PPE guidelines were modified to further protect patients and staff. Each patient presenting to the emergency department was given a surgical mask on entry. All employees were required to don N95 particulate respirators for the duration of their shifts to offset the risk of exposure to patients not considered to have initially screened positive.

ED employees' screening on presentation to work was implemented on March 11 and hospital-wide on March 13. After March 13, this intervention was managed by hospital operations, not the emergency department. Employees reporting to work were required to undergo screening each day and were given a colored sticker on their badge to indicate that they had passed a contactless temperature screening on arrival. The alternative entry points to the hospital were closed to ensure that all staff passed a screening checkpoint on arrival each day and were turned away if they had a fever or reported any signs of illness. This screening was an important measure taken by the hospital, which was suggested by the CDC[17] to reduce viral transmission among employees. Communications from occupational health were emailed to all staff, encouraging them to report any signs of illness and to stay home from work if they experienced any symptoms.

Phase 2: Capacity Management

Capacity management was an obvious challenge to our emergency department because an increasing number of

patients with positive risk screenings for COVID-19 presented to the emergency department for care. Under normal operations, the emergency department had 5 negative pressure rooms and 2 high-efficiency particulate air filters, allowing for the care of 7 patients under airborne isolation at a given time. After implementing multiple iterations of structural changes, the capacity increased to care for 46 patients under isolation for SARS-CoV-2 while maintaining the best possible infection control practices.

Under usual operations, the department was separated into 3 distinct sections over 2 floors, and the negative pressure rooms were evenly spread among them. In addition, there were several rooms with doors that allowed the addition of a high-efficiency particulate air filter; these too were evenly spread among the 3 care areas. Under these conditions, each zone was receiving PUIs, with nurses and providers caring for a mix of patients classified as potentially infectious or noninfectious. As the volume of PUIs increased, the rooms would fill up quickly, causing the care team to use less-than-ideal spaces for these patients. Examples included rooms with a curtain rather than a door, hallway beds while waiting for a negative pressure room, or holding in the triage area. Such conditions contributed to the exposure of other patients and staff, as well as high PPE burn rates and inefficiencies related to infection control measures. Increasing the capacity for patients classified as infectious quickly became a top priority.

The first example of structural change to increase our capacity for PUIs was the development of a low-acuity zone for ambulatory patients whose risk screen was positive and who required assessment and care. This area, colloquially known to staff as the “COVID café,” opened on March 13, 2020. It was constructed using half of the ED waiting room, an area of 1043 square feet. Modular hard wall panels were used to divide the waiting room; half would become the low-acuity zone, whereas the other half would remain an entry point to the main emergency department. A former security booth was converted into a nurses’ station with telephones, computers, and handwashing stations installed. A medication box was mounted on the wall, and airflow was modified in the area to make the entire zone negative pressure relative to the adjoining spaces.

Sixteen vertical (chair) care spaces were ultimately created in this area to care for mostly healthy young adults presenting with fever and cough. Patients were given a surgical mask on initial screening and immediately escorted to the low-acuity zone for triage. The chairs were sanitized between each patient visit. Staff working in this area donned full PPE and spent 4- to 6-hour stretches staffing this zone, switching out at break times to prevent burnout and PPE fatigue. Diagnostic tests performed in this area included COVID-19 nasopharyngeal swabs, the rapid group A streptococcal infection test, rapid influenza test, rapid respiratory syncytial virus test, and chest radiographs. Most patients were treated and discharged within 60 minutes. Limitations of the electronic medical record prevented the extraction of all patient data from the COVID-19 low acuity zone. However, a sample of 100 patients seen in this zone by 6 different providers in April 2019 revealed that 69% of patients had an arrival to departure time of less than 60 minutes. Mean arrival to departure time was 55.2 minutes (median 47.5 minutes, standard deviation 27.6 minutes). The common treatments given in this area included oral administration of acetaminophen, ibuprofen, and ondansetron. Rarely, patients required transfer to the central area of the emergency department for further evaluation and admission, which was easily done through a back door leading to the ambulance bay.

The primary risk in this area included patient-to-patient transmission. Although the patients cared for in this area were given surgical masks on initial presentation, we recognized the possibility of droplet transmission among patients in the zone. Whenever possible, patients were placed more than 6 feet apart. The entire area was terminally cleaned each day, and ultraviolet (UV)-light–pulsating robots were used by our environmental services (EVS) department once daily to reduce surface contamination.

Phase 3: Expanded Screening and Capacity Measures

The second structural change implemented in the emergency department was the installment of a 594-square-foot

outdoor screening tent on March 17. Installed in the parking lot outside the department's ambulance bay, this space became the entry point for all patients entering the emergency department, including those brought in by ambulance. The shelter provided an additional barrier between the main emergency department and patients with potentially infectious conditions. On entering, patients were provided with a surgical mask, and patient screening measures (Figure 5) were performed. Patients who screened positive were then placed on isolation precautions when they entered the emergency department and sorted to the aforementioned low-acuity zone, into a private ED room, or into the high-acuity area that was developed the following week.

When the outdoor screening tent was set up, it was already recognized that there were more patients classified as high acuity with positive COVID-19 screenings than available isolation rooms. Room turnover was a challenge, with terminal cleaning after patient departure taking up to 90 minutes. A COVID-19 high-acuity zone was created to respond to this issue and to add another layer of protection for our staff. In this space, a supply room was converted into a vertical care area, whereas an examination room and an office were converted into supply rooms. This separate and distinct high-acuity zone opened on March 23 with 8 rooms, 12 upright chairs, and 6 hallway beds. On March 29, the area was expanded to include an additional 4 rooms and ED radiology (computed tomography scanner and plain film radiology were included). Colloquially called the "COVID Suites" by our staff, this entire area was made negative pressure to reduce airborne exposures and was designed with designated donning and doffing rooms at the entry and exit points. Employees working in this area remained in full PPE for their time spent in the area, typically 4 to 6 hours, before switching with other staff. The area was considered a contaminated space because each room did not have individual airflow, but the overall space was negative pressure relative to the adjoining areas. The layout of the department after creating this change is illustrated in Figure 6.

Nosocomial spread of the virus in the high-acuity zone was a recognized risk. Nurses and caregivers were instructed to change outer gloves and isolation gowns between patients, patients were masked, and the airflow of the area helped to mitigate the risk of droplet transmission. Many patients were intubated in this area, reaching a peak of 4 intubations in 24 hours on March 26. Intubation was performed with as few participants in the room as possible because aerosolizing procedures were recognized to pose the most significant risk of viral transmission. Those performing and assisting with intubation were instructed to wear a full-body suit and hood in addition to the baseline PPE (Figure 7).

Room turnover guidelines relaxed as new data emerged regarding the transmission of SARS-CoV-2. Initially, terminal room cleaning, including UV-light pulsation, was required for all PUI rooms after patient departure. Later, the UV light was deemed necessary only if an aerosolizing procedure had occurred in the room. This change, approved by the hospital's infection control department, trimmed the time required for each room cleaning by approximately 30 minutes, creating additional capacity for patients as they arrived.

ED throughput is well known to be dependent on overall hospital capacity and inpatient efficiency. As ED volume rose, there was a concern whether the hospital, despite the cancelation of elective procedures, could manage the surge in volume and acuity. The emergency department partnered with clinical colleagues throughout the organization to make changes to admission criteria on the basis of current epidemiologic patterns. The emerging evidence was evaluated frequently by those involved, and the observations of the patient population were integrated when modifying the admission criteria. Lower oxygen saturation levels and higher respiratory rates were permitted on patients who were discharged home. Patients were referred for admission only if their oxygen saturation level was 93% or less or if they had other symptoms of severe disease (Figure 8). Patients traditionally slated for inpatient care were discharged with home oxygen and the option of telemedicine visits on days 2, 5, and 7 after the index ED encounter to ensure their ongoing safety. These changes were enacted with trepidation from the staff. Maintaining

the safety of our patients was a primary concern while conserving hospital capacity, and by extension ED capacity, for the patients who were the sickest at the time and into the future.

The inpatient census at our facility peaked in early April 2020. As a result of both the hospital's and the emergency department's success in expanding overall capacity, there were no recorded bed shortages. This facility had been so successful in controlling inpatient volume that COVID-19 transfers were received from other regional hospitals. As ED volume dissipated, but the length of stay for hospitalized patients remained extended, the emergency department's upper level was used as an inpatient unit caring for patients classified as COVID-19–negative. This structural change reduced the capacity of the emergency department but did not affect our operations because of the downward trend in ED volume.

Staff Safety and Morale

The threat of insufficient PPE availability owing to the disrupted supply chain and global shortage[18] affected this hospital, with the biggest concern being availability of N95 particulate respirators. Under ideal conditions, all face coverings, including N95 masks, were considered single use, to be disposed of on exiting a room. Owing to shortage concerns, conservation of masks was required from week 2 of the pandemic response, beginning March 15. Staff were required to use only 2 masks for their shift duration. By March 30, the hospital distributed masks to individual staff members during their daily temperature screening, with those in clinical areas receiving 1 mask per shift. A second mask was to be supplied if a high-risk aerosolizing procedure occurred. The hospital obtained powered air-purifying respirators, to be worn as alternatives to N95 masks in the appropriate care areas. A video demonstrating the PPE doffing process and procedures for cleaning powered air-purifying respirators was sent out to staff to provide a refresher on infection control.

Furthermore, our department provided the staff with guidelines for different PPE levels to be worn, depending on the care area where they were working. These guidelines were disseminated by email as well as by flyers and posters in the donning and doffing areas. ED caregivers received a pair of scrubs daily to be used during their clinical shift and to be returned to be laundered by the hospital at the end of the day. Throughout the emergency department, the universal precautions included the addition of the N95 mask. In the low- and high-acuity COVID-19 zones, higher levels of PPE were worn, with the highest level being donned by nurses and providers who were expected to intubate patients. Photographs were provided to staff to serve as examples (Figure 7) for staff to select the appropriate PPE for the care area where they would be working for the day.

Early on, the department struggled with the distribution and conservation of PPE. Potential overuse of high-level equipment was observed, and other departments removed PPE from the emergency department to bring to their respective areas of the facility. To combat the waste of PPE, the ED leadership team repurposed supply carts so that the department's unit leader could distribute PPE as designated. This process change effectively promoted conservation and decreased waste. By matching daily demand with what was supplied through the carts, staff members were always provided the necessary PPE without observed gaps in protection. The consistent run rate also made it more efficient for hospital operations to anticipate and address the ED needs daily. We are now able to reliably forecast future PPE requirements in anticipation of the second wave of infections.

The EVS team worked to decrease the bioburden inherent to any patient care area and reduce the likelihood of contact exposures. In response to the aforementioned evidence regarding surface decontamination, the frequency of ED cleaning rounds increased by 4 times the baseline. A member of the EVS team was embedded with the high-acuity COVID-19 zone team to ensure the efficiency of room turnover in that region. The EVS team's efforts were an additional structural and process improvement that fostered the environment of safety outcomes.

Throughout the month of March, the physician leaders used simulation to demonstrate safety measures during the

intubation of PUIs. Staff from the emergency department, intensive care, anesthesia, and respiratory therapy collaborated to reduce potential exposures to nurses, nursing technicians, and other staff who may have traditionally been present during intubation. The factors taught included the use of the equipment and procedure modifications to decrease the aerosolization of viral particles, as well as measures to reduce the number of staff in the room during intubation. Those who took the class became part of the COVID-19 Critical Airway Team, a measure that went live on April 2, 2020. This team could be activated to assist with the intubation of PUIs to decrease staff risk during this high-risk procedure ([Figure 9]). Seventy-three clinicians participated in the class, and 69 intubations were performed by the COVID-19 Critical Airway Team in the month of April.

As care spaces and processes transformed overnight, many staff members expressed frustration that they were uninformed of new changes and often had to “catch up” on arrival to their shift. In response, the leadership sent out daily briefings each evening describing the changes that had occurred throughout the day. The categories of information disseminated in these briefings included patient safety, staff safety, operations, other essential notes, and affirmations. The communications were well received by the staff who provided positive feedback. Furthermore, the staff were encouraged to join an online portal, initiated on March 27, which contained copies of the most current processes and procedures and allowed staff to discuss the changes in real time on a secure Web platform.

Our team introduced a weekly happy hour beginning April 10 over a video-conferencing platform. This virtual gathering provided an additional opportunity for staff to decompress, bond, and enjoy the presence of their team members outside of the stressful work environment.

In July 2020, our leadership team held several debriefs with ED staff to identify issues that remained prominent to the staff as our population of patients presenting with COVID-19–related symptoms decreased. The themes that emerged included communication issues, need for supplies, and anticipation of a potential second wave. The leadership is in the process of responding to the concerns of the staff while preparing for future occurrences.

Testing and Surveillance

The availability of testing for COVID-19 has remained a challenge throughout the pandemic in Westchester County. When our facility sent out the first COVID-19 test on March 7, 2020, the guidelines for testing were strictly controlled by the department of health and required that we received approval from it as well as the staff infectious disease physician. Furthermore, only the department of health was conducting tests at the time, and there were no private laboratories to use. In the first week of testing, 10% of the patients presenting to the emergency department qualified for COVID-19 testing ([Figure 3]). The testing guidelines were subsequently relaxed in the following weeks so that providers could determine the appropriateness of testing independently, and the capacity for testing also increased. By March 12, a private laboratory began to conduct tests with a faster turnaround time than the state laboratory. On March 15, our hospital’s partner facility began to receive our tests as well, further easing the testing bottleneck.

On April 3, in-house point-of-care testing was initiated with a 1-hour turnaround time, and we were able to drastically reduce send-out tests being conducted. This newfound testing capability was especially helpful in terms of managing inpatient capacity and sorting patients to the appropriate inpatient units. On April 6, we began the practice of testing all inpatients to ensure that no patients who had tested positive for COVID-19 were presumed to be negative and sent to inpatient units where they could potentially expose others to the virus. Testing peaked in mid-April 2020, with more than 70% of the patients receiving a COVID-19 test while in the emergency department.

Telehealth

Telehealth became a vital process measure implemented early in our COVID-19 response, beginning with video follow-ups for those discharged patients deemed clinically high risk on March 20, 2020. Although the ED staff did not directly perform these subsequent visits, they were responsible for the identification and handoff to the outpatient

team to ensure clinical quality through maintaining continuity of care. There were more than 1700 attempted video follow-ups, with 727 patients ultimately having 1 scheduled. Given that most medical practices were ill-equipped to safely care for these patients in an office setting, this process provided a patient-centered approach to care that helped maintain the safety of the greater medical staff and the community. A telehealth visit platform was installed in the outdoor screening tent as well, beginning April 6. This visit type allowed ED providers to remain inside the hospital and perform a medical screening examination of patients remotely. After being seen by the provider through a tablet computer, patients in the outdoor screening tent with normal vital signs could be swabbed for COVID-19 and then discharged home without entering the hospital. Ultimately, the emergency department cared for 273 patients in this manner, which assisted in limiting PPE use and potential staff exposures.

Outcomes

Positive identified pandemic response outcomes have mainly been achieved. In March and April 2020, there was never an identified inability to care for a patient because of a capacity constraint. Our internal quality measurements revealed that the patients who were sent home and subsequently returned within 48 hours of their index ED encounter requiring hospitalization remained relatively stable at a rate of 1.1% over the same time frame.

Although these outcome measurements highlighted operational efficiencies, they also served as a marker for clinical quality. What they failed to assess was the perception of care as measured by patients. The service quality measured by Press Ganey (Press Ganey Associates LLC) was noted to be nationally in the upper quartile during our pandemic response. The department ranked in the 92nd and 95th percentiles in the domains of overall assessment and likelihood of recommending, respectively. These outcomes demonstrated that even during an anxiety-provoking and clinically stressful period, the department structure and processes kept the patient at the center of all employed efforts.

Staff sick calls peaked with 10 calls on March 25, 2020, representing 18.5% of the nursing staff scheduled for that day ([Figure 4]). A low census in other areas of our hospital system, including radiology and ambulatory surgery, resulted in the redeployment of staff to assist our department during this time. Many of these “floating” staff members were nurses with emergency room experience who were able to fully function as RNs in our department. Others were used in more focused roles such as supply management or infection control; for example, a nurse would be stationed outside a doffing area to provide feedback to staff as they doffed PPE to reduce contamination.

The hospital never ran out of PPE for staff to safely provide care to patients. The New York State Department of Health conducted antibody testing of a sample of health care workers as well as residents of Westchester County; the results were provided to some senior leaders of the hospital demonstrating that 11% of the ED staff tested positive for COVID-19 antibodies. Many variables affect the development of COVID-19 antibodies, including community exposure, home environment, and exposures at work. The leadership at the hospital site interpreted 11% ED staff testing positive for COVID-19 antibodies as providing supporting evidence that this ED team was adequately protected from the virus. Moreover, the antibody rates observed further assured that PPE availability, instruction, and use effectively prevented health care worker infections.

COVID-19–related ED volume peaked on April 1, 2020, and afterward steadily declined. The ability to provide adequate testing increased throughout March and April, starting with the provision of tests to 10% of the ED patients and eventually reaching 75% of the patients by the end of April.

As our ED volume of patients who had tested positive for COVID-19 decreased, structural measures that allowed for a high volume of patients testing positive for COVID-19 were scaled back. The first phase of this was the closure of the low-acuity COVID-19 zone. Even as the department is working toward the resumption of routine operations, it remains prepared for the future, recognizing that the resurgence of SARS-CoV-2 in the community is likely.

Outcomes not measured as part of this case study include inpatient mortality, overall COVID-19 hospitalizations, disease complications, asymptomatic spread, and ED return visits beyond 48 hours.

Discussion Lessons Learned

This hospital's responsiveness in developing key structure and process measures to address the rapidly changing health care environment serves as an example of innovation during such a time of crisis. In the months since the initial outbreak of COVID-19 in New York, the body of literature surrounding the response to this pandemic has grown significantly. The rapid emergence of new literature to review during this facility's initial pandemic response resulted in the need for daily changes to existing structure and process measures. In hindsight, armed with the currently available literature, this emergency department recognizes successes as well as areas of opportunity for a potential second wave of COVID-19.

Perhaps paramount in terms of process measures, the use of face coverings for patients could have been implemented earlier. Early literature regarding mask use included case reports of asymptomatic viral transmission that was reduced with mask use,[19] but the WHO recommended mask use in public only for those with respiratory symptoms. Universal mask use is believed to be a factor in countries that demonstrate lower rates of COVID-19[20] and was mandated by authorities in New York beginning March 17.[21]

Face coverings worn by staff also underwent multiple iterations before it was decided on March 15 that N95 masks should be worn universally by staff in direct contact with patients at the hospital site. As previously noted, the screening of patients early on was inadequate to capture all patients with COVID-19; this problem was not unique, and asymptomatic transmission of the virus has been observed.[22] The universal use of N95 respirators could have potentially been more effective in preventing health care worker infections at this facility, especially during exposure to patients who had screened negative for COVID-19 but were later found to be infected. However, the use of N95 respirators for all staff in direct contact with patients at this facility went beyond what was called for by the WHO, which advised the use of standard medical masks except during aerosol-generating procedures.[18] The emergency department continues to mandate the use of N95 respirators for all health care workers in direct contact with patients.

Another process measure that was important to the facility's ability to provide care spaces for all patients was the ED admission and discharge workflow demonstrated in [Figure 8]. The 48-hour return rate of 1.1% demonstrates that the criteria were successful in measuring disease severity, although this case study is limited, in that at-home mortality cannot be measured and must be considered as a possibility. Other nearby hospitals used a similar risk-stratification strategy, using oxygen saturation level, respiratory rate, and other criteria to determine care pathways for patients presenting with COVID-19 symptoms.[23]

The transforming space in which care was provided in the emergency department during the pandemic was a key structure measure. Infection control should be a high priority in the design of emergency departments, with the ability to create large sections of negative pressure space if needed. Multiple points of entry into different sections of the department allowed for reduced contacts between patients classified as infectious and those classified as noninfectious. These lessons will be considered when embarking on a remodeling of the emergency department in the future.

Finally, we consider the ED staff infection rate of 11%. Compared with the 1.1% of the health care workers infected at a hospital in Wuhan, China,[24] and 2.4% in South Korea,[25] this rate seems undesirable or modestly successful. However, the multifactorial challenges that this region faced included population density, supply-chain issues, delays in the closure of schools and public spaces, hesitation of the public to accept universal face coverings, and other factors that may have contributed to COVID-19 exposure at, and outside of, work. This department's success was

demonstrated in comparison with that of the general public in Westchester County, which had an infection rate of 13.8%, as well as that of New York City, which demonstrated a rate of 20% among the general public and 12% among health care workers.[26] One hospital in the region experienced a staff COVID-19 antibody seroconversion rate of 46%,[27] further demonstrating the challenge of protecting health care workers in the New York metropolitan area. Structure and process measures that differed among the hospitals in the region may be examined in future studies to determine possible reasons for the disparity.

It should be considered whether the aforementioned lessons learned may have reduced the number of staff who contracted COVID-19. In preparation for the potential second wave of infections, this department considers the protection of staff and patients to be of the utmost importance.

Limitations

The described interventions were used during the emergence of the COVID-19 epidemic in an institution and emergency department with its own set of challenges and advantages. Information on transmission and the resources that would be required were continually changing, as was the availability of PPE and other supplies. For example, the processes required regular reevaluation as the CDC updated its guidelines regarding the mode of transmission of COVID-19 from droplet to airborne. An institution more equipped with validated information about the virus perhaps would have structured its response differently or according to another timeline.

Furthermore, it is recognized that there are limits to this hospital's response in terms of generalizability. The setting of a private hospital in Westchester County with many available specialists and partnering hospitals for possible transfers needing increased level of care is not applicable to all settings. In addition, the layout of the existing emergency department was such that it lent itself relatively easily to the creation of a larger negative pressure area. A challenge of the setting was that the personnel were perhaps stretched more thinly than those at teaching hospitals or in larger hospital systems that were able to redeploy large numbers of staff.

More information regarding the success of this intervention might also be gleaned from the outcomes not measured, including inpatient mortality, overall COVID-19 hospitalizations, disease complications, asymptomatic spread, and ED return visits beyond 48 hours.

Implications for Emergency Nurses

The COVID-19 pandemic presented many serious challenges from which there are important implications for emergency nurses. The importance of examining departmental structure and process measures to have a positive impact on outcome measures should not be overlooked when preparing for, or managing, a disaster or crisis.

ED structure measures, including the architecture of the department, may be examined on an ongoing basis to evaluate readiness to respond to crises, including infectious disease, mass casualties, and natural disasters. The addition of a waiting room nurse was a key structure measure in this department's response, serving an important role in infection control, which may be replicated in other departments.

Process measures, including interdisciplinary communication methods, environmental cleaning, and PPE guidelines, were paramount to this facility's success in managing the initial wave of the pandemic. Again, communication methods may be examined on an ongoing basis, ensuring that all staff members have access to communications from management describing rapidly evolving crises. Collaboration between frontline workers and ancillary departments such as EVS to achieve a common goal is reliant on the processes for communication between these departments. Improved communication and transparency from department leaders streamlined the implementation of the outlined interventions. Virtual happy hours and debriefing sessions functioned to keep the lines of communication open with staff and helped to improve morale during an otherwise demoralizing time.

As in many other settings, the use of telehealth was extremely helpful in triaging patients and decreasing exposure

to patients and staff. Practical screening tools facilitated this process and will likely have applications in other disease scenarios once formally validated.

Until this crisis, items of PPE, including N95 respirators were very rarely, if ever, reused. Emerging evidence and effective processes to conserve PPE resources might be required in future pandemics.

Conclusion

COVID-19, the information surrounding its spread and management, and the response to its prompt advent has made an indelible mark on the way emergency care is delivered. This facility-level case study reflects the response of 1 department at the epicenter of the outbreak in New York. Whereas change is often met with anxiety and resistance, multidisciplinary cooperation and strong leadership allowed for important and necessary structure and process measures to be amended along a tight and tense timeline. It remains to be seen whether these measures demonstrate significant success, and therefore more research is needed to determine whether such measures are associated with causal improvements.

Acknowledgments

We thank the following individuals for their assistance in the drafting and editing of this manuscript: Dr Margaret Carmen and Dr Farrukh Jafri. In addition, we thank the reviewers and the editorial board members at the *Journal of Emergency Nursing* for their dedication to the professional development of emergency nurses.

DETAILS

Subject:	Patient safety; Clinical outcomes; Quality of service; COVID-19; Equipment; Leadership; Precautions; Pandemics; Emergency services; Coronaviruses; Emergency medical care; Case reports
Business indexing term:	Subject: Leadership
Location:	United States--US; New York; New York City New York
Identifier / keyword:	Hospitals; Donabedian Model; Pandemics; Emergency Department; COVID-19
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	2
Pages:	239-255
Publication year:	2021
Publication date:	Mar 2021
Section:	Clinical
Publisher:	Elsevier Limited
Place of publication:	Philadelphia

Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Case Study, Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.10.008
ProQuest document ID:	2498280156
Document URL:	https://www.proquest.com/scholarly-journals/use-donabedian-model-as-framework-covid-19/docview/2498280156/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-08-01
Database:	Public Health Database

Information for Readers: JEN

ProQuest document link

FULL TEXT

TVM:UNDEFINED

DETAILS

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
First page:	A10

Publication year:	2021
Publication date:	Jan 2021
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	General Information
DOI:	https://doi.org/10.1016/S0099-1767(20)30392-5
ProQuest document ID:	2487206044
Document URL:	https://www.proquest.com/scholarly-journals/information-readers/docview/2487206044/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Jan 2021
Last updated:	2021-02-14
Database:	Public Health Database

Job Stress Among Emergency Nurses: JEN

ProQuest document link

FULL TEXT

Dear Editor:

I would like to congratulate Karbakhsh et al[1] for their successful publication titled “The effectiveness of a time management workshop on job stress of nurses working in emergency departments: An experimental study,” wherein the authors found no significant decrease in job stress among emergency nurses after a single 8-hour time

management skills session.

Job stress has been well documented among emergency nurses, and numerous peer-reviewed articles have described the unpredictable work environment, job demand, lack of teamwork, and poor managerial support as contributing factors.[2-4] Karbakhsh et al[1], however, had a forseeable limitation to their study design. Specifically, they attempted to replicate 2 studies that demonstrated a decrease in job stress secondary to time management training.[5,6] However, both studies were inapplicable for, and unable to be extrapolated to, emergency nursing. The first study used 6 90-minute time management sessions and resulted in a statistically significant decrease in job stress among a random selection of nurses across numerous hospital departments and was not specific to emergency nursing.[5] This is especially notable as there is a significant difference in job demand and time requirements between general staff nursing and emergency nurses.[7] As Adriaenssens et al[7] notes, emergency nurses therefore require vastly different managerial tactics and focused education when compared with other hospital nurses.

The second study that Karbakhsh et al[1] referenced demonstrated a negative correlation between job stress and time management behaviors among 30 head nurses, as tested by questionnaires.[6] Again, not only did this study not focus on the emergency nursing population, let alone even general staff nursing, it also did not test an education strategy nor educate the head nurses on time management skills and strategies. Together, a study design that attempts to replicate these would quickly become invalidated when applied to ED floor nursing. Therefore, it was not unforeseen that a single 8-hour time management session would not produce a significant decrease in job stress among emergency nurses.

Emergency nursing job stress, burnout, and turnover rates have all been shown to have clear correlation with one another.[2-4] Even more so, Ahwal and Arora[2] found that a decrease in *both* physical and psychological stressors would significantly improve patient care and nurse retention rates in the emergency department. Adriaenssens et al[7] took this further and recommended that emergency nursing managers become aware of these stressors and proactively implement preventative measures.

Furthermore, team dynamics have been shown to have a *greater* impact on job stress than time management;[4] group cohesion and general nursing staff retention improved after implementation of team-building interventions.[8] Unfortunately, I have not found studies that explore these relationships specifically among the ED population and therefore would kindly like to call upon the emergency nursing community for further exploration of team dynamics and group cohesion on emergency nursing job stress.—*Hannah V. Wade, BSN, RN, CEN, El Paso, TX; E-mail: hannahvwade@gmail.com*.

DETAILS

Subject:	Occupational stress; Emergency medical care; Time management; Nurses; Nursing; Managerial skills; Emergency services
Business indexing term:	Subject: Occupational stress Time management Managerial skills
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	19-20
Publication year:	2021

Publication date:	Jan 2021
Section:	Letter
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Letter
DOI:	https://doi.org/10.1016/j.jen.2020.07.014
ProQuest document ID:	2487205954
Document URL:	https://www.proquest.com/scholarly-journals/job-stress-among-emergency-nurses/docview/2487205954/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2021-04-09
Database:	Public Health Database

Understanding ED Buprenorphine Initiation for Opioid Use Disorder: A Guide for Emergency Nurses: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Opioid use disorder is a critical public health problem that continues to broaden in scope, adversely affecting millions of people worldwide. Significant efforts have been made to expand access to medication therapy for opioid use

disorder, in particular buprenorphine. As the emergency department is a critical point of access for many patients with opioid use disorder, the initiation of buprenorphine therapy in the emergency department is increasing, and emergency nurses should be familiar with the care of these vulnerable patients. The purpose of this article is to provide a clinical review of opioid use disorder and opioid withdrawal syndrome, medication treatments for opioid use disorder, best clinical practices for ED-initiated buprenorphine therapy, assessment of withdrawal symptoms, discharge considerations, and concerns for special populations. With expanded understanding of opioid use disorder, withdrawal, and available treatments, emergency nurses will be better prepared to deliver and support life-saving treatments for patients and families suffering from this disease. In addition, emergency nurses are well positioned to play an important role in public health advocacy around opioid use disorder, providing critical support for destigmatization and expanded access to safe and efficacious treatments.

FULL TEXT

Contribution to Emergency Nursing Practice

••Dependence on opioids is a critical public health problem in the United States and worldwide, and the emergency department is an important setting for delivering high-quality care, including medication-assisted therapy, for patients with opioid use disorder.

••This article reviews opioid use disorder and opioid withdrawal syndrome, medications used to treat opiate use disorder, considerations for beginning buprenorphine/naloxone in the emergency setting, clinical assessment of withdrawal symptoms, discharging patients with medication-assisted therapy, and specific considerations for special populations.

••Key implications for emergency nurses and their practice are summarized, including roles in education, advocacy, interventions, assessment, and referral to ongoing treatment.

Introduction

Opioid dependence and opioid use disorder (OUD) are critical public health problems that continue to increase both in the United States and beyond.[1-4] The emergency department is a critical source of care for those with OUD. Emergency department leaders have been called on by many, including the surgeon general and Centers for Disease Control and Prevention, to assist in addressing the opioid epidemic by expanding patients' access to opioid agonist treatment (OAT) with buprenorphine.[5] Patients with OUD are at an increased risk for poor health outcomes but are often marginalized or are unable to access primary health care services.[6,7] Therefore, many patients with OUD seek care in emergency departments for a variety of issues. ED visits are often a particularly critical moment for patients, bringing into focus the connection between opioid use and health consequences. Emergency clinicians are poised to leverage this moment, assisting patients to initiate effective OAT, in conjunction with a brief intervention and referral to continuing treatment. ED-based initiation of buprenorphine as treatment for OUD is rapidly expanding, and we are unaware of other peer-review, English language articles published in the *Journal of Emergency Nursing* or other emergency-oriented journals specifically focused on educating emergency nurses about this topic. Therefore, the purpose of this article is to provide emergency nurses with an overview of buprenorphine's use in treating OUD, the specifics of its use in the emergency setting, and to review the implications of ED-initiated buprenorphine for emergency nursing practice.

Assessment and Diagnosis of Opioid Use Disorder and Opioid Withdrawal

The *Diagnostic and Statistical Manual of Mental Disorders* (5th edition, text revision) (DSM-V) defines OUD as "a problematic pattern of opioid use leading to clinically significant impairment or distress."[8] Assessment for the presence of OUD is made using a set of 11 diagnostic criteria, which also allow clinicians to determine the severity

of disease (mild, moderate, or severe).[8] Whereas advanced practice emergency nurses are able to diagnose OUD using DSM-V criteria, bedside emergency nurses play an important role in screening and identifying patients who may have OUD and other substance use disorders. Assessing patients' patterns of opioid use, the degree to which they experience opioid cravings, past efforts to curtail use, and ways that opioid use may be interfering with patients' role obligations can assist in the early identification of patients who may be experiencing OUD. Patients with OUD are at a high risk for a wide range of adverse health outcomes including mortality, and recent estimates suggest that more than 16 million people worldwide and more than 2.1 million people in the US are affected.[9,10] The time required for opioid dependence to develop after exposure varies but is generally days to weeks.[11] After sustained exposure to opioids, μ-opioid receptors in the body adapt to the presence of opioid agonists by downregulating their "activation" and suppressing their neurons' excitability. When these same receptors are unbound in the absence of opioid, neuronal disinhibition and hyperexcitability result in the syndrome of opioid withdrawal.[12]

Opioid withdrawal is a constellation of predictable signs and symptoms that follows a discontinuation or reduction in opioid use.[8] Physiologic manifestations of opioid withdrawal include nausea, vomiting, diarrhea, piloerection (goose bumps/flesh), diaphoresis, yawning, mydriasis or photophobia, restlessness, lacrimation or rhinorrhea, and autonomic hyperactivity. Additional findings include pain, anxiety, irritability, stress intolerance, and drug craving.[8] These symptoms are very uncomfortable and distressing for patients. Avoiding feeling sick with withdrawal symptoms and the craving produced by the altered neurons is a primary reason for continued opioid use rather than a desire to obtain a euphoric high.[13] Opioid withdrawal is considered a high-risk period that is associated with an increased risk of return to opioid use, overdose, and death.[14-17] The use of opioid agonist medications such as methadone and buprenorphine is known to be an effective treatment for addressing opioid withdrawal.[18] An assessment for the presence and severity of opioid withdrawal should be made using a standardized, validated tool to allow for meaningful assessment and communication between providers. One widely used withdrawal assessment tool is described in the section on Evaluating Treatment Response. A clear use of terminology is also important when discussing OUD; therefore, definitions of common terms are provided in Table 1.

Planning: Opioid Agonist Treatment for Opioid Use Disorder

Growing evidence supports the use of opioid agonists in the treatment of OUD.[11,18] Evidence from multiple systematic reviews supports the efficacy of therapy with methadone or buprenorphine across a wide range of outcomes including decreasing the use of illicit drugs, improving physical and mental health, reducing risk of HIV and hepatitis C infections, and reducing all-cause mortality.[19-27] These medications are widely used both to treat patients with active symptoms of opioid withdrawal and as a bridge to long-term treatment.

Methadone

Methadone is a synthetic opioid, working as a full agonist at the μ-opioid receptor and producing a long half-life with significant interindividual variability.[28,29] Methadone is commonly used in opioid treatment programs for maintenance treatment, with daily oral doses ranging from 10 mg to greater than 250 mg, although most patients are maintained at less than 200 mg/d.[11] Although very effective in the treatment of OUD, methadone cannot be prescribed for the OUD indication; it is only administered and dispensed in licensed, specialized clinics, requiring patients to travel to a clinic daily to receive their dose. Most clinics use the oral liquid form of methadone as most of diverted methadone associated with dangerous overdoses is in the tablet formulation prescribed for pain. Methadone can prolong the QTc interval and increase the risk for torsades de pointes, especially when combined with other medications that also cause QTc prolongation.[30] In addition, methadone interacts with many other medications, including ciprofloxacin, carBAMazepine, tricyclic antidepressants, lithium, monoamine oxidase inhibitors, and selective serotonin reuptake inhibitors.[31] As methadone is a full μ-agonist, there are elevated risks of respiratory depression

and overdose, particularly if used with other sedating medications; dosing must be carefully titrated for the individual patient to avoid these risks.[29] Methadone maintenance dosing is not reported to state prescription monitoring programs as filled prescriptions are, making it difficult for emergency clinicians to readily verify a patient's regular dosage. Verification requires direct contact with the patient's clinic. Because of these complexities and regulatory restrictions, the initiation of methadone therapy for OUD is not recommended or feasible in the ED setting. In addition, replacement of missed methadone maintenance doses in the emergency department is typically not recommended, unless dosing can be verified with the patient's regular clinic.

Buprenorphine

Buprenorphine is a semisynthetic thebaine derivative and is a partial μ-opioid receptor agonist. In the US, it is currently approved for use in the treatment of OUD as well as in the treatment of moderate-to-severe chronic pain, in which efficacy and safety are well established.[25,32] Although patients using buprenorphine for the management of opioid withdrawal symptoms will experience agonistic effects in the form of diminished cravings, miosis, mild sedation, and mild respiratory depression, a unique property of this medication is a "ceiling effect" on respiratory depression and feelings of euphoria.[11,33,34] For the patient with OUD, these qualities result in the management of opioid craving and suppression of withdrawal symptoms with less respiratory and central nervous system depression and abuse potential than is present for full opioid agonists.[35]

In the ED setting, buprenorphine is typically administered as a sublingual tablet or film strip, although it is also available in transbuccal, transdermal, subdermal implant, subcutaneous, and parenteral formulations.[11,33] Sublingual and oral buprenorphine are often administered in combination with naloxone (a full opioid antagonist) to decrease abuse potential. When administered orally, naloxone does not cross the mucosa well and has very poor bioavailability, therefore, it is essentially inactive by this route. If a patient uses oral or sublingual formulations containing naloxone by injection or inhalation, the naloxone easily gets into the bloodstream, and the antagonistic effects are fully activated.[11,33] Currently, standard ED dosing of buprenorphine for patients with withdrawal symptoms is not available, and dosing practices are variable.[36-38] Recent evidence suggests that patients in the emergency department will likely require at least 8 mg of sublingual buprenorphine to experience a significant relief of withdrawal symptoms, with most patients achieving comfort from a total of 16 mg.[11,37] At present, the maximum recommended dose of buprenorphine for ED induction is 32 mg administered sublingually.[11]

As with methadone, there is a risk of QTc interval prolongation with buprenorphine, and caution should be used especially with the coadministration of other medications known to cause QT prolongation such as antipsychotics, tricyclic antidepressants, and selective serotonin reuptake inhibitors.[33] Research evidence indicates that the risk of QTc prolongation is less with buprenorphine than it is with methadone, making it a better choice for patients with co-occurring cardiac conditions.[39-41] The coadministration of buprenorphine with sedative medications or central nervous system depressants such as alcohol or benzodiazepines can compound its depressant effects, worsening respiratory depression.[42] In addition, the administration of buprenorphine in the presence of other opioids can cause severe precipitated withdrawal symptoms owing to the higher affinity for receptors of buprenorphine compared with other opioids. There is a potential for patients who are intoxicated with other opioids, such as methadone, to experience its rapid displacement from receptors with the introduction of buprenorphine, causing the onset of severe withdrawal symptoms including vomiting, hallucinations, delirium, seizures, and hemodynamic instability.[43,44] It is important to avoid precipitating withdrawal symptoms, not only because of the extreme discomfort and dangerous symptoms it can produce, but also because patients with this profoundly unpleasant experience may be understandably hesitant to participate in OAT for OUD in the future.[30]

Intervention: Buprenorphine/Naloxone Initiation in the Emergency Department

There is currently not a single approach to initiating buprenorphine therapy in the ED setting, and strategies may vary on the basis of local resources. A widely used strategy is presented in [Figure 1]. Patients presenting to the emergency department with suspected OUD or opioid withdrawal are assessed for the presence and severity of OUD using the aforementioned DSM-V criteria. In addition, their use history is evaluated, with attention to the type of opioids(s) used and the time of last use. It is important to recognize that the administration of buprenorphine in patients taking methadone may cause serious precipitated withdrawal for up to 72 hours after the patient's last use.[33,45] Patients experiencing withdrawal symptoms while on methadone are typically evaluated for methadone dosing adjustment rather than transition to buprenorphine.[11]

When OUD is confirmed, the severity of withdrawal symptoms should be assessed using a standardized tool such as the clinical opiate withdrawal scale (COWS), described in detail in later text ([Table 2]).[46] Patients with mild withdrawal symptoms (total COWS score 0-7) may not require buprenorphine in the emergency department; some institutions are able to provide buprenorphine, instructions on when and how to begin taking the medication, and referral to ongoing treatment for patients to be able to begin induction at home.[47] For those experiencing a greater burden of withdrawal symptoms (COWS ≥8), buprenorphine dosing typically begins with 4 to 8 mg of buprenorphine or buprenorphine/naloxone administered sublingually. The higher, 8-mg dose is widely used as a starting dose especially for patients with COWS scores of at least 13. In patients with higher COWS scores, the 8-mg dosing may be less likely to cause precipitated withdrawal.[48] Patients should be observed in the emergency department for 45 to 60 minutes and reassessed for withdrawal symptoms after the initial buprenorphine administration. If substantial relief of symptoms is not achieved, an additional 4 mg of sublingual buprenorphine may be given, followed by an additional period of observation. It should be anticipated that patients may require as much as 24 to 32 mg of buprenorphine to achieve symptomatic relief.[30,32] In addition to buprenorphine, patients may require other medications to relieve symptoms. These include acetaminophen, ibuprofen, or ketorolac for myalgias; dicyclomine or loperamide for abdominal cramping or diarrhea; ondansetron, prochlorperazine, or promethazine for nausea; and cloNIDine for elevated blood pressure or tachycardia.[49]

When buprenorphine is administered to patients in moderate-to-severe opioid withdrawal, they should experience rapid relief of suffering and uncomfortable symptoms, typically within 30 to 60 minutes.[33] Relief of withdrawal symptoms and opioid cravings is important as this allows patients to focus on additional strategies that are helpful to achieving remission and improved quality of life, such as counseling or behavioral therapy.[50]

Evaluating Treatment Response: Assessing Opioid Withdrawal Symptoms Clinical Opiate Withdrawal Scale

Assessment of withdrawal symptoms is most commonly accomplished using the COWS.[46] The COWS grades the severity of withdrawal symptoms on a scale of 0 to 36, with higher scores indicating more severe symptoms. Both subjective reports of symptoms (eg, anxiousness, irritability, gastrointestinal upset) and clinical observations of withdrawal signs (eg, piloerection of skin, pupil size, resting heart rate) are used in computing the COWS. It is important to wait until patients are experiencing objective signs of opioid withdrawal before administering buprenorphine to avoid precipitated withdrawal; therefore, frequent assessment using a standardized assessment tool such as the COWS is critical to ensuring optimal outcomes. Generally, a COWS score of at least 8 is recommended before the administration of buprenorphine, with some guidelines suggesting waiting until the patient scores 13.[11,30,37] Regardless, emergency nurses must be well acquainted with the use and documentation of the COWS as frequent reassessment is required to guide dosing and prevention of precipitated withdrawal. [Table 2] displays the COWS tool.[46]

Discharge and Follow-up

Discharge planning for patients in the emergency department after the initiation of treatment with buprenorphine is

contingent on several factors. First, whether there is a medical provider who has obtained a Drug Addiction Treatment Act of 2000 X-waiver is an important consideration. An X-waiver is required to prescribe buprenorphine for the treatment of OUD; any provider who holds a Drug Enforcement Administration registration may apply for an X-waiver after the completion of an approved training program.[51] If an X-waivered provider is available, a discharge prescription for a buprenorphine/naloxone combination product, or buprenorphine alone for pregnant patients, should be provided, with the typical buprenorphine dosage ranging between 8 mg and 16 mg daily for the sublingual formulation. The discharge prescriptions should provide enough medication for the patient to be able to attend a follow-up appointment with an OAT or recovery provider. If an X-waivered provider is not available, patients are permitted to return to the emergency department daily for up to 72 hours to receive daily doses of buprenorphine/naloxone under the "3-day rule."[52] As with patients discharged with a buprenorphine/naloxone prescription, the medication is intended to "bridge" the patient until they can reach an appointment with a follow-up provider.

Follow-up with an opioid treatment provider or program is an essential component of an ED-initiated OAT program. Establishing relationships and referral programs with community partners is helpful to ensuring that patients will be able to receive follow-up in a timely manner. Whenever possible, patients should be able to see a follow-up provider within 24 to 72 hours of their ED discharge. This may be the patient's primary care provider, if the primary care provider is an X-waivered practitioner. Otherwise, it will be necessary to refer the patient for follow-up treatment at another provider who is waivered and prescribes buprenorphine. It will likely be necessary to engage supportive resources such as social workers or care managers when arranging for outpatient follow-up, and it is ideal to use a "warm handoff" approach to smooth transitions between the emergency department and the continuing treatment.[53] It is important that clinicians provide education reinforcing the importance of engaging fully in a multimodal treatment program to maximize disease remission, and this begins with providing the patient with a date, a time, and a follow-up location whenever possible. However, a patient's preference for medication alone should not be a barrier as medication monotherapy has also been demonstrated to be effective treatment for OUD.[54,55] Recognizing that resources are often scarce and systems can be fragmented, it is important to let patients know that they can return to the emergency department if they are in need of continuing care and cannot access it in the outpatient setting.[56] With the aforementioned 3-day rule, emergency providers can continue to prescribe buprenorphine for 72 hours to prevent relapse and ensure that the patient reaches treatment safely.

Before discharge, it is also important to ensure that patients are supported with harm-reducing strategies and knowledge, including the provision of naloxone, and to ensure that the patient and their family or support people understand the signs of an overdose, how to administer naloxone, and how to call for emergency medical assistance. Patients should be educated on the dangers associated with concomitant use of buprenorphine with benzodiazepines or alcohol, as buprenorphine can exaggerate the sedating effects of these substances.[57,58] Additional harm-reduction strategies such as overdose prevention education, hepatitis C and HIV screening, and counseling on reproductive health should also be considered and offered as appropriate.[11]

Special Populations

Pregnancy and breastfeeding are not contraindications to receiving OAT with buprenorphine.[59] Therapy with buprenorphine for patients who are pregnant or breastfeeding with OUD is supported by the American College of Obstetricians and Gynecologists.[60] Maternal opioid use and acute withdrawal can both cause harm for the childbearing person and the baby, with increased risks of spontaneous abortion, stillbirth, prematurity, low-birth weight neonate, adverse neural effects, and birth defects.[61] Withdrawal from opioids can lead to preterm labor, fetal distress, and fetal withdrawal symptoms.[61] Buprenorphine has been demonstrated to be safe and effective in

pregnancy, with a meta-analysis indicating that the rate of congenital anomalies in patients treated with buprenorphine was similar to that of the general population.[62,63]

Research demonstrates that the amount of buprenorphine detectable in human breastmilk is very small.[11,60,64] For people with OUD who are breastfeeding, buprenorphine has been associated with a lower severity of neonatal abstinence syndrome symptoms, less need for pharmacologic treatment of neonatal abstinence syndrome, and shortened hospital stay, in addition to traditional benefits such as the transfer of passive immunity, supporting parent-infant bonding, and facilitating skin-to-skin contact.[65] The American Academy of Pediatrics, American Academy of Breastfeeding Medicine, Association of Women's Health, Obstetric, and Neonatal Nurses, and American College of Obstetricians and Gynecologists all support the use of buprenorphine for OUD in people who are breastfeeding.[60,64,66-68]

Whereas clinical practice has often been to prescribe buprenorphine monotherapy, rather than the buprenorphine-naloxone combination formulation for pregnant women, some recent research found the use of the combination product to be safe in pregnant people.[69-71] Because the naloxone-free formulation is more likely to be used nonmedically or diverted, this is an important area for continued research, and potential risks of prenatal naloxone exposure should be weighed with the risk of nonmedical buprenorphine use in individual patients.

OUD is a serious health problem for adolescents, as well as for adults, with recent estimates suggesting that nonmedical use of opioids and the development of OUD is on the rise in this adolescent age group.[72] Buprenorphine is currently approved for use in treating OUD in patients aged at least 16 years.[73] Three randomized controlled trials have investigated the use of buprenorphine in the treatment of OUD in adolescent patients.[74-76] Each study found buprenorphine to be relatively safe and well tolerated, with no serious adverse effects reported. Opioid abstinence outcomes, retention in treatment, and reductions in high-risk behaviors such as injection drug use were all similar to outcomes for adult patients.[73,77,78] Because most adolescents with OUD do not receive treatment[79,80] and most who are in treatment receive therapies with high rates of dropout and relapse such as abstinence-based treatment or outpatient therapy,[77,81,82] the role of the emergency department in connecting adolescents to effective, evidence-based treatment strategies including buprenorphine may increase in the future.

As with adolescents, OUD is an important and increasing health problem for older adults.[83] Rates of OUD in older adults are expected to continue to rise as the "baby boomer" generation ages because this population has demonstrated high rates of substance use.[84] Research evidence on the use of OAT is limited in older adults; however, the properties of buprenorphine (eg, less risk of overdose and QTc prolongation) make it a good option for patients who are older and may have comorbid conditions, and it is first-line therapy for the treatment of OUD in older adults according to Canadian guidelines.[85,86] The half-life of buprenorphine is relatively stable in patients older than 65 years, and there is less polypharmacy risk than for other opioids as buprenorphine possesses less cytochrome P450 activity.[87]

Implications for Emergency Nurses

Emergency nurses across the spectrum of professional roles all play a critical part in helping patients safely begin OAT, optimizing their chances of remission and improvement in quality of life. Although there is likely overlap between professional roles and activities, engagement from emergency nurses in executive, managerial, scientist, advanced practice, and clinical roles is necessary to address this critical health problem. In addition to administering induction and supportive medications, assessing for effect and signs of opioid withdrawal, and providing patients and families with medication-specific education, bedside emergency nurses can be central in helping to decrease the shame and the stigma that are present around OUD. Helping patients, families, colleagues, and the public to reframe thinking about OUD is critical to reducing stigma and making it more likely that those in need will seek

treatment and receive the support that is necessary to achieve OUD remission.[88] Encouraging people to think about OUD as a chronic disease that needs a consistent and multifaceted management strategy to achieve optimal results—much the way we approach other chronic diseases such as diabetes or hypertension—can be helpful. Moving from a model that conceptualizes OUD as a moral weakness or choice to one that understands OUD as a chronic medical illness provides space for OUD treatment to take its place alongside the rest of health care. Emergency nurses are well positioned to model this in discussing OUD and OAT with patients and families. People with OUD often feel a strong sense of shame, guilt, or isolation that can make engaging with treatment very difficult, and helping them to feel supported while in the emergency department, when transitioning to follow-up care, and at home can help empower them throughout the process.[89]

The use of destigmatizing language around OUD, drug use, and OAT is also of critical importance. Our language mirrors our thoughts about OUD, and the use of stigmatizing language reinforces myths and stereotypes, presents barriers to treatment seeking, sways public attitudes, and even can reduce the willingness of policymakers to allocate resources toward OUD.[88,90] The National Institute on Drug Abuse recommends the use of “person-first” or patient-centered language that supports the integrity of the person rather than equating the individual to their condition.[91] For example, rather than saying “drug abuser,” an emergency nurse using a person-centered approach would say, “a person with OUD.” Additional examples are provided in Table 3.

To best support patients with OUD, it is important for emergency nurses to have a strong understanding of helpful resources available within and outside of their hospital settings. Although resources will not be standard, many hospitals and emergency departments have clinical social workers, care managers, substance use disorder treatment specialists, and mental health professionals who can all play important roles in caring for patients with OUD. Understanding local resources will help the emergency nurse be prepared to coordinate the multidisciplinary team and care planning for patients. In addition, having a strong awareness of and familiarity with community resources such as treatment centers, peer support programs, needle exchanges, harm-reduction centers, virology testing centers, and shelters accepting patients receiving medication-assisted therapy OAT will ensure that the emergency nurse is able to recommend support resources appropriate for individual patients.

Emergency nurses can help ensure the delivery of high-quality care by having a strong understanding of local care standards and protocols. For example, best practice includes providing pregnancy testing for persons of childbearing age to ensure that pregnancies are identified and that patients are connected to prenatal care, in addition to guiding treatment decisions. Patients receiving medication for OUD are at high risks of relapse and overdose; therefore, ensuring access to a naloxone kit and education for patients and their supports is an important marker of high-quality care.[92] All patients receiving opioid medications must be educated on the proper storage and disposal of their medications, and buprenorphine is no exception as there has been an alarming increase in pediatric accidental exposures with the advance of OAT.[33,93] Emergency nurses are optimally positioned to ensure that each of these best practices and local standards has been provided to patients with OUD before discharge from the emergency department.

Those emergency nurses in advanced practice roles (nurse practitioner, certified nurse midwife, certified registered nurse anesthetist, certified nurse specialist) are eligible to apply for an X-waiver. To do so, they must be licensed under state law to prescribe schedule III, IV, or V medications for pain; complete at least 24 hours of education through a qualified provider; demonstrate the ability to treat and manage OUD through other training or experience; and, if required by state law, be supervised or work in collaboration with a qualifying physician. The American Association of Nurse Practitioners has created an interactive map that provides information regarding the practice environment for advanced practice nurses (APRNs) on a state-by-state basis as some states may have legislation

prohibiting APRNs from prescribing these medications despite federal regulations. The map is available at https://www.aanp.org/advocacy/state/state-practice-environment. Free, 24-hour X-waiver trainings are available for APRNs through the Providers Clinical Support System, who has partnered with multiple professional organizations including the American College of Emergency Physicians, the Society for Academic Emergency Medicine, the American Psychiatric Nurses Association, and American Academy of Addiction Psychiatry to expand access to this training (https://pcssnow.org/medications-for-addiction-treatment/). Expanding the number of emergency APRNs prepared to provide buprenorphine for OUD is critical as many patients may lack other access to health care providers, using the emergency department as a result. Because there is a cap on the number of patients that X-waivered providers can actively treat at any given time, increasing the overall number of eligible providers is essential to expanding access to this important, evidence-based treatment.[94]

In addition, emergency APRNs are often clinical leaders, participating in the development and implementation of new programs and educational efforts for other clinicians. Those with expertise in caring for patients with OUD in the ED setting can play an important role in providing continuing education in this area for colleagues within and outside of the emergency department, expanding the number of clinicians who are prepared to provide compassionate, evidence-based care for these vulnerable patients and their families. With extensive clinical knowledge and evidence-based practice skills, emergency APRNs can also be instrumental in the implementation and evaluation of ED-based buprenorphine programs, forging the collaborative relationships necessary to develop successful treatment protocols and community referral partnerships.

Similarly, emergency nurse executives and managers are positioned to be able to advocate for and develop ED-based programs focused on identifying and providing treatment for patients with OUD. As formalized leaders, they are empowered to set priorities for special areas of focus, to bring education and training programs to their staff members, and to develop policy around the care of patients with OUD. These leaders can support the development of ED-based OUD screening programs, ED-initiated buprenorphine protocols, harm-reduction strategies such as the distribution of naloxone kits and opioid take-back sites. Our emergency nurse leaders are prepared to navigate often-complex hospital administrative systems, sponsoring and supporting ED-based programming across committees such as pharmacy and therapeutics, finance, and nursing practice. Nurse executives often set the tone and serve as examples for many other staff members. Their approach to OUD should be compassionate and nonjudgmental, drawing on current evidence, best practices, and principles of nursing theory to optimize success and positive outcomes.

Finally, scientific knowledge in this area is rapidly evolving, yet many gaps in knowledge remain. Emergency nurse scientists can and must play a central role in continuing to expand scientific evidence to support clinical practice, especially through nursing's unique lens. OUD is a complex problem with profound impacts on all facets of the human experience; therefore, research programs that embrace multiparadigmatic approaches are necessary to develop a more full and nuanced understanding of our patients' experiences with OUD. In particular, research addressing gaps in our understanding of the treatment of adolescents, older adults, patients with co-occurring psychiatric disorders, patients with chronic pain, and those living with OUD within jails and prisons is sorely needed, as is knowledge supporting the clinical care of pregnant women with OUD.[95] Emergency nursing scientists work at the intersections between nursing, medicine, public health, education, psychology, and many other disciplines and have unique opportunities to bring together traditionally "siloed" practices with the goal of ultimately improving care for patients and families affected by OUD.

OUD is a complex and widespread public health problem, and the emergency department is an important point of entry into the health care system for many patients with OUD. By expanding access to OAT through provision of

buprenorphine in the emergency department, it is anticipated that our nation's emergency departments can play an important role in saving lives and improving the health and quality of life for many patients with OUD. As experts in communication, advocacy, navigating complex systems, and providing expert clinical care, emergency nurses are poised to help address this continuing health crisis.

Author Disclosures

Conflicts of interest: none to report.

Term	Definition
At-risk substance use	A pattern of substance use that deviates from the accustomed social or medical use is based on the quantity, frequency, and duration of substance use; the reasons for substance use; and the increased risk for substance-related harms to an individual's well-being.[96]
Diversion	The channeling of regulated pharmaceuticals from someone for whom they are legally prescribed to another person for whom they are not prescribed.
Induction	Refers to the initial phase of transitioning a patient from use of an opioid to a prescribed dose of opioid agonist treatment designed to provide relief from withdrawal symptoms and lessen opioid cravings. The induction process can be medically monitored or completed at home by patients.
Medication-assisted therapy	The use of medications, in combination with counseling and behavioral therapies, to provide a "whole-patient" approach to the treatment of substance use disorders.[97]
Opiate	Refers to natural opioids such as heroin, morphine, or codeine.
Opioid	Refers to all natural, semisynthetic, and synthetic opioids.
Opioid agonist treatment	Medication-based treatment for OUD using an opioid agonist treatment such as buprenorphine or methadone.
Opioid use disorder	A problematic pattern of opioid use leading to clinically significant impairment or distress. The DSM-V includes 12 diagnostic criteria in which the total number of criteria endorsed indicates the severity (mild, moderate, severe) of OUD.[8]
Opioid dependence	Occurs when the body adjusts its normal functioning around regular opioid use; people experience unpleasant symptoms (withdrawal) when opioid use is stopped.

Opioid withdrawal syndrome	An unpleasant set of symptoms that occur when a person with opioid dependence reduces or stops using opioid, or receives an opioid antagonist after a period of heavy opioid use. The DSM-V requires the presence of 3 or more symptoms (dysphoric mood, nausea or vomiting, muscle aches, lacrimation or rhinorrhea, pupillary dilation, piloerection or sweating, diarrhea, yawning, fever, or insomnia) to confirm a diagnosis of opioid withdrawal syndrome.[8]
Opioid tolerance	Occurs when a person using opioids begins to experience a diminished response to the opioid, requiring more opioid to experience the same effect.
Nonmedical use	Taking prescribed or diverted medications in a manner that is not consistent with the way, reasons, amount, or time-frame in which they were prescribed.

Resting Pulse Rate: _____ beats/minute Measured after patient is sitting or lying for one minute0pulse rate 80 or below1pulse rate 81-1002pulse rate 101-1204pulse rate greater than 120	GI Upset: over last ½hour0no GI symptoms1stomach cramps2nausea or loose stool3vomiting or diarrhea5multiple episodes of diarrhea or vomiting
Sweating: over past ½hour not accounted for by room temperature or patient activity0no report of chills or flushing1subjective report of chills or flushing2flushed or observable moistness on face3beads of sweat on brow or face4sweat streaming off face	Tremor: observation of outstretched hands0no tremor1tremor can be felt, but not observed2slight tremor observable4gross tremor or muscle twitching
Restlessness: observation during assessment0able to sit still1reports difficulty sitting still, but is able to do so3frequent shifting or extraneous movements of legs/arms5unable to sit still for more than a few seconds	Yawning: observation during assessment0no yawning1yawning once or twice during assessment2yawning three or more times during assessment4yawning several times/minute
Pupil size0pupils pinned or normal size for room light1pupils possibly larger than normal for room light2pupils moderately dilated5pupils so dilated that only the rim of the iris is visible	Anxiety or Irritability0none1patient reports increasing irritability or anxiousness2patient obviously irritable or anxious4patient so irritable or anxious that participation in the assessment is difficult
Bone or Joint aches: if patient was having pain previously, only the additional component attributed to opiate withdrawal is scored0not present1mild diffuse discomfort2patient reports severe diffuse aching of joints/muscles4patient is rubbing joints or muscles and is unable to sit still because of discomfort	Gooseflesh skin0skin is smooth3piloerection of skin can be felt or hairs standing upon arms5prominent piloerection

Runny nose or tearing: Not accounted for by cold symptoms or allergies0not present1nasal stuffiness or unusually moist eyes2nose running or tearing4nose constantly running or tears streaming down cheeks	Total Score _____ The total score is the sum of all 11 items Initials of person completing assessment_____

Stigmatizing language	Patient-centered language	Rationale
•Opioid substitution therapy•Opioid substitution treatment•Replacement therapy	•Treatment•Opioid agonist therapy•Medication for treatment of OUD•Pharmacotherapy•Medication-assisted treatment•Medication-assisted therapy	•The terms “substitution” or “replacement” reinforce the misconception that medication-assisted therapy is replacing 1 addiction with another.[98]•Some authors proposed that the terms “medication-assisted treatment” or “therapy” wrongly imply that medication is only an adjunct to other forms of treatment, whereas research demonstrates that medication alone is an effective treatment for OUD.[54,55]
•Abuse•Substance misuse•Misuse	When describing illicit drugs:•Use•At-risk substance useWhen describing prescription medications:•Used other than prescribed•At-risk substance use	•Research indicates that the word “abuse” has a strong association with negative judgments and punishment.[99]•Although “substance misuse” has been commonly used, recent authors describe it as technically imprecise and likely to contribute to stigma.[96]
•Clean	When referencing toxicology testing:•Testing negativeNontoxicology references:•Being in remission or recovery•Abstinent from drugs•Not taking drugs•Not currently/actively using drugs	•Use of “clean” or “dirty” can evoke or reinforce negative or punitive cognitions.[89]•Use of clinically accurate, nonstigmatizing terminology is consistent with language used for other medical conditions.
•Dirty	When referencing toxicology testing:•Testing positiveNontoxicology references:•Person who uses drugs	•May decrease patients’ sense of hope and self-efficacy for change.[89]•Use of clinically accurate, nonstigmatizing terminology is consistent with language used for other medical conditions.

•Habit	•Substance use disorder•Drug addiction	•The word “habit” implies inaccurately that a person is choosing to use substances or can choose to stop.[98]•Habit may undermine the seriousness of the disease.
•Addict•User•Substance or drug abuser•Junkie•Former or reformed addict	•Person with OUD•Person with opioid addiction•Patient•Person in recovery or long-term recovery	•Use first-person language.•Reinforces notion that a person has a problem rather than is the problem.[9]•Avoids terms that elicit negative association, punitive attitudes, individual blame.[89]
•Addicted baby	•Baby with signs of withdrawal from prenatal drug exposure•Baby with neonatal opioid withdrawal•Baby with neonatal abstinence syndrome	•Babies can be born with manifestations of withdrawal syndrome owing to physical dependence but not OUD.[100]

DETAILS

Subject:	Emergency medical care; Drug withdrawal; Public health; Mortality; Opioids; Health problems; Nurses; Buprenorphine; Access; Narcotics; Destigmatization; Patients; Drugs; Clinics; Methadone; Advocacy; Initiation; Pain; Mental depression; Nursing; Withdrawal symptoms; Clinical assessment; Emergency services; Vulnerability; Substance use disorder
Location:	United States--US
Identifier / keyword:	Emergency department; Emergency nursing; Opioid-related disorders; Opiate substitution treatment; Buprenorphine
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	139-154
Publication year:	2021
Publication date:	Jan 2021
Section:	Clinical Science Translation Review
Publisher:	Elsevier Limited

Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.10.001
ProQuest document ID:	2487205948
Document URL:	https://www.proquest. com/scholarly-journals/understanding-ed-buprenorphine-initiation-opioid/docview/2487205948/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-03-28
Database:	Public Health Database

Emergency Nursing Review Questions: January 2021: JEN

ProQuest document link

ABSTRACT (ENGLISH)

A.History of recent viral infection B.Eating green beans canned at home C.Recently visiting a zoo D.Camping in a tick-infested area 3. A patient with chronic heart failure presents to the emergency department with acute dehydration and hypokalemia after an increase in their dose of furosemide. Recent viral infection (A), visiting a zoo (C), and exposure to ticks (D) are not associated with the symmetrical descending paralysis seen in botulism.3 3.

FULL TEXT

These review questions are based on the Emergency Nursing Core Curriculum and other pertinent resources to emergency nursing practice. They offer emergency nurses an opportunity to test their knowledge about their practice.

Questions

1. A patient is given discharge instructions after being treated for a tick bite. Which of the following statements made by the patient indicates further teaching is needed?

•A.“I will remove ticks by twisting them out with a pair of tweezers.”

•B.“I will use isopropyl alcohol to clean my skin after removing the tick.”

•C.“I can flush the tick down the toilet.”

•D.“I will apply permethrin to my clothes.”

2. A patient presents to the emergency department with symptoms that started with double vision and drooping eyelids. The symptoms have progressed to difficulty swallowing over the past several hours. Which of the following information, provided by the patient, should be reported immediately to the health care provider?

•A.History of recent viral infection

•B.Eating green beans canned at home

•C.Recently visiting a zoo

•D.Camping in a tick-infested area

3. A patient diagnosed with cannabinoid hyperemesis syndrome presents to the emergency department during the hyperemesis phase of the syndrome. In addition to interventions for dehydration, which of the following medications would the nurse anticipate administering?

•A.Ondansetron

•B.Promethazine

•C.Metoclopramide

•D.Capsaicin

4. A patient with chronic heart failure presents to the emergency department with acute dehydration and hypokalemia after an increase in their dose of furosemide. In addition to monitoring the patient’s potassium level, which of the following laboratory values is most important to monitor?

•A.Sodium

•B.Chloride

•C.Magnesium

•D.Calcium

5. An unsheltered patient presents to the emergency department with fever, fatigue, and loss of appetite. Based on these symptoms and this population’s risk factors, which of the following specific assessment questions would be most important for the nurse to ask next?

•A.Do you have nausea and vomiting?

•**B.**What colors are your urine and stool?

•**C.**Do you have kidney disease?

•**D.**What medications are you taking?

Answers

1. Correct answer: A

The tick should be removed with a steady even pressure because jerking or twisting could cause the tick's mouth parts to remain in the skin. Using isopropyl alcohol to clean the skin (B), disposing of the tick down the toilet (C), and applying a permethrin product to clothing or shoes is correct (D). However, permethrin products should not be applied to skin.[1,2]

2. Correct answer: B

This patient is exhibiting signs of botulism, an acute paralytic illness caused by ingesting a neurotoxin produced by *Clostridium botulinum.* Although botulism is rare, it is most often caused by eating improperly canned foods. Botulism results in a descending flaccid paralysis that begins with the cranial nerves. It is important that treatment with *C botulinum* antitoxin begins as soon as possible because the antitoxin only neutralizes toxin that has not yet bound to nerve endings. Recent viral infection (A), visiting a zoo (C), and exposure to ticks (D) are not associated with the symmetrical descending paralysis seen in botulism.[3]

3. Correct answer: D

Cannabinoid hyperemesis syndrome is a condition that may occur in regular cannabis users. It has 3 phases: prodromal, vomiting, and recovery. The prodromal phase is characterized by mild symptoms of nausea and gastrointestinal discomfort that are usually worse in the morning. The hyperemic phase is characterized by intense vomiting, epigastric or abdominal pain, and sweating and flushing. The recovery phase begins when vomiting ends. The usual antiemetic medications, ondansetron (A), promethazine (B), and metoclopramide (C), are not effective in relieving nausea and vomiting. However, a hot shower or bath may relieve symptoms, as well as a capsaicin-based cream applied to the abdomen. The cause of this syndrome is not yet fully understood.[4]

4. Correct answer: C

Furosemide causes urinary magnesium loss. When the magnesium level is low, the kidneys increase excretion of potassium, which will exacerbate hypokalemia if the low magnesium level is not also addressed. This, in turn, can increase the patient's risk for cardiac dysrhythmias. The other laboratory values should also be monitored, but in this situation, the magnesium level is the highest priority.[5]

5. Correct answer: B

Hepatitis A is an acute illness with signs and symptoms that include fever, fatigue, loss of appetite, dark urine, light-colored stools and jaundice. Hepatitis A is transmitted by means of the fecal oral route. In the past, it was often associated with food, but the most recent increase in cases, which began in 2016, has been associated with those in close contact with infected individuals including: homeless individuals, men having sex with men, those who use drugs, and more recently incarcerated individuals. Recent cases also have been associated with high morbidity and hospitalizations. As of July 18, 2020, 33 states have reported 33566 cases with 20561 hospitalizations, and 332 deaths. Prevention includes contact precautions, cleaning protocols, and vaccination of high-risk individuals. Asking about nausea and vomiting (A), other comorbidities such as kidney disease (C), and medications (D) are appropriate but would be of lower priority.[6,7]

DETAILS

Subject:	Laboratories; Vomiting; Emergency medical care; Heart failure; Botulism; Nausea; Dehydration; Camping; Kidney diseases; Skin; Ticks; Abdomen; Core curriculum; Viral infections; Nursing; Paralysis; Infections; Hepatitis; Emergency services
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	155-156
Publication year:	2021
Publication date:	Jan 2021
Section:	Emergency Nursing Review Questions
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.08.008
ProQuest document ID:	2487205943
Document URL:	https://www.proquest.com/scholarly-journals/emergency-nursing-review-questions-january-2021/docview/2487205943/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2021-05-29
Database:	Public Health Database

Assessment of Interrater Reliability of the Emergency Severity Index After Implementation in Emergency Departments in Jamaica Using a Learning Collaborative Approach: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

In 2016, the Ministry of Health in Jamaica selected the Emergency Severity Index as the triage tool to be used nationally. This study evaluated the effectiveness of this approach by assessing the interrater reliability among new users trained with minimal resources by 2 experienced trainers, 1 local and 1 international.

Methods

A retrospective case series review was conducted within an online learning collaborative framework. After completion of the training, the participants from each of the 19 clinical sites were asked to submit 2 triage cases per month for blinded review by the expert trainers. The triage categories assigned by each reviewer were compared with those assigned by the newly trained Emergency Severity Index providers. A weighted kappa value was calculated to assess the degree of agreement between the sites and the expert trainers.

Results

A total of 166 cases were received over the study period. Participation in the learning collaborative was consistently below 50%. The interrater reliability between the expert trainers ($\kappa = 0.48$) as well as between each scorer and each accident and emergency department site ($\kappa SF = 0.33$, $\kappa PT = 0.26$) was low, although there was improvement over the study period. Incomplete triage documentation limited raters' ability to assign triage categories and assess interrater reliability.

Discussion

Despite a rigorous implementation process, the interrater reliability of the Emergency Severity Index skills of Jamaican emergency nurses and doctors when compared with that of the 2 experts was poor. Several areas were identified for strengthening. Considerations for the implementation of the Emergency Severity Index in countries outside of the US were also discussed.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current literature indicates that ESI is a validated triage system, used over 70% of emergency departments in the USA where it was developed.

••This article contributes to the growing body of literature revealing that the reliability of the Emergency Severity Index triage algorithm has not yet been established outside of the US.

••Key implications for emergency nuring practice found in this article include special considerations that can be considered when implementing the Emergency Severity Index triage algorithm outside of the US. Implementation of this algorithm outside of the US could be enhaced by sustainable support measures for new practicioners, as well as knowledge of local triage practices.

Introduction

The Emergency Severity Index (ESI) is a 5-level triage tool validated and used in more than 70% of emergency departments in the United States.[1] The reported interrater reliability (agreement among different raters) of the ESI ranges from 0.69 to 0.89 in the United States.[2-4] In Jamaica, there is variability across sites, and triage may be performed by physicians and/or nurses. Not all doctors and nurses engaged in triage are trained in emergency medicine. Triage training is quite variable across the island. We previously reported the implementation process of the ESI at 19 emergency departments across the island of Jamaica in 2016.[5] To improve maintenance of ESI skills posttraining, ongoing support was provided through a learning collaborative, held as monthly webinars. All 19 accident and emergency departments were trained, included in the webinars, and asked to review triage cases each month and report triage levels before the monthly webinar. Cases were discussed during the webinar. The scores for the same cases were then reviewed (blinded to the triage nurses' scores) to determine the interrater reliability. The aim of this project was to assess the interrater reliability of triage levels among new users of the ESI trained with minimal resources by 2 experienced ESI trainers, 1 local (SF) and 1 international (PT).

Methods

A retrospective case series review design was used as part of an educational program, using a learning collaborative approach. The project was approved by the Institutional Review Boards at Duke University (Pro0079666), the University of the West Indies (ECP- 90 16/17), and the Ministry of Health in Jamaica. Data were collected monthly for 9 months from October 2017 to June 2018.

Summary of ESI Training

The Ministry of Health in Jamaica played a strong role in the support of the design and implementation of the training throughout the island. The Ministry of Health required participation from each accident and emergency department. Briefly, the training was conducted by PT and SF with participants from 19 local accident and emergency departments across the 5 geographical health regions over a 4-day period from June 6 to June 9, 2017. A detailed account of the training was previously published.[5] PT was a member of the original ESI Triage Research Team, LLC, and has published extensively on its use. SF is a local advocate for the ESI and has championed its use in the teaching hospital where it was introduced in 2004. The training teams consisted of a minimum of 4 persons at each accident and emergency department. Physicians and nurses across the island of Jamaica were trained over the course of 4 days. Most of the participants completed online training in the ESI before attending the workshop.

Case Reviews and Interrater Reliability Assessments

The study team worked closely with the Ministry of Health to determine a feasible method to obtain triage case reviews at each of the 19 sites. They also determined the number of cases deemed acceptable to ask the sites to complete per month. After completion of the training, the participants from each of the 19 clinical sites that participated in the training were asked to submit 2 triage cases per month for review by PT and SF. The Ministry of Health determined that asking for more cases would be perceived as too burdensome. The cases for discussion were selected by random assignation of a specified date and time by a research assistant (KK) who did not participate in assigning an ESI level. A case report form was developed, and each site prepared the case report form with the information from the triage note. A champion at each site was responsible for overseeing the process and submitting the case forms to the designated contact from the research team at the University of the West Indies in Kingston. Triage nurses were not required to complete the case report form. All cases were anonymous. Triage personnel and patient identifiers were removed. The study investigators were blinded to the sites and medical staff submitting cases, and received only triage data reported on the case report form. Triage data included the age and

gender of the patient, vital signs, pain score, and clinical information obtained only from the triage note, inclusive of the narrative assessment of the patient presentation at triage. The ESI level assigned at the clinical site was also recorded. SF and PT were each provided with a form with all the clinical data. The information regarding the site submitting the case and the triage level assigned at that site was removed. SF and PT independently reviewed each case report form and assigned a triage level. The study staff entered the accident and emergency department–assigned triage level, as well as the level assigned by SF and PT, blinded to the accident and emergency department and each other's assigned triage level.

Learning Collaborative

For 9 months after the training (October 2017 to June 2018), monthly learning collaborative webinars were led by SF and PT on the first Friday of each month from 9 am to 10 am. Persons from all 19 sites were invited to the learning collaborative, and all participants in the learning collaborative signed a consent form. Before the monthly webinar session, and after assigning independent triage levels, SF and PT reviewed and discussed the cases, and selected specific cases for discussion during the monthly learning collaborative webinar sessions. The sessions were intended as a space where ESI providers could review real cases and discuss how they were triaged. The discussion was guided by SF and PT. The aim was to optimize the use of the ESI in the Jamaican context across multiple sites while maintaining the integrity of the instrument. The cases were presented in a PowerPoint (Microsoft Corporation) format, and the participants were asked to report how they would rate the case and why. At the end of each case discussion, the participants and trainers would come to an agreement about the ESI rating. The learning collaborative framework also allowed discussion of the quality of the information presented in terms of vital signs and triage note. Not all cases were discussed in the learning collaborative sessions; however, all submitted cases were included in the analysis for this article.

Data Analysis

Each rater submitted the triage level for the submitted cases separately to a research assistant (KK) before each learning collaborative. All submitted cases were rated; however, cases with missing data were excluded from statistical analysis. The ESI levels assigned at the sites were compared with the ratings assigned by PT and by SF, and these data were used to calculate a weighted kappa value to assess the degree of agreement among the sites. In addition, the raters (PT and SF) were compared with each other to assess the degree to which they agreed. *P*

Results

Fifty-seven physicians and 44 nurses were trained in the initial phase at 19 sites, all of which were eligible for participation. [Table 1] reports the number of clinical sites submitting cases and the number of cases submitted for review whether they could be rated or not, as well as the level of participation each month in the learning collaborative. A total of 166 cases were submitted over the 9-month period. The level of participation in the learning collaborative was consistently below 50% of the 19 sites. The case submission rate decreased over the course of the 9 months, from 73% in October 2017 to 31% by June 2018. [Table 2] reports the interrater reliability between the scorers (SF and PT), as well as between each scorer and each accident and emergency department ESI site. SF and PT had the strongest agreement ($\kappa = .482$), with SF having stronger overall agreement with the ESI sites than PT. Although vital signs are not a part of the ESI for levels 1, 2, 4, or 5, they are used to determine the need to uptriage from level 3 to level 2. [Table 3] reports the frequency of documentation of vital signs and pain scores in the triage note. Heart rate (98.2%) was the vital sign that was recorded most frequently, whereas pain score (12.7%) was the least commonly recorded. Pain scores are an important ESI criteria and are considered when determining assignment of ESI level 2. The poor documentation of pain scores contributed to the difficulty in reviewing cases and rating them. [Table 4] shows the cases that could not be rated owing to incomplete triage notes by month for SF and PT.

This was particularly high for SF in December 2019, for PT in May 2018, and for both reviewers in April 2018. These cases were not included in the calculation of the interrater reliability.

Discussion

This study examined the results on the interrater reliability of the ESI, after implementation through a structured train-the-trainer program across the island of Jamaica. After in-person train-the-trainer sessions, all accident and emergency departments that participated in the learning collaborative were invited to participate in a monthly webinar for 9 months. If all sites had submitted 2 cases per month, then each month 38 cases would have been received. At no point in the 9-month study period did all the sites submit cases. Participation in the learning collaborative was lower than anticipated, falling as low as 5% (1 site) and not exceeding 50% of the sites trained at any time. Many attempts to encourage participation were used, including frequent e-mail, WhatsApp messages, and telephone reminders to participants and team leaders, as well as encouragement for participation by the Ministry of Health. We did not assess the cause of low participation formally; however, during the sessions, some factors reported to the investigators included an inability to release staff to attend sessions owing to staff shortages, persons being on leave, reassignment of some of the persons initially trained to areas outside of the accident and emergency department, and technological challenges preventing persons at work from logging on. During the learning collaborative sessions, the cases submitted by the accident and emergency departments were reviewed and discussed. Although there was initial enthusiasm and a robust discussion of cases in earlier sessions, this enthusiasm dampened and participation declined over time.

The overall interrater reliability between the expert raters ($\kappa = 0.48$) and the accident and emergency department sites was weak.[6] A kappa statistic range of .40 to .59 corresponds to weak interrater reliability.[6] SF consistently agreed more with the sites ($\kappa = 0.33$) than PT ($\kappa = 0.26$). This likely reflects better knowledge of local institutional practices, which include the practices related to resources that strongly influence the assignment of ESI levels 3, 4, and 5. The agreement between PT and the sites increased over the study period, perhaps because PT became more familiar with local practices through the learning collaborative discussions.

There are many possible reasons for the poor interrater reliability, which could offer valuable lessons. The first is the challenge of retrospectively assigning a triage score based solely on the written triage note. Both SF and PT were unable to assign scores for 9.8% of the cases reviewed. Initially, PT had a lower threshold and attempted to assign a triage level when perhaps all documentation was not present. Over time, PT altered this practice, as evidenced by an increase in the number of cases that she did not score in the last 2 months. We believe that several factors contributed to the inability to score cases. First, the notes varied significantly in both quantity and quality, severely limiting the ability to assign a score. Many notes did not provide sufficient history of the complaint and were extremely short. Pain scores and an objective assessment of the patient were often excluded. Vital signs were often incomplete. Although the recording of vital signs is not absolutely necessary in all cases, all patients classified as ESI level 3 should have vital signs assessed to identify danger zone vitals that may result in uptriage to level 2. Vital signs—in particular, respiratory rate and heart rate—are important in determining the need to uptriage patients from level 3 to level 2.[4] Oxygen saturation (recorded in 77% of the cases in this study) was responsible for uptriage in 2% of the cases. Uptriage owing to pain is the most subjective component of the ESI. Data from the Netherlands found little correlation between documented pain scores and triage.[7] Poor documentation of vital signs and pain scores, and poor-quality triage notes (lack of any narrative describing an objective assessment of how the patient appeared, or any other assessment) affected the ability to accurately rate cases.

Second, both nurses and physicians perform triage in Jamaican hospitals. Significant differences in the notes between these 2 types of ESI providers were detectable. Although the reviewers were blinded to the type of provider

who completed the note, it was often obvious. For example, many notes included a treatment plan for medications to be administered in the accident and emergency department rather than the list of medications the patients take at home, indicating that a physician triaged the patient. Third, there are differences between Jamaica and the United States in terms of the use of resources. For example, many local accident and emergency departments do not have oral pain medications at triage. Very often, parenteral analgesia is ordered from triage. This results in a higher triage score because this counts as 1 resource. Neither SF nor PT was able to assess resource capacity because they were blinded to the accident and emergency department when reviewing the triage cases. There is also variation in resource use among different hospital accident and emergency departments across Jamaica. Rapid staff turnover and staff shortages are common in Jamaican accident and emergency departments. Staff who were initially trained in the ESI may have moved to other duties or left the institution. It is likely that some of the persons who performed triage during the study period did not receive training by the ESI trainers.

The intent of the train-the-trainer session was that the participants would be competent in the use of the ESI and be able to teach the nurses and physicians in their accident and emergency department how to use the ESI. The participants in the learning collaborative reported that staffing limitations and high staff turnover affected many training teams over the study period. We were unable to track turnover or how many additional nurses and physicians were trained at each accident and emergency department.

Our project had many strengths. We used a structured model of training physicians and nurses in the ESI and reinforced the training with monthly webinar sessions of case reviews from accident and emergency departments. These sessions allowed discussion of a wide range of issues that were not the subject of this study but provided important feedback for the Ministry of Health. The issues included the lack of staffing and erosion of training teams, difficulty maintaining ESI-trained persons in triage, and variations in practice. As such, the model allowed for a useful exchange of ideas.

Lessons Learned and Recommendations

Many lessons were learned from this implementation of the ESI in Jamaica that can be used globally. Suggestions for improvement are included in the Box.

Specific to Jamaica, additional lessons can be learned that may be applicable to other countries. The Ministry of Health conducts regular audits of emergency departments in Jamaica. The use of pain scores at triage, adequately documented vital signs, an objective assessment of the patient, and documentation of completion of triage training teams should be added to the existing audit tool. The stability of the training teams is paramount to success. This could help ensure constant reinforcement at each site. The model used in our project centered on creating training teams at each hospital. However, many training teams were significantly eroded over the study period and were not replenished. It may be more sustainable to create a centralized team within the Ministry of Health Training Unit that moves from hospital to hospital in a scheduled manner to conduct and monitor ESI training. Moving forward, the cases collected during the learning collaborative will be used to create a slide set that can supplement existing resources and enhance local ESI training.

It is possible that the ESI is simply not reliable in countries outside of the United States. One evaluation of the ESI in Brazil[8] reported low interrater reliability similar to that reported in this study. Silva et al[8] conducted a multicenter comparison of nurse-performed ESI triage at 3 hospitals in Brazil, the United Arab Emirates, and the United States and found a mean accuracy of only 59.2% and high variability in triage.[9] More stable ED staffing, which is present in the United States, and a higher proportion of specialist emergency-trained nurses and physicians allowing more stable staffing may be necessary factors for successful use of the ESI. Although this may be true, we are unable to directly relate our poor interrater reliability to the ESI owing to the difficulties in conducting a retrospective review of

incomplete triage notes.

There have been suggestions to use technology to enhance the reliability of the triage process. Machine learning was incorporated into an electronic triage system and found to be equivalent or better than traditional ESI triage, particularly for patients classified as ESI level 3.[10] The use of mobile ESI has also been shown to improve the accuracy of ESI triage.[11] Such applications may be particularly beneficial in resource-limited settings.

Limitations

Our project has several limitations. The attrition rate among training teams at each accident and emergency department was not assessed. The feedback during the webinars suggests that this attrition is a significant factor mitigating success because the participants reported significant attrition of accident and emergency department training teams over the 9-month period. Attendance and attrition may have been affected by scheduling the sessions on the same day/time each month. To encourage attendance, the sessions can be rotated among different days/times. The use of a retrospective case review to assign triage scores and assess interrater reliability was problematic because the information provided was often too limited. We were unable to determine if the provider who triaged the reviewed cases was actually trained by the trainer on how to use the ESI. Although this is a significant limitation, it also represents the real world. There may also be differences in how nurses and doctors perform triage; however, this was not assessed.[12]

Implications for Emergency Nurses

This study provides useful guidance to persons seeking to implement the ESI in low-resource settings outside of the United States. The finding of low interrater reliability between Jamaican doctors and nurses and the ESI experts reinforces the need for practical and sustainable measures to support new practitioners of the ESI. Triage note quality, completeness of vital-sign assessment, and high attrition rate among triage nurses and doctors need to be improved in Jamaican emergency departments as part of the overall program to improve ED triage. The stronger agreement between the local ESI expert and the sites as compared with that between the US-based ESI expert and the sites reflects the impact of knowledge of local triage practice in evaluating performance. These factors should be carefully considered by those implementing ESI in non-US settings.

Conclusions

Despite a rigorous implementation process, the interrater reliability of the ESI among Jamaican accident and emergency department nurses and doctors was poor. Recommendations are made to improve implementation of the ESI that can be used to support other programmatic implementation in Jamaican accident and emergency departments and emergency departments globally.

Acknowledgments

Funding for this project was obtained from the Pan-American Health Organization and we thank the Ministry of Health for Jamaica for their support of this initiative, as well as all the participants for their involvement. P.T. and S.F. received funding from the Jamaica Ministry of Health for the project. P.T. has received research funding and is supported by NHLBI (UH3 -HL137856-01, U01HL133964) and AHRQ (R18 RHS024501A), unrelated to this project. P.T. is a member of the ESI Triage Research Team LLC.

Month	Sites that submitted cases n (%)	No. of cases submitted (N=166)	Sites that participated in learning collaborative n (%)

October 2017	14 (73.7)	28	9 (47.4)
November 2017	11 (57.9)	22	4 (21.0)
December 2017	13 (68.4)	25*	9 (47.4)
January 2018	11 (57.9)	22	6 (31.5)
February 2018	9 (47.4)	18	6 (31.5)
March 2018	6 (31.6)	12	5 (26.3)
April 2018	8 (42.1)	15*	1 (5.3)
May 2018	6 (31.6)	12	3 (15.7)
June 2018	6 (31.6)	12	2 (10.5)
Total		166	

Comparison	No. of valid cases	Weighted kappa	P value
SF vs PT	164	0.48	<.05
SF vs ESI sites	163	0.33	<.05
PT vs ESI sites	163	0.26	<.05

Vital sign	Cases	Vitals completed (%)
Heart rate	163	98.2
Blood pressure	126	75.9

Temperature	145	87.3
Respiratory rate	143	86.1
O2 saturation	129	77.7
Pain score	21	12.7

Month	No. of cases submitted	Cases that could not be rated by SF n (%)	Cases that could not be rated by PT n (%)
October 2017	28	0 (0.0)	2 (7.1)
November 2017	22	1 (4.8)	2 (9.5)
December 2017	25	7 (28.0)	2 (8.0)
January 2018	22	1 (4.5)	2 (9.1)
February 2018	18	1 (5.9)	1 (5.9)
March 2018	12	0 (0.0)	0 (0.0)
April 2018	15	4 (26.7)	3 (20.0)
May 2018	12	1 (8.3)	3 (25.0)
June 2018	12	1 (8.3)	1 (8.3)
Total	166	9.8	9.8

DETAILS

Subject:	Trainers; Emergency medical care; Collaborative learning; Collaboration; Accidents; Participation; Collaborative approach; Vital signs; Physicians; Severity; Triage; Implementation; Interrater reliability; Pain; Nurses; Algorithms; Assignment; Emergency services; Cognitive style
Location:	Jamaica
Identifier / keyword:	Emergency Severity Index; triage; Jamaica; learning collaborative
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	58-65
Publication year:	2021
Publication date:	Jan 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.07.003
ProQuest document ID:	2487205939
Document URL:	https://www.proquest.com/scholarly-journals/assessment-interrater-reliability-emergency/docview/2487205939/se-2?accountid=211160
Copyright:	©2020. Emerg ency Nurses Association
Last updated:	2023-08-22

Initial Testing of a Web-Based Intervention to Reduce Adolescent Driver Inattention: A Randomized Controlled Trial: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

Motor vehicle crashes are the leading cause of adolescent death. Inattention to the roadway contributes to crash risk. The objective of this study was to deploy an initial study of a web-based intervention (*Let's Choose Ourselves*) designed to improve adolescent driver attention to the roadway.

Methods

We used a randomized controlled trial design in a sample of adolescent drivers to test if a web-based intervention decreased cell phone engagement in driving simulation at 3 months as compared with controls. As secondary hypotheses, we tested if the intervention increased the use of peer passengers to manage distractions and decreased eyes off the forward roadway in driving simulation and decreased self-reported risky driving behaviors. Adolescents, aged 16-17 years, licensed for ≤90 days were randomized to *Let's Choose Ourselves* with distractions in the simulator protocol at baseline, *Let's Choose Ourselves* with no distractions, an attention control intervention on healthy eating with distractions, or attention control with no distractions. We used Poisson regression modeling to test the primary and secondary hypotheses.

Results

The trial included 60 adolescents (66.7% female, 78.3% non-Hispanic white subjects, mean age 16.8 years, licensed 50.8 days). In Poisson regression, controlling for sex, we found no significant effects of *Let's Choose Ourselves* on primary or secondary outcomes. However, there was a significant effect of visit on self-report outcomes, with self-reported distracted driving behaviors increasing over time.

Discussion

Although there were no significant effects of *Let's Choose Ourselves*, self-reported risky driving behaviors increased over time. Further investigation of the relationship between driving experience and increasing inattention to the road in adolescents is warranted.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current literature on motor vehicle crash prevention indicates that adolescent driver inattention contributes to crashes, yet there is a lack of theoretically grounded interventions to reduce this type of risky driving behavior.

••This article contributes the findings that although a theoretically grounded web-based intervention did not reduce adolescent driver inattention in newly licensed drivers, self-reported cell phone use while driving was present at enrollment in these newly licensed drivers and increased over the 6 months of study enrollment.

••Key implications for emergency nursing practice found in this article are that motor vehicle crash prevention efforts will take a multipronged approach, as even the newest drivers are engaging in cell phone use while driving. Injury prevention efforts related to adolescent driver inattention can start early with adolescents, well before they are independent drivers.

Introduction

Motor vehicle crashes (MVCs) are the leading cause of adolescent death and disability.[1] Adolescent drivers are at highest MVC risk in the first 6 months of licensure, making it a vitally important period for interventions.[2,3] Inattention to the roadway is a major contributor to adolescent driver MVCs[4,5] and includes not looking at the roadway, hands not on the wheel, and mind off the task of driving.[6] Adolescents are particularly susceptible to driver inattention, notably owing to cell phone use and presence of peer passengers in the vehicle. Adolescent drivers disproportionately account for distraction-related crashes, with cell phones involved in 23% of distracted-related fatal crashes with adolescent drivers.[7] A higher number of peer passengers also increases fatal MVC risk among adolescent drivers.[8,9] Both cell phones and peer passengers can take attention away from the roadway, including eyes off the roadway. Eye glances >2 seconds off the roadway by teenagers is associated with an odds ratio of 5.5 increased risk of a crash.[10]

Few theoretically grounded, behavioral interventions exist to reduce teenage driver inattention. We carried out an initial study of an individually targeted, theoretically grounded web-based intervention designed to reduce adolescent driver inattention to the roadway (*Let's Choose Ourselves* [LCO]). LCO addressed cell phone use and peer passengers as contributors to adolescent driver inattention, rooted in the theoretical constructs of attitudes, perceived behavioral control, and norms related to adolescent driver inattention.[11] We used a 4-group, randomized controlled trial design (n = 60) with a simulated driving assessment and self-reported risky driving behaviors to test if LCO could improve attention to the roadway.

Methods Design

We enrolled adolescent drivers aged 16-17 years and licensed for ≤90 days in the Commonwealth of Pennsylvania. The protocol was approved by the institutional review board at Children's Hospital of Philadelphia (CHOP) under the protocol #14-011336 "Web-based Intervention to Prevent Risky Driving Study." We obtained written consent from parents/guardians and written adolescent assent (paper or electronic through Research Electronic Data Capture software). We also obtained a Certificate of Confidentiality, had an independent safety monitor, and registered the trial with Clinicaltrials.gov (NCT02319317). Data collection occurred between June 30, 2015, and August 8, 2016. We used a 4-group, randomized controlled trial design. We tested LCO against an attention control intervention on healthy eating. Outcomes were assessed using a simulator protocol that included simulated driving assessment at baseline and a 3-month follow-up. In addition, self-reported risky driving behaviors at baseline, 1-, 3-, and 6-month follow-ups were assessed.

Participants

Adolescents were recruited through letters and e-mails to families affiliated with CHOP. We also used word of mouth, information sessions at local high schools, and e-mails to groups expressing interest. In addition to age (16-17 years) and licensure requirements (≤90 days in Pennsylvania), inclusion criteria were access to a computer, internet and personal e-mail; willing to travel to CHOP for study procedures; and the ability to read and write English. Exclusion criteria were self-reported history of claustrophobia, migraine headaches, or motion sickness; self-reported current pregnancy (all related to the ability to complete the assessment in the driving simulator); or participation in a teenage driving study at CHOP within the past 6 months.

Intervention Description

The web-based intervention LCO was developed through a multistep process on the basis of the Theory of Planned Behavior and previously reported[11] and delivered through a commercially available e-learning software by means of a secure learning management system. LCO consisted of 6 sections (welcome, general content on adolescent driving, ideas behind LCO, cell phone use, passengers, and wrap-up). The content for LCO was fact-based; grounded in focus group data collected by the study team;[12,13] interactive; and addressed attitudes, perceived behavioral control, and norms about adolescent driver inattention. LCO provided realistic scenarios of how to deal with cell phone and passenger distractions with content and interactive activities that included free-answer questions, drag-and-drop activities, multiple choice questions, and videos from a driving simulator displaying what can happen when an adolescent takes attention away from the roadway. The goal was for participants to complete their assigned intervention in 1 online session lasting 30-45 minutes without interaction with a study team member. An attention control was used with the goal to expose control participants to an interactive web-based experience on health content with activities that were similar in format and delivery but did not overlap on driving-related content. The attention control contained fact-based information on healthy food choices and exercise, interactive questions and activities, and realistic scenarios for making food choices. The attention control modules were intended to parallel the LCO activities but with content on nutritious meals and snacks, exercise, how to make healthy choices for yourself, and school food options.

Here we describe the 4 groups to which they were randomized. In group 1 (LCO with distractions [LCO-D]), participants received cell phone distractions and the presence of a sex-matched research assistant (RA) peer passenger in the baseline simulator protocol before the online intervention LCO. Group 2 (LCO with no distractions [LCO-ND]) participants received no distractions or the presence of a sex-matched RA peer passenger in the baseline simulator protocol before the online intervention LCO. Group 3 (healthy eating with distractions [HE-D]) participants received cell phone distractions and the presence of a sex-matched RA peer passenger in the baseline simulator protocol before the online intervention HE. Group 4 (healthy eating with no distractions [HE-ND]) participants received no cell phone distractions and the presence of a sex-matched RA peer passenger in the baseline simulator protocol before the online intervention HE. In this initial study, we chose to include groups with and without exposure to cell phone distractions and a sex-matched RA peer passenger in the baseline simulator protocol to examine potential assessment reactivity of distractions at baseline.[14,15] The details of distractions and sex-matched RA passengers are described in the simulated driving protocol details and Supplementary Appendix.

Procedures

After consent, assent, and eligibility were confirmed, participants completed the baseline self-report questionnaires and experimental drives in the simulator protocol. Participants then completed their assigned online intervention (LCO or HE) at a study computer at CHOP. At 3-months postenrollment, participants returned for a follow-up assessment in the driving simulator. At 1, 3, and 6 months, participants also completed self-report questionnaires online or in person. We chose to include 1-month self-report measures to increase retention, as well as collect data during a time period in which driving behaviors change rapidly; a 1-month in-person study visit with the driving simulator was deemed undue participant burden given the time intensity of the simulator protocol study visit. Retention strategies also included e-mails and study phone calls for reminders to complete the questionnaires or attend the in-person study visit.

Randomization Procedures

A list of participant numbers was randomized by computer software by a statistician into 4 groups and placed in envelopes, sealed, and locked in a drawer in consecutive order by participant number.[15]

Simulated Driving Protocol

The simulated driving assessment protocol was used at baseline and 3-month follow-up to assess the effects of the intervention on the outcome measures described later in the text. A previously validated driving assessment in a simulator (simulated driving assessment)[16] was delivered to participants using a Realtime Technology, Inc. fixed-based driving simulator and an Applied Science Laboratories mobile eye tracking system located at CHOP. The simulated driving assessment exposed participants to variations of the most common adolescent driver crash configurations.[17] The 21 potential crash scenarios were distributed across 3 experimental drives, separated by intervening straight roads, curves, and turns not intended to trigger collisions.[16] Supplementary Appendix outlines the details of the simulated driving protocol.

Variables

Our primary outcome was cell phone engagement during the simulated driving assessment measured at baseline and 3 months. The secondary outcomes, also measured at baseline and 3 months during the simulated driving assessment, included the use of a peer passenger to manage distractions and eyes off the forward roadway (EOFR) ≥2 seconds. The secondary outcomes included self-report driving behaviors, included baseline, 1-, 3- and 6-months cell phone use while driving on the road and highest number of peer passengers. See Supplementary Appendix for details of interrater reliability of coded simulator protocol variables.

Cell Phone Engagement

Driving simulator videos of participant behaviors at baseline and 3 months were used to determine cell phone engagement on 6 cell phone–related events (Supplementary Appendix, Supplementary Table 1 for distraction event description by experimental drive). Cell phone engagement was defined as visual or manual interaction with the phone. This included looking at the phone, picking up the phone, taking a picture, sending the picture, hand manipulation of phone (mimicking writing a text), answering a call, and looking at a picture on the phone (Supplementary Appendix, Supplementary Table 2 for definitions of variables for cell phone distractions coded as yes/no [eg, looked at phone]). Across the 6 distraction events, counts of yes = 1 and no = 0 were summed for scores of cell phone engagement (possible range, 0-17).

Use of a Peer Passenger to Manage Distractions

Driving simulator videos of participant behaviors at baseline and 3 months were used to determine the use of a peer passenger to manage distractions on 3 cell phone–related events (Supplementary Appendix, Supplementary Table 1). The use of a peer passenger was defined as interactions with the RA peer passenger to handle the cell phone interactions during the simulated driving assessment, such as asking the passenger to read or send a text (Supplementary Appendix, Supplementary Table 2). This outcome metric was based on the focus group research indicating that adolescent drivers perceived using a peer passenger to handle a cell phone (eg, looking at messages, sending messages) was a safety-conscious behavior.[13] Across the 3 distraction events in drive C, counts of yes = 1 and no = 0 on the interaction metrics were summed for scores of the use of a peer passenger (possible range, 0-3).

For those randomized to receive distractions during their baseline simulated driving assessment, videos were coded at baseline and the 3-month follow-up visit; for those randomized not to receive baseline distractions, only their 3-month follow-up visit videos were coded (ie, the baseline did not contain distraction events).

EOFR ≥2 Second

Eye tracking videos of participant glances were used to determine the number of glances with EOFR ≥2 seconds during the simulated driving assessment. EOFR ≥2 seconds was calculated as a count of glances with duration ≥2 seconds. These were calculated across the 6 events described in Supplementary Appendix, Supplementary Table 1. EOFR ≥2 seconds in a 6-second interval is associated with increased crash risk in adolescents.[10] See details in Supplementary Appendix for

coding of EOFR ≥2 seconds. Across the 6 events, the number of EOFR ≥2 seconds events while moving were summed for a sum score as a count.

Self-Report Driving Behaviors

We collected self-report behavioral data at baseline, 1 month, 3 months and 6 months on cell phone and peer passenger–related behaviors. Items included the average number of days per month that they (while driving): (1) talked on a handheld cell phone, (2) talked on a hands-free cell phone, (3) read a text, or (4) sent a text. The response options were counts of 0-31 days. The participants were also asked to report the highest number of teenage passengers they had in the car while driving. The response options were counts of 0-6 or more. The response of 6 or more was transformed to a discrete value of 6 for the purposes of analysis. At baseline, the participants were asked to report on behavior in the previous month; at 1 month, 3 months, and 6 months, participants were asked to report on behavior since the previous assessment.

Demographic Characteristics

At baseline, self-reported characteristics on sex, date of birth to calculate age, race/ethnicity, and date of licensure to calculate licensure length were collected in person or online. Age, state of licensure, and licensure date were verified at the baseline study visit with a copy of the participant's driver's license.

Data Analysis

We used descriptive statistics to describe the sample characteristics, as well as the simulator protocol and self-report outcome measures at baseline, 1 month, 3 months, and 6 months. The distributions of participant demographic characteristics and baseline measures were compared across groups at baseline using Wilcoxon rank sum tests for continuous variables and chi-square statistics for categorical variables.

To estimate effects on the primary and secondary outcomes across the 4 groups, separate models were used for cell phone engagement; use of a peer passenger; and EOFR ≥2 seconds at 3 months using Poisson regression. Using these models, we calculated rate ratios (RRs) and 95% confidence intervals (CIs) by comparing counts of each outcome variable per participant among intervention groups controlling for sex. Given that only participants in the LOC-D and HE-D groups received exposure to distractions and the use of an RA peer passenger at baseline, we also used Poisson regression models to estimate the RR and 95% CI with only those 2 groups for each of the simulator outcomes at 3 months, controlling for baseline simulator outcomes and sex. Separate models for each of the self-report measures at 1 month, 3 months, and 6 months were examined using repeated measures Poisson regression, controlling for sex and baseline measures and accounting for correlation among visits within participant, plus the interaction of group and visit. For final models, we removed interaction terms that were not statistically significant. We accounted for overdispersion in all Poisson models by including the ratio of the deviance to degrees of freedom as dispersion parameter.

At the inception of the overall study (including before the steps of intervention development[11]), an a priori power analysis indicated a sample of 60 participants would yield at least 80% power to detect an effect size ≥0.30 (Cohen's d) for the interaction between group and time in a 2 × 2 mixed design analysis of variance, given up to 50% attrition, a correlation of at least 0.50 between baseline and follow-up measurements, and $\alpha \leq 0.05$. Because this was a phase II trial in preparation for a later phase III trial, the design evolved through the process of intervention development, and the need to examine potential assessment reactivity of baseline exposures to distractions in the simulator emerged. This resulted in a 4-group design. The study team could not increase the sample in this initial study, and thus the target of 60 remained. In the resultant design, we sought to estimate key study parameters with RRs with 2-sided 95% CIs and test the hypotheses at the traditional 2-sided level αof 0.05. The limitations of the sample size and a post hoc power analysis of the effect size of the primary outcome will be discussed. The analyses

were conducted using SAS 9.4 (SAS Institute Inc., Cary, NC).

Results

We tracked our participants using guidelines from the Consolidated Standards of Reporting Trials (Figure). Table 1 outlines the demographic characteristics of the sample overall and by intervention group; 61 participants were enrolled and randomized. We found no differences in the demographic characteristics by intervention group. All adolescents completed their assigned intervention, and the mean time to complete LCO was 27 minutes, 59 seconds (range: 15 minutes, 2 seconds to 39 minutes, 51 seconds). For the attention control on healthy eating, it was 24 minutes, 52 seconds (range: 13 minutes, 0 seconds to 60 minutes, 53 seconds).

Table 2 describes the simulator outcomes of cell phone engagement, the use of a peer passenger, and EOFR ≥2 second at baseline and 3-month follow-up. Table 3 shows the RR and 95% CI from the Poisson regression analyses. In the Poisson regression across all 4 groups, controlling for sex, we did not find significant effects of LCO at 3 months. We observed that the direction of the effect of LCO-D trended toward safer behaviors: those who received LCO-D had less cell phone engagement, more use of a peer passenger, and fewer EOFR ≥2 seconds. In the Poisson regression for simulator outcomes across only the 2 groups that received distractions in the baseline assessment, controlling for sex and baseline distraction metrics, we also did not find significant effects of LCO at 3 months (Table 3). Similarly, we found that again trends compared with the control group; LCO-D had less cell phone engagement, more use of a peer passenger, and fewer EOFR ≥2 seconds, though CIs did not indicate significance.

Table 4 describes the means and standard deviations of self-reported risky driving behaviors at baseline, 1-, 3- and 6-month follow-up. Using a repeated measures Poisson regression, controlling for sex and baseline measure, we found that there was no significant effect of the interaction between visit and intervention group on any of the self-reported outcomes measures. Using a repeated measures Poisson regression, controlling for sex and baseline behaviors, with no interaction term of visit and group, there was a significant effect of time, in which there was an increasing engagement in self-reported risky behaviors over time. Table 5 outlines the results of these Poisson regression analyses. These behaviors included the highest numbers of peer passengers (3 month [rate ratio RR 1.32; 95% CI, 1.15–1.52] and 6 month [1.58; 1.38–1.81] compared with 1 month), sending a text message (3 month [1.58; 1.03–2.42] compared with 1 month), and reading text messages (3 month [1.45; 1.08–1.94] and 6 month [1.55; 1.11–2.17] compared with 1 month).

Discussion

We did not find significant effects of LCO on primary or secondary outcomes in reducing inattention as measured in our simulator protocol. We also did not find effects of exposure to baseline risks in the simulator. However, the results indicated a preliminary effect size of LCO, with directionality indicating the potential for reducing unsafe driving behavior for adolescents through an individually targeted intervention. In addition, in this small sample, there was an increase in the report of cell phone use and carrying number of peer passengers over the 6 months of study enrollment as they gained driving experience. The results with this one-time, brief online intervention delivered during the initial months of licensure add knowledge of when and how interventions are delivered to reduce adolescent driver MVC risk.

Although not significant, the results are encouraging in that they were in the direction of safer behaviors (ie, less cell phone engagement in the simulator). For the primary outcome, the HE groups were 23%-24% more likely to engage with their cell phone than the group LCO with distractions, although not significant. The HE groups were also 16%-74% less likely (although not significant) to use the peer passengers to manage distractions than the group LCO with distractions. This can be described as the LCO group more often handing the cell phone to the peer passenger to check or send messages. Such behaviors can be argued as potential harm reduction behaviors for cell phone use

while driving in adolescents. These effects were consistent with EOFR ≥2 seconds, with the HE groups having 15%-58% more events than the group LCO with distractions. This may contribute to the understanding of components that may be useful for future interventions in driver inattention for adolescents.

More research is needed on the quickly changing behaviors related to social norms among adolescents in their use of technology relative to driving. The introduction of cell phones into the vehicle has also created a virtual peer passenger for the driver to engage with during trips. Although increasing numbers of peer passengers in the vehicle are a known risk factor for fatal risk,[8,9] we know little about the scenarios for adolescent drivers in which there is a driver, peer passenger, and cell phone.[13,18] Overall, a nimble approach to address these inattentive behaviors that responds to rapidly changing technology, even in the newly licensed adolescents, is needed.

A unique contribution was the periodic assessment of self-report cell phone use and peer passenger carrying for 6 months during the early phase of licensure (enrolled at ≤90 days of licensure). Adolescents were engaging in behaviors that take their eyes off the road and their mind off the task of driving. Although the intervention did not have a significant effect on self-report distracted driving behaviors, there was an increase in self-reported cell phone use and highest number of peer passengers over the 6 months. For reading a text message, at 3 and 6 months compared with 1 month, they reported 45% and 55% increases in behaviors, respectively. The highest number of peer passengers reported at baseline was above the graduated driver license passenger restrictions in Pennsylvania (total sample 1.97 compared with no more than 1 passenger younger than 18 years for the first 6 months of licensure).[19] Our results highlight the importance of addressing risky driving behaviors either during the prelicensure phase or at the time of licensure.

To reduce driver inattention, repeated interactions with adolescents may be needed. Event monitoring and feedback with parent-adolescent dyads have shown to reduce adolescent kinematic risky driving events.[20,21] With the increasing pervasiveness of cell phones,[22,23] further research is needed on when and how to address these types of distractions in a way that is effective and sustained. Given that today's adolescents are exposed to parental cell phone use while driving from childhood through their adolescent years,[24–26] multipronged efforts will be needed.

Limitations

Our study was limited by a small sample size. We chose to use a 4-group design to understand the role of in-vehicle distractions and wanted to understand multiple secondary outcomes to determine our next steps. However, the sample size, particularly when comparing the 2 groups who received distractions at baseline, limited our abilities to detect differences between groups. It is acknowledged that the original power analysis was for a 2-group design, and during the intervention development, the need for the evaluation of assessment reactivity in the simulation was needed. We carried out a post hoc analysis of the Poisson models that controlled for sex and baseline assessment of distractions for our primary outcome of cell phone engagement in the simulator. We found that a sample size of n = 307 would be needed to detect significant differences between the LCO and HE groups. This should inform future research relative to this intervention approach. The rigorous experimental control in the simulator is useful when trying to test interventions in potentially unsafe driving situations. However, the simulator is an artificial environment where there is no risk for an actual crash, and participants are fully aware that they are being monitored. Therefore, behaviors in the simulator may not be generalizable to on-road behaviors. Response bias may limit the validity of the self-report data related to cell phone use while driving and carrying peer passengers. The sample was biased in that they were all from 1 state, recruited primarily through the resources through the CHOP primary care system. In addition, the sample was predominately female and white non-Hispanic subjects.

Implications for Emergency Nurses

Key implications for emergency nursing practice rest on the foundation that adolescent MVCs are largely

preventable. Knowledge about state policies on cell phone use while driving, peer passenger restrictions, and other parameters of graduated driver license provisions can help provide evidence-based anticipatory guidance to adolescents and families. Even the newest drivers engaged in distracted driving behaviors, and thus further education and reinforcement of safety-conscious behaviors are needed. In addition, consideration of efforts aimed at not just those adolescents who are in their learner permit phase or newly licensed but rather at a broader target of those who are not yet drivers. Programs can capitalize on state policies that address distracted driving. For example, survey data indicate that adolescents support policy restrictions on handheld cell phone use as well as reading/sending messages.[27] An intervention prevention program could leverage positive community norms around these policies.

Injury prevention programs by emergency nurses could address the intersection of adolescent driving, parent involvement, and technology. There is a strong emphasis on the role of parents in the learning to drive or early licensure time period.[3,28] Technological interventions such as text message–blocking technology show promise,[29] but there are few studies to examine effects. There may be advantages to combining facets of technology-based interventions with behavioral interventions to increase uptake. There are a few commercially available products that can inhibit cell phone use while driving. However, families must find these technological-based interventions acceptable and feasible for use for their adolescents.[30]

Conclusions

Newly licensed adolescent drivers are at particularly high risk for MVCs. LCO is an individually targeted intervention for newly licensed teenage drivers that addresses inattention to the roadway. This initial study of testing LCO did not indicate significant effects of the intervention, although trends were in the expected direction. The results point toward a need to address inattention early in the learning to drive and licensure process as we saw increasing frequency of self-reported risky driving over the 6 months of enrollment. Further work is needed to better understand effective measures that can address cell phone use while driving.

Author Disclosures

This research was supported by the National Institute of Nursing Research of the National Institutes of Health under award number R00NR013548 (Principal Investigator: C.C. McDonald). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. This research was also supported by the Dorothy Mereness Endowed Research Fund at the University of Pennsylvania School of Nursing.

Conflicts of interest: none to report.

Acknowledgments

We thank Flaura K. Winston, MD, PHD and Nancy Kassam-Adams, PhD, for their contributions. We also thank Chelsea Ward, MS and the Center for Research Injury and Prevention Driving Simulator Core at the Children's Hospital of Philadelphia. For assistance in recruitment, we thank the Pediatric Research Consortium and the Recruitment Enhancement Core at the Children's Hospital of Philadelphia. Finally, we thank the participants in this study.

Supplementary Appendix Simulated Driving Protocol

The RTI driving simulator system included a driver seat, 3 channel 4,600 LCD (liquid-crystal display) panels (160° field of view), rear view, left, and right mirror inlayed images, pedals, and a steering system. Graphics were delivered at 1,280 × 1,024 resolution at 60 Hz and raw simulator data were collected at 60 Hz. Videos of the participant's driving behavior in the simulator were also recorded by 3 cameras (positioned over the right shoulder, pointing at the participant's face and over the foot for view of brake and accelerator). The ASL Mobile Eye captured eye

movements on the forward scene at 30 Hz. Participants wore the ASL Mobile Eye glasses (or alternative goggles worn over eyeglasses) with 2 video cameras (forward image and right eye of participant) to capture gaze location during experimental drives. Video data from the 2 cameras were integrated into a single video with superimposed crosshairs for eye gaze location.

The simulated driving assessment protocol exposed participants to variations of the most common adolescent driver crash configurations.[17] The 21 potential crash scenarios were distributed across 3 experimental drives, separated by intervening straight roads, curves, and turns not intended to trigger collisions.[16] There were 2 experimental drives with cellphone events (Drive A and B) and 1 experimental drive with presence of a gender-matched RA posing as a peer passenger (RA peer passenger) and distraction-related events (Drive C). The exposure to cellphone engagement in the simulator and use of a gender-matched RA peer passenger to manage distractions were designed to occur in intervening segments outside the 21 potential crash scenarios. The protocol that included cellphone distraction events and presence of a gender-matched RA peer passenger had incoming text messages, an incoming call, a prompt to take a picture, a prompt to look at a picture and a prompt to send a text message distributed during the experimental drives (Drives A, B, and C). See Supplementary Table. 1 Distraction events descriptions outlining details of distraction events by drive. Half the participants were randomized to the simulator protocol that included exposure to cellphone distraction events (Drive A, B, and C) and presence of a gender-matched RA peer passenger during the 3 experimental drives. The other half completed the same experimental drives, but they did not contain exposure to cellphone distraction events or the presence of a gender-matched RA peer passenger.

Before initiating experimental drives, adolescent participants received a hands-on orientation to the study cellphone (Verizon LG Optimus Zone 2 Prepaid Smartphone). Participants received standard instructions to treat it as their own phone and use it how they normally would use a cellphone when driving.

Coding of *EOFR ≥2 Seconds*

First, glances during the distraction events were calculated in a 6-second interval from the initial engagement in each event (i.e. 6-seconds from when a participant first looked at phone in taking a picture prompt, etc.). To capture *EOFR ≥2* seconds while the “car” was moving, we also evaluated velocity during glance duration. Although on-road studies use an average velocity of 5 mph in a 6-second epoch, we chose a conservative threshold of 2.5 mph for this simulator study so to capture glances when the vehicle was in motion, rather than at a stop sign or light.[31] To determine if the *EOFR ≥2* seconds occurred ≥2.5 mph, simulator video and supplemental simulator-recorded velocity were used to determine velocity at *EOFR ≥2* seconds events. RAs recorded velocities at time of initial glance for *EOFR* ≥2 seconds and checked against supplemental simulator-recorded velocity.

Interrater Reliability of Coded Simulator Protocol Variables

A Master Coder trained 2 RAs to code items for “cell phone engagement and use of a peer passenger” using the definitions in Supplementary Table 2 below. After the initial training, results were compared, discussed, definitions clarified, and discrepancies reconciled. Coding was completed independently by the RAs with 2 more participants and 100% agreement on items was reached. The 2 RA coders used the standard rubric and definitions and reviewed the simulator videos for analysis. When the simulator video did not clearly indicate a Yes/No on an item, eye tracking videos were used to confirm coding outcome. The coders noted "Yes" or "No" for each item in the events and the simulator time was also recorded if Yes was coded. A Master Coder performed interrater reliability random checks on 25%-30% of the participants from each visit to determine discrepancies with "Yes" or "No." Any discrepancies were reviewed by the PI to determine final item coding. The average interrater reliability for the 2 RA coders with the Master Coder was 0.93 for the items used in the calculation of cell phone engagement and Peer Passenger Use. Coders were blinded to whether participants were assigned to the intervention or control groups.

Eye tracking videos were used to code *EOFR ≥2* seconds. For *EOFR ≥2* seconds, the start time in the eye tracking video for coding each 6-second interval was double verified by 2 research team members. The start time of a glance was when the participant's eye gaze began to leave the road; end time was when the participant's eye gaze was focused back on the forward roadway. Start and end time of glances were recorded, and duration of glances were calculated. A Master Coder trained 3 RAs to standardize coding procedures for 100% agreement on presence of glance ≥1 second and 10% were reconciled by the PI. We chose 1-second glance duration for the random checks for a conservative approach to the coding. Coders were blinded to whether participants were assigned to the intervention or control groups.

Supplementary Appendix

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.07.012.

Variable	Total sample		LCO-D		LCO-ND		HE-D		HE-ND		P
n	%	n	%	N	%	n	%	n	%	Total	60
100.0	15	25.0	16	26.7	15	25.0	14	23.3		Sex	
									0.31	Female	40
66.7	8	53.3	13	81.3	11	73.3	8	57.1		Male	20
33.3	7	46.7	3	18.8	4	26.7	6	42.9		Race/ethnicity	
									0.53	NH black	9
15.0	4	26.7	3	18.8	1	6.7	1	7.1		NH other/Mixed	4
6.7	–	–	2	12.5	1	6.7	1	7.1		NH white	47

	Total sample	LCO-D	LCO-ND	HE-D	HE-ND

N	Mean (SD)	Median (IQR)	n	Mean (SD)	Median (IQR)	n	Mean (SD)	Median (IQR)	n	Mean (SD)	Median (IQR)	n	Mean (SD)	Median (IQR)	Cell phone engagement
Baseline	30	8.13 (5.22)	8 (4–13)	15	7.67 (5.21)	6 (4–14)	16	NA	NA	15	8.60 (5.37)	8 (5–13)	14	NA	NA
3 mo	53	9.43 (5.40)	10 (6–14)	14	8.36 (6.31)	7 (2–14)	13	9.85 (5.79)	10 (9–12)	13	9.46 (5.43)	10 (6–14)	13	10.15 (4.30)	10 (6–13)
Use of a peer passenger to manage distractions															
Baseline	30	0.90 (0.96)	1 (0–2)	15	0.80 (0.68)	1 (0–1)	16	NA	NA	15	1 (1.2)	0 (0–2)	14	NA	NA
3 mo	53	0.64 (0.9)	0 (0–1)	14	0.86 (0.86)	1 (0–2)	13	0.62 (0.96)	0 (0–2)	13	0.85 (1.07)	0 (0–2)	13	0.23 (0.60)	0 (0–0)
EOFR ≥2 s															
Baseline	30	1.50 (2.19)	0.50 (0–3)	15	1.07 (1.53)	0 (0–2)	16	NA	NA	15	1.93 (2.69)	1 (0–3)	14	NA	NA
3 mo	53	1.26 (1.56)	1 (0–2)	14	1.14 (1.35)	0.50 (0–2)	13	0.92 (1.32)	0 (0–2)	13	1.69 (1.75)	1 (0–2)	13	1.31 (1.84)	1 (0–2)

	Rate ratio	95% CI	P value
Controlling for sex			
Cell phone engagement			

Sex (M vs F)	1.38	0.95–2.01	0.10
HE-D vs LCO-D	1.24	0.74–2.08	0.42
HE-ND vs LCO-D	1.23	0.75–2.02	0.41
LCO-ND vs LCO-D	1.32	0.79–2.23	0.29
Use of peer passenger to manage distractions			
Sex (M vs F)	0.50	0.19–1.32	0.16
HE-D vs LCO-D	0.84	0.33–2.15	0.71
HE-ND vs LCO-D	0.26	0.06–1.09	0.07
LCO-ND vs LCO-D	0.58	0.21–1.65	0.31
EOFR ≥2 s			
Sex (M vs F)	1.26	0.59–2.66	0.55
HE-D vs LCO-D	1.58	0.60–4.12	0.35
HE-ND vs LCO-D	1.15	0.43–3.11	0.78
LCO-ND vs LCO-D	0.88	0.29–2.69	0.82
Controlling for sex and baseline assessment of distractions[*]			
Cell phone engagement			
Sex (M vs F)	1.49	1.05–2.13	0.03
HE-D vs LCO-D	1.14	0.81–1.60	0.45
Use of peer passenger to manage distractions			
Sex (M vs F)	0.40	0.15–1.04	0.06
HE-D vs LCO-D	0.50	0.20–1.24	0.14
EOFR ≥2 s			
Sex (M vs F)	0.80	0.30–2.17	0.66

HE-D vs LCO-D	1.11	0.43–2.84	0.83

	Total population		Intervention group											
LCO-D			LCO-ND			HE-D			HE-ND		N	Mean (SD)	Median (IQR)	n
Mean (SD)	Median (IQR)	N	Mean (SD)	Median (IQR)	n	Mean (SD)	Median (IQR)	n	Mean (SD)	Median (IQR)	Handheld cell phone use (average d/mo)			
											Baseline	60	0.78 (1.70)	0 (0–1)	15
0.67 (1.40)	0 (0–1)	16	0.5 (0.73)	0 (0–1)	15	1.27 (2.81)	0 (0–1)	14	0.68 (1.23)	0 (0–1.5)	1 mo	58	2.22 (4.3)	0 (0–2)	14
2.79 (5.59)	0 (0–2)	16	2.56 (4.40)	0 (0–3.5)	15	1.6 (3.07)	0 (0–3)	13	1.92 (4.23)	0 (0–2)	3 mo	55	2.44 (5.13)	0 (0–2)	14
1.86 (4.05)	0 (0–2)	15	3.6 (6.62)	0 (0–5)	13	3.08 (6.51)	0 (0–1)	13	1.08 (1.61)	0 (0–1)	6 mo	56	3.07 (5.48)	1 (0–4.50)	13
3.31 (7.10)	0 (0–3)	15	3.87 (6.58)	1 (0–5)	15	3.4 (4.52)	1 (0–5)	13	1.54 (3.04)	0 (0–1)	Hands-free cell phone use (average d/mo)				
Baseline	60	1.08 (2.17)	0 (0–1.5)	15	0.87 (2.59)	0 (0–0)	16	0.88 (1.36)	0 (0–1.5)	15	0.97 (1.88)	0 (0–2)	14	1.68 (2.77)	0.5 (0–2)

1 mo	58	2.16 (4.51)	0 (0–2)	14	1.71 (2.89)	0 (0–5)	16	1.69 (3.16)	0 (0–2)	15	2.40 (4.91)	0 (0–2)	13	2.92 (6.76)	0 (0–0)
3 mo	55	2.65 (4.84)	0 (0–3)	14	2.79 (5.49)	0 (0–1)	15	4.47 (5.72)	3 (0–10)	13	1.15 (2.19)	0 (0–0)	13	1.92 (4.73)	0 (0–0)
6 mo	55	3.16 (5.03)	1 (0–4)	13	3.00 (4.40)	0 (0–6)	15	5.07 (6.94)	2 (0–9)	14	2.21 (3.53)	0.5 (0–3)	13	2.15 (4.24)	0 (0–3)
Read text (average d/mo)															
Baseline	60	1.86 (4.61)	0 (0–2)	15	2.53 (7.10)	0 (0–2)	16	1.06 (1.69)	0 (0–1.5)	15	2.2 (4.49)	0 (0–2)	14	1.68 (3.94)	0 (0–1)
1 mo	58	2.88 (5.53)	0 (0–2)	14	4.21 (7.62)	0.5 (0–2)	16	2.63 (5.19)	1 (0–2.5)	15	2.53 (4.47)	0 (0–3)	13	2.15 (4.72)	0 (0–1)
3 mo	55	4.22 (7.00)	1 (0–4)	14	3 (6.85)	0.5 (0–2)	15	4.6 (6.67)	2 (0–6)	13	5.54 (8.53)	2 (1–4)	13	3.77 (6.41)	1 (0–3)
6 mo	56	4.48 (6.26)	2 (0–5.50)	13	4.38 (7.53)	1 (0–4)	15	5.93 (7.27)	3 (1–10)	15	4.93 (6.12)	3 (0–10)	13	2.38 (3.12)	1 (0–4)
Send text (average d/mo)															
Baseline	60	1.61 (4.43)	0 (0–1)	15	2.27 (7.16)	0 (0–1)	16	0.63 (1.63)	0 (0–0)	15	2.07 (3.58)	0 (0–4)	14	1.54 (3.9)	0 (0–1)
1 mo	58	1.76 (4.49)	0 (0–1)	14	3.14 (7.28)	0 (0–1)	16	1.38 (2.70)	0 (0–1.5)	15	1.27 (3.86)	0 (0–0)	13	1.31 (2.95)	0 (0–1)
3 mo	55	2.82 (6.25)	0 (0–2)	14	1.86 (5.39)	0 (0–0)	15	3.8 (6.86)	0 (0–5)	13	3 (8.18)	0 (0–2)	13	2.54 (4.5)	0 (0–2)
6 mo	56	2.82 (5.22)	0 (0–3.50)	13	1.62 (4.25)	0 (0–0)	15	4.87 (7.41)	1 (0–10)	15	2.47 (4.6)	0 (0–3)	13	2.08 (3.23)	0 (0–4)

Highest number of teenage passengers															
Baseline	60	1.97 (1.44)	2 (1–2.5)	15	1.4 (0.99)	1 (1–2)	16	2.25 (1.34)	2 (1–2.5)	15	2.2 (1.82)	1 (1–3)	14	2.00 (1.47)	1.50 (1–3)
1 mo	58	1.97 (1.14)	2 (1–2)	14	1.5 (0.94)	1.5 (1–2)	16	2.13 (1.15)	2 (1–2.5)	15	2.2 (1.26)	2 (1–2)	13	2.00 (1.15)	2 (1–3)
3 mo	55	2.56 (1.41)	2 (1–3)	14	2.71 (1.64)	2.5 (1–3)	15	2.40 (0.91)	2 (2–3)	13	2.62 (1.71)	2 (1–3)	13	2.54 (1.45)	2 (1–4)
6 mo	56	3.09 (1.35)	3 (2–4)	13	2.54 (1.13)	3 (2–3)	15	3.20 (1.01)	3 (2–4)	15	3.6 (1.35)	4 (2–4)	13	2.92 (1.75)	3 (2–4)

	Rate ratio	95% CI	P value
Handheld cell phone use			
Sex (M vs F)	1.23	0.59–2.56	0.58
HE-D vs LCO-D	0.58	0.17–2.05	0.40
HE-ND vs LCO-D	0.59	0.18–1.92	0.38
LCO-ND vs LCO-D	1.74	0.49–6.11	0.39
3m vs 1m	1.16	0.76–1.78	0.49
6m vs 1m	1.44	0.98–2.11	0.06
Hands-free cell phone use			
Sex (M vs F)	0.64	0.26–1.56	0.32
HE-D vs LCO-D	0.76	0.23–2.52	0.65
HE-ND vs LCO-D	0.73	0.21–2.59	0.63

LCO-ND vs LCO-D	1.53	0.47–4.99	0.48
3 mo vs 1mo	1.25	0.81–1.94	0.32
6 mo vs 1 mo	1.42	0.85–2.37	0.18
Read text			
Sex (M vs F)	1.42	0.79–2.55	0.25
HE-D vs LCO-D	2.06	0.76–5.57	0.15
HE-ND vs LCO-D	1.28	0.51–3.21	0.60
LCO-ND vs LCO-D	3.11	1.20–8.09	0.02
3 mo vs 1 mo	1.45	1.08–1.94	0.01
6 mo vs 1 mo	1.55	1.11–2.17	0.01
Send text			
Sex (M vs F)	1.61	0.73–3.58	0.24
HE-D vs LCO-D	4.03	0.57–28.61	0.16
HE-ND vs LCO-D	2.89	0.58–14.29	0.19
LCO-ND vs LCO-D	10.19	1.80–57.76	0.01
3 mo vs 1 mo	1.58	1.03–2.42	0.04
6 mo vs 1 mo	1.60	0.91–2.81	0.10
Highest number of teenage passengers			
Sex (M vs F)	1.03	0.87–1.21	0.75
HE-D vs LCO-D	1.04	0.83–1.31	0.74
HE-ND vs LCO-D	0.95	0.71–1.26	0.72
LCO-ND vs LCO-D	1.00	0.78–1.28	0.98
3 mo vs 1 mo	1.32	1.15–1.52	< 0.001

6 mo vs 1 mo	1.58	1.38–1.81	< 0.001

Item	Definition
Cell phone engagement	
Looks at phone	Eyes glance and/or head movement toward phone.
Picks up phone	When phone is in hand of participant (e.g. participant reaches for phone and puts in hand when a notification comes in).
Takes a picture	Opening of camera, camera is visible, holds phone up to the screen in response to prompt or a camera click is audible (picture makes a clicking sound).
Sends picture to friend	Hand manipulation of the phone screen after the picture is taken (likely texting friend after taking the picture).
Hand manipulation of phone	Hand interaction with phone screen.
Answers call	Accepts incoming call and ringer stops.
Looks at picture	Eye glance and/or head motion toward picture that passenger is holding up.
Use of peer passenger to manage distractions	
Asks passenger to text	Verbal request of research assistant passenger to send text to friend.
Asks passenger to read	Verbal request of research assistant passenger to read text that was received.

DETAILS

Subject:	Passengers; Emergency medical care; Behavior; Software; Intervention; Healthy food; Adolescents; Driving; Roads &highways; Questionnaires; Internet; Attention deficits; Mobile phones; Vehicles; Cellular telephones; Simulation; Clinical trials; Licenses; Computer based; Adolescent girls; Teenagers; Self report
Location:	Pennsylvania; United States--US
Identifier / keyword:	Adolescent; Distracted driving; Intervention; Inattention; Motor vehicle crash

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	88- 100.e3
Publication year:	2021
Publication date:	Jan 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Evidence Based Healthcare, Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.07.012
ProQuest document ID:	2487205936
Document URL:	https://www.proquest.com/scholarly-journals/initial-testing-web-based-intervention-reduce/docview/2487205936/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-01-26
Database:	Public Health Database

Document 35 of 61

CE Earn Up to 10.5 Contact Hours: JEN

ProQuest document link

FULL TEXT

TVM:UNDEFINED

DETAILS

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
First page:	206
Publication year:	2021
Publication date:	Jan 2021
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	Engl ish
Document type:	Instructional
DOI:	https://doi.org/10.1016/S0099-1767(20)30413-X
ProQuest document ID:	2487205927
Document URL:	https://www.proquest.com/scholarly-journals/ce-earn-up-10-5-contact-hours/docview/2487205927/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Jan 2021
Last updated:	2021-03-01

Cost Savings of Frequent, Concise Skills Competency Training in the Emergency Department: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Nurse educators are confronted with ensuring skills competency and staff compliance to support the provision of safe and quality care. The ED setting presents additional challenges when conducting skills competency training. One military hospital's emergency department implemented a method of frequent, concise skills training sessions to overcome barriers unique to the ED setting; the same method was then implemented at a second military organization owing to the effectiveness of the training approach to increase staff compliance. This article outlines the methods for the implementation of frequent, concise skills training sessions, and it displays the cost savings and increased compliance experienced by the 2 health care organizations after the implementation of this frequent, concise skills training method.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current literature indicates that frequent, concise skills training may prove beneficial in knowledge retention, staff satisfaction, and cost-effectiveness.

••This article contributes an example of the methods employed at 2 military hospital emergency departments and displays the cost savings and increased staff compliance after the implementation of frequent, concise skills training sessions.

••Key implications for emergency nursing practice found in this article include that frequent, concise skills training may prove beneficial for increasing staff compliance and cost containment in the ED environment.

Emergency departments remain a common health care access point for acute, chronic, and emergent conditions within the United States and the world. ED crowding is a problem discussed throughout the literature.[1-4] The challenge of providing adequate staffing levels in the emergency department is related to the unpredictability of the hourly patient census and this potential for crowding. Ensuring regular, relevant training to maintain competency in this busy atmosphere proves challenging. Ensuring that nurses are not away from direct patient care for long periods while maintaining an adequate staffing schedule for the high volume of patients presents a complex puzzle concerning education. One military emergency department developed an efficient skills competency training (SCT) schedule to ensure the provision of frequent education in conjunction with cost containment. This same education model was then replicated at another, smaller military hospital.

Background

The Joint Commission (TJC)[5] defines competency as a measurable way to identify knowledge, skills, and abilities, but states that this definition is fluid and not formal. TJC standards state that the goal is to demonstrate and perform safe and quality care.[5] TJC does not define what competencies resemble. These competencies should be determined by the specific patient population, the skills, and the knowledge needed to render appropriate care.[5] Traditionally, SCT has been conducted in the form of a skills fair in 1 6-hour to 8-hour day in our setting. All skills for the year for an entire organization were conducted in a large room with multiple stations. Collaboratively, educators, nursing leaders, and risk managers determine the contents of the fair. Yet, these types of fairs are often time-consuming, and the learner becomes disengaged.[6] One study identified that the learners considered that the goal was to “check the box” (an idiom meaning “complete to the barest minimum standard”), and complete the stations, rather than learn content in direct relation to their clinical practice.[7] Only 52% of the nurses felt that the content at traditional skills fairs was relevant to their practice.[7] In a second study, the nurses reported minimal influence regarding the content and felt that the training was repetitive and boring despite using distractors such as themes and games.[6]

Alternatively, unit-based training has been shown to promote confidence among the nursing staff and contribute to positive patient outcomes management. The skills were perceived as more relevant to patient care provided on that specific unit. The skills education was developed using recent case reviews and input from the clinical staff. The learners also felt that the time allocated to the training was a huge contributor to positive perceptions because the staff were already at work when the training took place, and it did not require them to come on their day off or work overtime.[7] Ogle and Harville[8] innovated training at 1 military field hospital and found that the participants perceived that presenting all required skills in 1 continuous session was overwhelming. In response, the authors elected to space out the timing for each skill over multiple days in 1-hour blocks of instruction. The problems and innovations in the literature aligned with the feedback and results experienced by the 2 military organizations described in this article.

Setting

The first hospital for implementation of the SCT approach was a military treatment facility, with an emergency department of 38 beds and 65 nurses on staff to treat an average of 200 patients a day. The leadership staff included 2 team leaders (assistant chief nurses), 1 head nurse (chief nurse), and the chief nurse of emergency operations (encompassing the urgent care clinic, the emergency department, and emergency medical services). There was a full-time nurse educator who led the military medic training and required certifications for the department to include cardiopulmonary resuscitation. The annual nursing skills training was performed by 2 master’s-prepared nurse educators who also provided bedside nursing care when not providing education to the department. All 3 of the nurse educators were paid hourly and provided bedside clinical staffing in addition to their educator duties. The nursing care model for the department encompassed a primary nurse model with a 4:1 ratio, with 2 nurses assigned per zone to assist one another. Both of the nurse educators who provided the annual skills training held their certifications in emergency nursing (CEN) and pediatric emergency nursing (CPEN). The staff was paid at the same government-service level, with different steps on the basis of experience and time in service. Therefore, the charge role was rotated among the staff. The charge nurse for the day did not routinely take a direct patient assignment.

Training Relevance

Before each SCT session, the nurse educators reviewed the evidence-based guidelines through the hospital's access to Elsevier Clinical Skills (Elsevier BV). In addition, the nurse educators reviewed the relevant hospital policies for the skills being delivered to update the staff on any policy changes that may have occurred. Furthermore,

the staff provided the nurse educators with initial learner engagement input on concerns and challenges in the delivery of bedside care. This staff information was used for future SCT sessions. The communication was shared with the leadership to ensure that the feedback was delivered up and down the chain of command.

Training Method/Trigger for Change

The same military treatment facility created a different approach to SCT in their emergency department, and the same method was then adopted at another military facility. Before these changes, many of the staff were noncompliant with completing their educational competency training. Although the specific information regarding the levels of staff compliance was not available to the authors, the trigger for the implementation of this training method was because of multiple adverse events that required a department-wide increase in the compliance of skills training for the staff. After the implementation of the hands-on SCT program, only 2 of the 65 nurses did not meet the standard in the first year of the new approach (Figure).

The hands-on SCT was conducted in 6 sessions spread throughout the year, delivered to 2 nursing teams (for a total of 12 sessions) in the emergency department. Each session contained 3 to 4 skills that were taught to each team. Each session was limited to 1 hour or less, and the nurses covered each other's patient assignments just as they did for meal breaks. The education team (nurse educators and a clinical nurse specialist) and leadership team (chief nurse of the emergency department, nurse managers, and team leaders) met frequently to re-evaluate the skills and to adjust any requirements on the basis of new risk-management cases and topics presented for just-in-time education. Just-in-time education addressed a facility change in health care procedures, facility policy, or change in evidence-based practices. In addition, the staff was empowered to provide suggestions for future content to be demonstrated or reinforced.

The staff members in the emergency department were scheduled in 12-hour shifts with 7 am, 11 am, and 7 pm starts. The ED volume was reviewed for low-volume hours. On the basis of this review, the hours of 4 am to 12 pm were selected to deliver the education. The staff attended the training during their regular scheduled shift. Because there are only 3 or 4 skills at a time, the training was delivered in the trauma bay or the department conference room. This allowed the nursing staff to never be far away from patient care; the staff could return quickly to clinical care if needed. Depending on hospital requirements, departmental needs, and trending patient safety reports, skills checkoffs are performed once a year, and others are done more frequently (rapid infuser utilization, porta cath access/deaccess, ESI triage). Most of the skills were hands-on with return demonstration, with approximately 2 critical-thinking case studies followed by a quiz. All skills sessions were designed to meet the educational objectives and to efficiently return the staff to their patient care assignment. The skills stations were constructed to be broken down quickly for the room to accept a patient with trauma if needed.

Further Implementation

On the basis of this hands-on SCT model, a similar plan was implemented at the second military hospital. The second facility was smaller, with a 28-bed emergency department seeing an average of 150 patients a day, and 48 nurses on staff. The training method was the same, except that the times were changed slightly to accommodate the late midshift of 3 pm. In this case, the morning sessions were the same as above, but a 1-hour session from 2:30 pm to 3:30 pm was allowed for those who worked that later shift. These evening shift nurses would go immediately into training on arrival to work before taking a patient assignment.

Cost Savings

The government nurses' hourly rate was used to demonstrate the cost savings because both nurse educators are hourly staff nurses. The Table illustrates the costs and the savings resulting from this approach. The cost savings for both military emergency departments discussed in this article were more than 50%, as illustrated in the Table.

Evaluation Metrics for SCT Replication

On the basis of the postimplementation proportion of nurses who were in compliance with annual competency training, we evaluated the hands-on SCT method as beneficial to ensure staff compliance with attendance to annual skills training. Future data collection is also needed to assess the benefits of improving knowledge, skills, and attitudes or perceptions when performing the skills pre- and posttraining. In addition, further analysis of the long-term outcomes on the reduction of morbidity and mortality after frequent skills training is required to assess the benefits of this method.

Implications for Emergency Nurses

Despite the busy nature of the ED environment, frequent, concise skills training is achievable. Considering patient volume and staffing hours, different strategies can be adopted to meet the varied needs of the organization. Health care procedures, facility policies, and evidence-based practices change regularly. Frequent unit-based training is a potential solution to overcome the challenges faced by nurse educators in busy ED environments. In addition, at 2 health care organizations, this hands-on SCT education schedule was cost-effective when compared with the traditional annual SCT arrangement.

Conclusion

A competency assessment must be completed by the nursing staff to ensure that safe, competent, and reliable care is being performed daily. The traditional skills fair schedule is less reliable and retainable, and lacks cost-effectiveness. Frequent, concise skills training may improve the confidence of the nursing staff and unit leaders in their care of patients in the emergency department. Future systematic literature reviews and continued program evaluation of our hands-on SCT training methods are needed in the ED environment.

Acknowledgments

We thank Monique Wallace, MSN, RN, CEN, CPEN, for her assistance and contributions in developing the frequent skills training sessions at the military organization.

Author Disclosures

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Womack Army Medical Center, Fort Belvoir Community Hospital, Defense Health Agency, Department of Defense, or the US government.

Conflicts of interest: none to report.

Hospital 1		Hospital 2	
Traditional annual skills competency training		Traditional annual skills competency training	
Staff nurses, total	65	Staff nurses, total	48
Hourly rate, $	40	Hourly rate, $	40
Total sessions	1	Total sessions	1

Hours per session	6	Hours per session	6
Educators' cost, $ (40 × 6)	480	Educators' cost, $ (40 × 6)	240
Total cost, $	16,080	Total cost, $	11,760
Frequent, concise skills competency training		Frequent, concise skills competency training	
Educators, total	2	Educators, total	1
Hourly rate, $	40	Hourly rate, $	40
Total sessions	12	Total sessions	12
Hours per session	8	Hours per session	8
Total cost, $	7,680	Total cost, $	3,840

DETAILS

Subject:	Schedules; Savings; Workforce planning; Patients; Emergency medical care; Health care; Nursing education; Displays; Cost control; Military hospitals; Nursing care; Compliance; Skill development; Leadership; Nurse tutors; Nursing skills; Quality of care; Competence; Nurses; Teachers; Emergency services
Business indexing term:	Subject: Workforce planning Leadership Skill development Cost control
Identifier / keyword:	Emergency department; Skills competency training; Cost savings; Skills fairs; Competency
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	181-185
Publication year:	2021
Publication date:	Jan 2021
Section:	Nurse Educator

Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.07.013
ProQuest document ID:	2487205919
Document URL:	https://www.proquest.com/scholarly-journals/cost-savings-frequent-concise-skills-competency/docview/2487205919/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-06-12
Database:	Public Health Database

Scientific Approach to Assess if Change Led to Improvement—Methods for Statistical Process Control Analysis in Quality Improvement: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Key implications for emergency nursing practice found in this article include education for nurses and nurse managers to improve understanding of statistical process control, intervention analysis, and process changes in quality improvement projects. Quality improvement continued to evolve throughout the 1950s and ’60s both in industry with Toyota Production Systems’ emphasis on decreasing variation, and in health care with the adoption of review committees such as the Joint Commission on Accreditation of Healthcare Organizations.1 Multiple models for organizing quality improvement projects exist, including Lean Six Sigma’s Define, Measure, Analyze, Improve,

Control, and the Institute for Healthcare Improvement's Plan-Do-Study-Act (PDSA) cycles.2-4 Models for translation and replication of projects to other environments include the Reach, Effectiveness, Adoption, Implementation, and Maintenance framework.5 Our hospital uses the Institute for Healthcare Improvement's framework for organizing quality improvement projects, using tools such as process maps, fishbone diagrams, key driver diagrams, and Pareto charts. In quality improvement analysis, one does not control how many, or which type of, patients present to the process. [...]quality improvement statistical models analyze if changes are due to random variation inherent to the process, or if they are true markers of change.Basics of Control Charts Dr Walter Shewhart, considered the "father of statistical quality control," first proposed the use of control charts within the electric industry. Common cause variation can generally be identified on a statistical process control chart by data points between the upper and lower control limits without an identifiable pattern.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current quality improvement literature and varying methodologies advocate for the use of statistical process control charts for analysis and ability to infer causation from interventions.

••This article contributes a guide for creating and analyzing statistical process control charts to assess for change in quality improvement projects.

••Key implications for emergency nursing practice found in this article include education for nurses and nurse managers to improve understanding of statistical process control, intervention analysis, and process changes in quality improvement projects.

Quality improvement is an expectation in most hospitals and emergency departments throughout the United States. With hospitals requiring reporting on key metrics such as readmission rates, time to thrombolytic administration in stroke, or time to cardiac catheterization laboratory activation for ST-elevation myocardial infarctions, many emergency departments deploy quality improvement teams to monitor and improve these metrics and others to promote quality and safety. Emergency nurses and managers are key members and leaders of these quality improvement teams. Knowledge of the process and methodology employed to analyze the results of quality improvement initiatives will help the emergency nurse contribute to and lead projects.

In the 1920s, the "Father of QI," Dr W. Edwards Deming, described quality improvement for industry as a "never-ending cycle of continuous improvement." Quality improvement continued to evolve throughout the 1950s and '60s both in industry with Toyota Production Systems' emphasis on decreasing variation, and in health care with the adoption of review committees such as the Joint Commission on Accreditation of Healthcare Organizations.[1] Multiple models for organizing quality improvement projects exist, including Lean Six Sigma's Define, Measure, Analyze, Improve, Control, and the Institute for Healthcare Improvement's Plan-Do-Study-Act (PDSA) cycles.[2-4] Models for translation and replication of projects to other environments include the Reach, Effectiveness, Adoption, Implementation, and Maintenance framework.[5] Our hospital uses the Institute for Healthcare Improvement's framework for organizing quality improvement projects, using tools such as process maps, fishbone diagrams, key driver diagrams, and Pareto charts. Regardless of which framework is chosen for a quality improvement project, the measurement of data changes is essential to establish if an intervention leads to change. In addition, quality improvement best practices focus on establishing the baseline performance of a process before formulating and implementing an intervention. By using statistical process control charts to follow key metrics over time, quality improvement teams analyze if their intervention leads to change.

A key difference between quality improvement projects and traditional research is the statistical models used to

analyze the data. Dr Deming described 2 types of studies: (1) “enumerative” studies done on a static population, and what we think of as traditional health care research; and (2) “analytic” studies done on a dynamic or real-life process tracked over time and more associated with quality improvement.[6] Traditional research statistical analysis requires a static control group to compare with an intervention group. Alternatively, quality improvement focuses on a “stream” of people/patients exposed to a process over time where a large amount of inherent variation within the system and patient population is expected. In quality improvement analysis, one does not control how many, or which type of, patients present to the process. Thus, quality improvement statistical models analyze if changes are due to random variation inherent to the process, or if they are true markers of change.

Basics of Control Charts

Dr Walter Shewhart, considered the “father of statistical quality control,” first proposed the use of control charts within the electric industry. Shewhart proposed the use of control charts to measure a process over time, and detect if an intervention led to a change in process. In collaboration with Dr Deming and Dr Joseph Juran, Shewhart created this foundation of quality improvement analysis for the manufacturing industry more than 100 years ago.[7] Medicine only recently adopted these methods.

Shewhart introduced 2 charts to assess a change in process. In all charts, the metric is plotted over time, where the x-axis is a unit of time, and the y-axis is the data value at each time point such as averaged emergency department wait time each week (x-axis: week, y-axis: average emergency department wait time). The first type of chart is a “run chart” in which the data points (ideally a minimum of 15 points) are plotted with a line connecting the points sequentially and a horizontal line at the median (Figure 1A). Run charts can show trends or shifts, but analysis of run charts is limited because they can miss significant process changes, and they are unreliable in assessing the capability of the process or predicting the future.[8]

Shewhart thus proposed applying statistical methods to produce the second type of chart, a “control chart.” Control charts similarly plot increments of time on the x-axis, with the key quality metric being measured on the y-axis, but they also include upper and lower control limits and a center line. Shewhart noted that all processes have natural variation, and the distribution of this natural variation will follow the distribution of a traditional bell-shaped curve. For example, in the course of a week, the emergency department average wait time will vary from day to day, but will predictably fall in a specific range more than 95% of the time. In a normal bell-shaped distribution curve, the center line is the median, mean, and mode, and approximately 68% of the data points are within ±1 SD, approximately 95% of the data points are within ±2 SDs, and 99.7% of the data points are within ±3 SDs of the center line. A control chart defines the upper control limit as +3 SDs above the mean/center line, and the lower control limit as –3 SDs below the mean/center line (Figure 2). Returning to the emergency department wait time example, when the emergency department average wait time is plotted over time, 99.7% of the time the wait time will be between the upper control limit and lower control limit (Figure 1B). However, special factors (eg, a national pandemic such as coronavirus disease [COVID-19]) may cause the average emergency department wait time to be outside the range of the calculated upper and lower control limits. Shewhart created multiple types of control charts to account for several different types of variables.

How to Choose the Appropriate Control Chart

When selecting the appropriate Shewhart chart for process analysis, the quality improvement team must consider both the kind of data being analyzed and the distribution (spread around the center point) of the data (Figure 3). Data is first classified as either “attribute” (frequency of event, ex: percentage of time ED length of stay is less than three hours) or “continuous” (measurement on a scale, ex: they daily average ED length of stay in minutes).

For attribute data, where we are classifying (yes/no), we see binominal distribution as a percentage and use the “p-

chart." Where we count/rate the proportion of the events, we see Poisson distribution and select either the "c-chart" (fixed opportunity) or the "u-chart" (variable opportunity).

For continuous data, we see binominal distribution, and with a sub-group size of 1, we may use the ImR chart; or with a sub-group 8 to 10, the Xbar &S chart. Algebraic formulas for manual computation are available in many standard quality improvement texts and robust statistical tools such as Minitab (Minitab, LLC); or Microsoft Excel (Microsoft Corporation) add-ons such as QI Macros (KnowWare International, Inc) are available to automate the calculations for the various charts' center lines and upper/lower control limits ([Table]).

Common or Special Cause Variation?

Once the data is plotted using a control chart, the team must look at the variation within the data. Variation can be visualized in the movement of the data points around the center line. Some variation is expected or predictable. Examples of expected variation include hospital census from weekday to weekend (larger hospital census on weekdays), or emergency department wait times over a 24-hour period (longer wait times at 4 pm than at 4 am). This type of variation is called "Common Cause Variation" because it is inherent within the system, and therefore affects everyone working on the process and all outcomes of the process.[13] If a process only exhibits "common cause," the process is stable and in a state of statistical control. Common cause variation can generally be identified on a statistical process control chart by data points between the upper and lower control limits without an identifiable pattern.

Variation that is irregular or unpredictable is called "Special Cause Variation." Special cause variation demonstrates an unstable system that results from causes not inherent to the system, may not affect everyone working on the process, and generally arise from special circumstances.[13] Examples of this include changes in emergency department daily census volumes owing to COVID-19, or laboratory turnaround times when a machine is broken. Importantly, special cause variation may arise from interventions in PDSA cycles implemented in quality improvement projects. Special cause variation can be identified on a statistical process control chart by data points outside the upper or lower control limits, or points with an identifiable pattern. Quality improvement teams look for special cause variation associated with interventions to evaluate if these interventions are changing the system.

A key to maintaining valid statistical methods in quality improvement analysis is to first establish a baseline, and use it to establish the control chart center line and upper and lower control limits. If the baseline period shows that the process is in control, that is, only common cause variation is evident, and no instances of special cause variation exist, the quality improvement team can then implement an intervention. However, if a quality improvement team plots a control chart, and sees that there are multiple cases of special cause variation, then the team must standardize the process or define the data before implementing any interventions. If a quality improvement team implements their intervention on an unstable process, identification of a special cause variation may be falsely attributed to an intervention, leading the team to inappropriately assume that the intervention created the change.

Application of Nelson Rules to Control Charts

After creating a control chart, the team determines whether the process demonstrates common cause variation or special cause variation. Eight rules assess for special cause; the initial 4 were postulated by Western Electric in the 1950s, and then were later updated by Lloyd S. Nelson in 1984.[16] The special cause rules are as described in [Figure 4]. Once a sign of a special cause manifests itself, this indicates a shift in the process, and the quality improvement team should recalculate a new mean and new control limits ([Figure 1]B). The most frequently used rule to validate a center line shift is when nine consecutive points above or below the mean are noted on the control chart.

In some cases, a change in data immediately follows a quality improvement team's PDSA intervention. In other cases, a change may lag behind the intervention, or no change may be seen at all after an intervention. Assessing

the data over time allows the quality improvement team to determine if a center line shift has occurred in relation to an intervention. Then the quality improvement team can assert that their interventions led to a meaningful change (Figure 5).

Why Cannot We Just Compare Data From Before and After an Intervention?

Most researchers are accustomed to working with defined populations. Often this is 2 groups—a control group and an intervention group—or alternatively 1 group that is evaluated before and after an intervention. Familiarity with this way of evaluating the effects of an intervention often leads to quality improvement teams using the same evaluative methods to assess the effects of an intervention applied to an ongoing process. However, this is a fatal mistake because combining all the data from before the intervention and combining all the data from after the intervention introduces a time break in the data that may or may not be correlated with when the data changed. The goal with quality improvement is not to see if the data are different after the intervention; it is to see if the data are different because of the intervention. The only way to know this is to plot the data repeatedly over time, annotate when the intervention took place, observe for when the data changed (if at all), and see if the intervention and the data change are temporally correlated.

Consider an example of an emergency department quality improvement team tasked with improving their emergency department length of stay. A new process was implemented on New Year's Day 2020. The team compared the average and SD of the emergency department length of stay for the last 6 months of 2019 and the first 6 months of 2020, and indeed there was a statistically significant difference. Does this mean that the intervention was responsible for the change? It is quite possible that the length of stay had a sudden and stable improvement 2 months before the intervention, or 2 months after the intervention. Or, alternatively, did the emergency department length of stay improvement in 2020 result from the overall decrease in emergency department volumes seen at many places in the US in March and April because of COVID-19? There would be no way to see this external cause if the data from 2019 and 2020 were grouped into annual statistics. By plotting the data on a statistical process control chart, the quality improvement team would see a significant change starting in March 2020—2 months after the intervention—that caused a noticeable change in the data, that is, COVID-19. Thus, the improvement cannot be attributed to the intervention implemented in January 2020.

Unfortunately, while some authors may appropriately plot data over time, it is not accurate to force a break in their data sets for statistical analysis at the time of the intervention. Consider the scenario presented in Figure 5 where 20 weeks of average wait time is plotted on an SPC x-bar chart and the team enacted an intervention at the end of week 10. For all three panels a traditional statistical test (t-test) comparing the 1st ten weeks to the 2nd ten weeks would give a Pvalue of Figure 5A, the change occurs directly after the intervention in week 10 suggesting a cause and effect relationship, and the QI team would correctly conclude their intervention lead to the change. However, in Figure 5B wait times begin shifting in week 8, 2 weeks prior to the intervention and indicating change was occurring prior to the intervention. Therefore, the QI team should conclude that another factor besides the intervention lead to the change. Alternatively, in Figure 5C, the shift in wait times occurs after week 12, 2 weeks after the intervention, indicating that unless the QI team can account for the lag, ie. provider hesitancy in adoption of new protocol, the intervention did not directly lead to the change. Thus, without analysis through SPC charting and Nelson's rules, cause and effect conclusions cannot be made. So while data cumulative analysis of data before and after an intervention may create an illusion that the data changed concurrently with the intervention, the only way to make the correct correlation is to plot the data over time, and create a new data phase only when a Nelson rule[16] is met.

Implications for Emergency Nursing Practice

In the emergency department, nurses and nurse managers are integral to quality improvement projects. From this

article, nurses and nurse managers will learn how to improve their ability to read and understand control charts, and their ability to assess for change in a process due to an intervention from accurate interpretation of the statistical process control charts. Ample opportunities for quality improvement projects exist in the emergency department, and through understanding of quality improvement statistical process control analysis, emergency nurses can act as leaders in process changes.

Conclusions

Ultimately, emergency nurses working at the bedside play vital roles on emergency department quality improvement teams. Knowledge of quality improvement methodology allows emergency nurses to contribute as leaders on quality improvement teams. Using data and quality improvement statistical methods helps teams better understand the effect that interventions have on the process. Only after establishing a baseline and plotting the data over time on the appropriate statistical process control chart can a quality improvement team assess for a special cause variation or a center line shift. Statistical process control charts show special cause temporally related to an intervention more accurately than before-and-after studies by allowing the quality improvement team to demonstrate clear cause and effect from their planned changes. This fundamental understanding of statistical process control charting allows the emergency nurse to lead quality improvement teams and implement effective quality improvement projects.

Acknowledgments

Doug MacDowell, BA, Division of Emergency Medicine, Nationwide Children's Hospital, Columbus, OH, for assistance with reference management and formatting.

Author Disclosures

The authors' academic support is funded from internal funding from Nationwide Children's Hospital and the Department of Pediatrics at The Ohio State University, Columbus, OH.

Conflicts of interest: none to report.

Learning level	Published resources
Basic	Carey RG, Lloyd RC. Measuring Quality Improvement in Healthcare: A Guide to Statistical Process Control Applications. 1st ed. American Society of Quality Press; 2001.
Arthur J. Lean Six Sigma for Hospitals: Improving Patient Safety, Patient Flow and the Bottom Line. 2nd ed. McGraw-Hill Education; 2016.	Arthur J. Breakthrough Improvement with QI Macros and Excel: Finding the Invisible Low-Hanging Fruit. 1st ed. McGraw-Hill Education; 2014.
Intermediate	Carey RG, Staker LV. Improving Healthcare with Control Charts: Basic and Advanced SPC Methods and Case Studies. ASQ Quality Press; 2002.

Langley GJ, Nolan TW, Provost LP, Norman CL, Moen RD, Nolan KM. The Improvement Guide: A Practical Approach to Enhancing Organizational Performance. 2nd ed. Jossey-Bass; 2009.	Advanced
Provost LP, Murray SK. The Health Care Data Guide: Learning from Data for Improvement. Jossey-Bass; 2011.	Sollecito WA, Johnson JK. McLaughlin &Kaluzny's Continuous Quality Improvement in Health Care. 5th ed. Jones &Bartlett Learning; 2018.

DETAILS

Subject:	Emergency medical care; Quality management; Nurse managers; Teams; Electric industries; Health care; Process engineering; Intervention; Control charts; Process controls; Hospitals; Nurses; Health care industry; Diagrams; Coronaviruses; Translation; Quality control; COVID-19; Quality of care; Emergency services; Quality improvement; Professional practice
Business indexing term:	Subject: Electric industries Control charts Process controls Quality improvement
Identifier / keyword:	Quality improvement methodology; Statistical process control charts; Quality improvement analysis; Nelson rules
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	198-205
Publication year:	2021
Publication date:	Jan 2021
Section:	Understanding Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966

Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.09.002
ProQuest document ID:	2487205918
Document URL:	https://www.proquest.com/scholarly-journals/scientific-approach-assess-if-change-led/docview/2487205918/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-06-21
Database:	Public Health Database

Editorial Board: JEN

ProQuest document link

FULL TEXT

TVM:UNDEFINED

DETAILS

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
First page:	A7
Publication year:	2021
Publication date:	Jan 2021
Publisher:	Elsevier Limited
Place of publication:	Philadelphia

Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	General Information
DOI:	https://doi.org/10.1016/S0099-1767(20)30390-1
ProQuest document ID:	2487205916
Document URL:	https://www.proquest.com/scholarly-journals/editorial-board/docview/2487205916/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Jan 2021
Last updated:	2021-02-14
Database:	Public Health Database

Evaluation of a Nurse Pediatric Emergency Care Coordinator–Facilitated Program on Pediatric Readiness and Process of Care in Community Emergency Departments After Collaboration With a Pediatric Academic Medical Center: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Key implications for emergency nursing practice found in this article are the central role of a nurse pediatric emergency care coordinator in pediatric emergency readiness improvement and the potential role of simulation-based collaborative initiatives between community emergency departments and a pediatric academic medical center in optimizing pediatric readiness efforts. 3 In response to this report, key stakeholders—including the American Academy of Pediatrics, the American College of Emergency Physicians, and the Emergency Nurses Association—developed Joint Policy Statement Guidelines (JPSG) for the emergency care of children.4-6

Compliance with these guidelines forms the basis for the term “pediatric emergency readiness.” In 2013, the 3 stakeholder groups, along with the federal Emergency Medical Services for Children program, formed a coalition called the National Pediatric Readiness Project as a multiphase quality initiative to ensure that all emergency departments have the essential resources and guidelines to provide high-quality care to pediatric patients.5 In the first phase, the pediatric readiness survey was conducted across 4,137 US emergency departments and noted a median 69/100 weighted pediatric readiness score (WPRS), which helped to identify gaps and disparities in the WPRS among emergency departments where lower-volume emergency departments had lower WPRS than higher-volume emergency departments.5 The main gaps included but were not limited to deficiencies in the presence of pediatric emergency care coordinators (PECCs) and in the development of a quality improvement plan and pediatric patient safety and disaster plans. Emergency departments with lower WPRS were less likely to comply with evidence-based treatment guidelines for high-acuity conditions, including cardiac arrest,7 sepsis,8 and seizure.9,10 Recently, a few studies reported on the disparities in health outcomes where presentation to an emergency department with lower WPRS was associated with an increased risk of death for children with critical illness, making efforts to improve pediatric readiness in emergency departments more necessary.11,12 In previous reports, the most common reasons for low WPRS were the lack of implementation of ED policies dedicated to children and the absence of a PECC.5 A nurse PECC is defined as a registered nurse who possesses special interest, knowledge, and skill in the emergency nursing care of children through clinical experience and has demonstrated competence in critical thinking and clinical skills.

FULL TEXT

Contribution to Emergency Nursing Practice

••A majority of acutely ill children are seen in community emergency departments that have lower weighted pediatric readiness scores than those of pediatric emergency departments; therefore, readiness improvement initiatives are needed.

••The main finding of this work is the improvement in weighted pediatric readiness scores and the process of care in a set of community emergency departments after collaboration with a pediatric academic medical center.

••Key implications for emergency nursing practice found in this article are the central role of a nurse pediatric emergency care coordinator in pediatric emergency readiness improvement and the potential role of simulation-based collaborative initiatives between community emergency departments and a pediatric academic medical center in optimizing pediatric readiness efforts.

Introduction

Each year, more than 30 million ill and injured children are cared for in 5,000 emergency departments in the United States, of which most children access care in 1 of 4,500 community emergency departments (CEDs) that are not solely prepared to care for children.[1,2] These CEDs vary in terms of the total volume of pediatric patients where many of them care for fewer than 5 children a day. In 2006, the Institute of Medicine described pediatric emergency care in the US as “uneven.”[3] In response to this report, key stakeholders—including the American Academy of Pediatrics, the American College of Emergency Physicians, and the Emergency Nurses Association—developed Joint Policy Statement Guidelines (JPSG) for the emergency care of children.[4-6] Compliance with these guidelines forms the basis for the term “pediatric emergency readiness.”

In 2013, the 3 stakeholder groups, along with the federal Emergency Medical Services for Children program, formed a coalition called the National Pediatric Readiness Project as a multiphase quality initiative to ensure that all emergency departments have the essential resources and guidelines to provide high-quality care to pediatric patients.[5] In the first phase, the pediatric readiness survey was conducted across 4,137 US emergency departments

and noted a median 69/100 weighted pediatric readiness score (WPRS), which helped to identify gaps and disparities in the WPRS among emergency departments where lower-volume emergency departments had lower WPRS than higher-volume emergency departments.[5] The main gaps included but were not limited to deficiencies in the presence of pediatric emergency care coordinators (PECCs) and in the development of a quality improvement plan and pediatric patient safety and disaster plans.

These disparities in pediatric readiness have reflected on the quality of care provided in both simulated and clinical settings. Emergency departments with lower WPRS were less likely to comply with evidence-based treatment guidelines for high-acuity conditions, including cardiac arrest,[7] sepsis,[8] and seizure.[9,10] Recently, a few studies reported on the disparities in health outcomes where presentation to an emergency department with lower WPRS was associated with an increased risk of death for children with critical illness, making efforts to improve pediatric readiness in emergency departments more necessary.[11,12]

In previous reports, the most common reasons for low WPRS were the lack of implementation of ED policies dedicated to children and the absence of a PECC.[5] A nurse PECC is defined as a registered nurse who possesses special interest, knowledge, and skill in the emergency nursing care of children through clinical experience and has demonstrated competence in critical thinking and clinical skills. These nurse PECCs would work collaboratively with physician PECCs to promote the preparedness of their emergency department to care for children.[5,6] Despite the JPSG statement that all emergency departments should designate a PECC,[6] only 59% of the emergency departments had a nurse PECC, and 48% had a physician PECC.[5] Furthermore, the updated JPSG highlights the importance of collaboration between CEDs, their designated PECC, and pediatric academic medical centers (AMCs) to enhance pediatric emergency readiness to ensure optimal health outcomes for all children in the US.[13] To achieve this goal, AMCs need to expand their network to support community hospitals and maintain a continuum of care initiated in the CED.

We previously reported a collaborative improvement program between a state pediatric AMC and a spectrum of CEDs to improve pediatric emergency readiness.[14] Our initial iteration included a baseline assessment of the WPRS and in situ simulation–based measurement of the process of care that was followed by a standardized “assessment report” as a guide for improvement. In each CED, a pediatric champion (a physician or nurse) worked independently to accomplish local improvement. These champions functioned as nurse PECCs and were supported by the AMC and provided with the necessary resources and materials, but they worked voluntarily and were not formally designated as PECCs in their CEDs; nor did they have regular interactions with the AMC team. Despite the 15% improvement in the WPRS, wide variations were noted in improvement because some champions did not complete their assigned items, given the lack of a prescribed intervention with the study team and limited access to improvement resources. This has highlighted recurrent deficiencies and themes in the process of care provided, such as failure to rapidly establish intraosseous (IO) access or appropriate weight-based volume fluid resuscitation in the context of a pediatric patient presenting with shock. The deficiencies identified during our WPRS assessment were system gaps that had a strong potential to be associated with poor outcomes if performed in an actual clinical setting and provided strong targeted action items for our next iterative intervention.

The objective of the current study was to update and evaluate the effectiveness of our established WPRS model and the process of care across a set of new CEDs. We hypothesize that a collaborative program between a pediatric AMC and CEDs and designating a nurse PECC in each CED will (1) improve the structure of care as measured by the WPRS and (2) improve the process of care provided in these CEDs by completing these targeted action items.

Methods Study Design

We conducted a prospective pre- and postinterventional study using in situ simulation to evaluate our updated

collaborative model in improving the WPRS and the process of care across a set CEDs. Process of care, defined as an evidence-based action or intervention performed during the delivery of patient care, was assessed in a simulated setting in the participating CEDs. The project was exempted from review by the Indiana University as the pediatric AMC for this work.

Instrument

The WPRS was developed as a 55-question Web-based assessment (http://www.pedsready.org) on the basis of certain sections of the 2009 guidelines by a subpanel of experts from the national steering committee who developed the weighting criteria. Piloting and further weighting of the assessment items were conducted in California, given its diverse patient population. On the basis of the results of the study by the subpanel of experts and the results of the California Pediatric Readiness Project, 24 of the questions were weighted in the national assessment to generate an overall WPRS for each hospital. The WPRS was then normalized to a 100-point scale, where a higher score equals higher pediatric readiness. In 2013, the most comprehensive evaluation of pediatric readiness of US emergency departments revealed that low-volume emergency departments had a median WPRS of 61.4 points (interquartile range [IQR], 49.5-73.6); medium-volume emergency departments, 69.3 points (IQR, 57.9-81.8); medium- to high-volume emergency departments, 74.8 points (IQR, 60.9-87.9); and high-volume emergency departments, 89.8 points (IQR, 74.7-97.2). In addition, it showed an improvement in the median WPRS from the reported 55 points in 2003 to 68.9 points in 2013.[5]

Study Setting and Population

The participating sites were 8 CEDs in the state of Indiana. These medium-volume CEDs (1,800 to 4,999 annual pediatric patients) were chosen on the basis of their geographic location and historical transfer of patients to our academic center. In addition, they represent a set of CEDs that are not affiliated with our AMC or from our previously reported collaborative projects. All site visits were scheduled in coordination with each hospital's ED director and/or manager, who served as a point person for their site. Staff were recruited to participate in the simulation sessions by the study coordinators through this point person. The participating CEDs agreed to identify a nurse PECC to serve as the site contact and to coordinate all phases of the intervention with the AMC team. Each CED signed a letter of agreement, which outlined the program's mission/vision and set expectations before enrollment.

Study Protocol

Our project was conducted over 12 months. The project consisted of 3 phases: (1) baseline on-site assessment, (2) pediatric readiness interventions, and (3) postintervention assessment.

A logic model of this program is provided in Figure 1. The study timeline is shown in Figure 2.

Baseline On-Site Assessment

The baseline on-site assessment consisted of the following:

On-site weighted pediatric readiness score assessment

The WPRS consists of 6 domains outlined in the National Pediatric Readiness Project: (1) administration and coordination of care; (2) competencies for providers; (3) quality improvement; (4) patient and medications safety; (5) policies/procedures; and (6) equipment, supplies, and medications.[5] During the baseline assessment visit, an in-person WPRS was completed for each CED by the study facilitator, a registered nurse content expert in pediatric emergency care, simulation, and quality improvement from the pediatric AMC. All items in the WPRS were verified during an in-person discussion with the CED manager or director at each site. This visit involved directly examining all the scored items on the checklist across the 6 domains (locating each piece of equipment, reviewing policies/guidelines in paper or electronic form, and reviewing staffing).

In situ simulation–based assessment

A multiprofessional team of educators and experts in pediatric critical care medicine, pediatric emergency medicine, and pediatric critical care transport from the pediatric AMC previously formed an educator team named Pediatric Community Outreach Mobile Education. The educator team conducted baseline in situ simulation sessions.
CED participant teams were composed of 5 to 6 health care providers, including emergency medicine physicians, nurses, respiratory therapists, and other members. The participants were protected from any clinical responsibilities during the simulations and debriefings. Each team participated in a 3-hour in situ simulation session that included a 10-day-old neonate with critical coarctation of the aorta, a 6-year-old child presenting with status epilepticus, and a 6-month-old infant presenting with a nonaccidental head injury. All sessions were conducted in the actual CED resuscitation bay using its existing resources. Each session began with a standardized orientation, including an introduction to the team, the mission of the project, and the day's agenda. The participants were oriented to the functionality of the high-fidelity simulators (SimJunior and SimBaby, Laerdal Medical). Laboratory data were provided on preprinted laminated cards on request, including standard point-of-care testing and relevant radiographs. After each simulation, the educators scored all the teams using critical action checklists (Figure 3). Content validation of the simulation checklists was obtained using an approach similar to the one used in our previously published work.[14] All simulation materials are provided in Supplementary Appendix 1.

Pediatric Readiness Interventions

This was conducted over 6 to 8 months and involved 3 phases: (1) Customized performance report, (2) PECC-facilitated WPRS interventions, and (3) action item completion.

Customized performance report

Within 2 weeks after the baseline assessment conducted by the study team, each CED site designated a registered nurse PECC to execute selected recommendations from the JPSG list.[13] The designated PECC at each CED received a customized report that included a summary of its WPRS and simulation performance data in comparison with other CEDs and a description of the prescribed interventions and the action item(s) that the PECC would implement over the subsequent 6 months. Each CED had its customized report to address its score and guide its improvement efforts throughout the project. Each PECC, CED medical director, and the study facilitator reviewed this performance report within 2 weeks of the baseline assessment and selected 1 action item for improvement. An example of the customized performance report is provided in Supplementary Appendix 2.

Pediatric emergency care coordinators-facilitated weighted pediatric readiness score interventions

On designation of a nurse PECC at each participating CED, an average of 2 hours per week was dedicated to each PECC to this role, during which each PECC worked to achieve improvement in at least 1 of the 6 total domains. The PECCs had access to the needed resources and a detailed schedule of standardized bimonthly check-ins with the study facilitator throughout the 6-month intervention. During these check-ins, the PECCs reviewed achievements of the progress made in the WPRS and the plan for the next 2 months and were provided with any additional resources as needed. All PECCs were also encouraged to reach out to the study facilitator outside the "check-in" if needed. Examples of the PECCs' activities are described in the Supplementary Appendix 3.

Action item completion

We had compiled a list of action items for improvement in the CEDs on the basis of our existing program. This led to the development of specific, measurable, achievable, relevant, and time-sensitive (SMART) aims that linked the WPRS to the process of care as observed during the simulated sessions. Each SMART aim included resources and a timeline for completion of the individual action item by the designated PECC. The execution of aims was conducted in a simulated setting and facilitated by each site PECC. Every 2 months, each PECC and study facilitator interacted to review the progress of the selected action item. These interactions addressed any issues

affecting the successful completion of the action item and ensured provision of the needed resources. Action items were considered completed on the basis of the SMART aim of each action as demonstrated in Supplementary Appendix 4.

Examples of these SMART aims were as follows:

Rapid fluid resuscitation using a push/pull technique: to increase the percentage of staff who could demonstrate delivery of 40 cc/kg to 60 cc/kg in less than 10 minutes using push/pull by 25% within 6 months.

IO access training: to increase the percentage of staff who could demonstrate competency in pediatric IO placement by an additional 25% within 6 months.

Weight-based dosing for resuscitation: to increase the percentage of staff who could demonstrate correct weight on the basis of dosing calculations in under 2 minutes for resuscitation medications using local resources/guidelines/tools by an additional 25% within 6 months.

Pediatric basic life support training: to increase the percentage of staff who could demonstrate greater than 75% basic life support–quality score in the emergency department using local equipment/guidelines by an additional 25% within 6 months.

All action items and resources were compiled on the collaborative website and made available to the participating PECCs (https://www.impactscollaborative.com/resources). An example of a SMART action item is provided in Supplementary Appendix 5.

Postintervention Assessment

Six months after the baseline assessment, the study facilitator conducted a follow-up assessment of the WPRS and the completion of the SMART aims. An on-site WPRS follow-up assessment was conducted using the same methodology used in the baseline visits. In addition, the completion of the assigned SMART aims was measured in each CED.

Measures Weighted Pediatric Readiness Scores

The WPRS was measured in person using the surveys twice: once during the baseline visits and then again during the follow-up visits with an interval of 6 months between the 2 measurements.

Simulation-Based Performance

The performances of the CED teams based on the simulated scenarios checklists were calculated by adding the number of correct items in each checklist. The performance was scored in real time on the basis of the number of items performed correctly, with the use of individual checklists for each scenario by 2 separate instructors who scored each checklist independently, and then the scores were discussed among these individuals until a consensus was reached. Each case performance score was calculated using equal weighting for all subcomponents and dividing by the total number of possible elements to derive a score on a scale of 0 to 100.

Action Items

The completion of each action item was measured on the basis of the SMART aim; the item was considered complete after the measurable evidence as described in the study protocol. The completion status of these action items was determined by direct reporting from each PECC from the participating CEDs.

Surveys of Participating Pediatric Emergency Care Coordinators

To understand the perception of PECCs regarding the value of the overall collaborative program and the potential barriers or facilitators that have contributed to the WPRS improvement, we surveyed these PECCs using a 5-question survey that used a 5-point Likert scale (eg, 5 = “strongly agree” and 1 = “strongly disagree”), followed by the comments section. The comments section was used to encourage the PECC to provide a detailed description of the potential facilitators/barriers from the PECC’s perspective. These forms were filled and collected on the same day the follow-up WPRS was measured.

Statistical Analysis

A Microsoft Excel version 14.0 (Microsoft Corporation) spreadsheet was created for all data entry (WPRS and simulation-based performance). All analytic assumptions were verified, and all analyses were performed using SAS version 9.4 (SAS Institute Inc). Basic descriptive statistics were given as frequencies (percentages) for categorical variables and medians (IQR) for continuous variables. Values are given as means (SD) and medians (IQR). Changes in domain scores were analyzed using the Wilcoxon signed-rank nonparametric test to account for the paired aspect of the data; owing to many of the domains having results that were nonlinear, they could not be transformed into linearity.

Results Weighted Pediatric Readiness Scores

Sixteen interprofessional teams from 8 medium–pediatric-volume CEDs participated in this study (Table 1). The average time between the initial and follow-up assessments across all CEDs was 6 months. The WPRS significantly improved by 16.7 points from the initial assessment (mean [SD] 53.82 [5.12]) to the follow-up assessment (mean [SD] 70.52 [4.25]). Significant improvement was noted in the administration and coordination of care by 8.25 points (out of a total of 19 points; $P = 0.008$); competencies for providers by 3.75 points (out of a total of 10 points; $P = 0.016$); patient and medication safety by 2.64 points (out of a total of 14 points; $P = 0.004$); and equipment, supplies, and medications by 1.42 points (out of a total of 33 points; $P = 0.004$). Detailed results of the improvements in each WPRS domain are presented in Table 2.

Simulation-Based Performance

A total of 16 interprofessional teams (80 providers) participated in the simulation sessions. Of the 80 providers, 15 (18.5%) were general emergency physicians, 54 (67.7%) were registered nurses, 3 (3.7%) were respiratory therapists, and 8 (10%) were other ancillary staff. The total performance scores were 57% for nonaccidental head injury, 82% for status epilepticus, and 80% for coarctation of the aorta. None of the participating teams had 100% adherence scores for any of the scenarios. Table 3 shows the detailed simulation performance scores and checklists.

Action Items

Among all the action items, 4 were completed by 8 CEDs ([1] rapid fluid resuscitation using a push/pull technique, [2] IO access training, [3] weight-based dosing for resuscitation, and [4] pediatric basic life support training). The assigned PECC in each CED was the main facilitator for its ED action item. A total of 50% of these action items were completed within the 6-month intervention period, whereas 50% extended beyond the intervention period. Table 4 summarizes all action items and their related WPRS domains.

Surveys of ED Site Pediatric Emergency Care Coordinators

The PECCs from all participating CEDs completed the survey (Supplementary Appendix 5). The survey revealed a high degree of agreement with all the components of the survey, with 96% of the survey items receiving a “strongly agree” response. In particular, all PECCs chose the in situ simulation as the most helpful component. The comments section revealed the following themes: “This program is tremendous and is a great help and source to nonpediatrics hospitals”; “Collaborative has helped boosting the pediatric care in our ED”; “It has provided us with education/resources/tools to continue to improve our pediatric acute care”; and “We would appreciate any onsite simulations you offer or extra resources to help prepare our staff for the pediatric population.”

Discussion

Disparities in pediatric emergency readiness, the process of care, and subsequent patient outcomes exist in emergency departments across the US.[5,10,12,13,15] Efforts to address these disparities might include local and state collaborations designed to provide resources, educational materials, pediatric policies and guidelines, and appointment of PECCs.[14,16-19] A majority of the prior initiatives between pediatric AMCs and CEDs to enhance

pediatric emergency readiness have mainly focused on improving the WPRS. These initiatives did not assess the transfer of WPRS improvement to the process of care and were limited by the lack of measures of actionable item improvement, making the impact of their WPRS improvement on the process of care undetermined.

In this report, we describe a collaborative improvement program between the state pediatric AMC and a set of CEDs that resulted in significant improvement in pediatric readiness after the designation of a formal nurse PECC in the participating CEDs. A marked improvement was noted in the domains of administration and coordination of care; competencies for providers; patient and medication safety; and equipment, supplies, and medications. Furthermore, the PECC-facilitated improvement in the WPRS was associated with improvements in the process of care in the simulated setting as demonstrated by the completion of the action items in the participating CEDs. Our findings mirror the national guidelines that endorse the central role of a PECC in ensuring day-to-day pediatric preparedness and promoting the quality of pediatric emergency care.[6]

In this study, all participating CEDs agreed to designate a nurse PECC during the intervention period, which catalyzed the improvement not only in the WPRS, but subsequently in the execution of action items revealed during the simulation-based assessment. The PECCs were nurses who had special interest, knowledge, and skillset in the emergency care of children and served as champions in their emergency departments. This central component of our intervention allowed the designated PECCs to potentiate their roles through a formal agreement with their ED administrative entity. Furthermore, in collaboration with their CED leadership, the PECCs were successful in transforming baseline data into actionable items, which was demonstrated by the completion of the action items among the 8 participating CEDs. For example, the PECCs were in charge of promoting rapid fluid resuscitation using push/pull technique and IO access training skills among CED providers through educational sessions and pediatric mock-codes to ensure provider competency. This resulted in a marked improvement in the second domain of the WPRS (competencies for providers) that reflected the completion of all 4 action items throughout the study as highlighted in [Table 4]. Another example included PECCs ensuring that equipment and supplies (IO, push/pull set-up, and chest compression backboard during basic life support training) were readily available and systematically organized and restocked for the training to be conducted. This led to a marked improvement in the sixth domain (equipment, supplies, and medications), which had a positive impact on the successful completion of 3 of the relevant action items. These findings are aligned with the most recent published guidelines that recognized that the presence of a PECC is strongly correlated with improved pediatric readiness, independent from other hospital factors.[5]

In this study, the in situ simulation provided a robust tool for the assessment of the care provided in these CEDs and formed a foundation for the development of customized action plans. In situ simulation, defined as a simulation that takes place “in the actual patient care setting,” can promote a high level of fidelity and realism that allows CED teams to apply their knowledge using their equipment in real clinical surroundings.[20-24] For example, the simulated coarctation case revealed that only 31% of the teams obtained blood pressure in a neonate owing to a lack of appropriate neonatal-size blood pressure cuffs, which is part of the equipment and supplies domain of the WPRS. Similarly, in the simulated status epilepticus, only 52% of the teams used benzodiazepines appropriately, whereas only 6% of the teams in the nonaccidental head injury case applied the appropriate-size cervical collar, which provided a strong argument to the CED leadership to ensure that adequate attention is paid to the provider competency and availability of equipment domains of the WPRS. Our use of in situ simulation as an investigative methodology is aligned with the literature report in acute care settings.[8,23,25-27]

A unique component of our study was the customized performance report and the scheduled check-ins. This report, derived by simulation-based data combined with pediatric readiness assessment, provided a snapshot of each

CED's performance in simulation and its WPRS, and a direct comparison with the other participating CEDs. In addition, this report was a supportive tool for the PECCs to engage the CED leadership in addressing their readiness score and it empowered them in executing the action item to promote pediatric care. The bimonthly check-ins with the study facilitator to guide the improvement process and provide resources and material served as a "platform" to create a sustainable partnership and maintain ongoing communication between the CEDs and the study team. This component likely augmented the improvement efforts in each CED, which was demonstrated by a significant increase in the follow-up WPRS compared with the initial score.

When the PECCs were surveyed, they expressed that all components of the collaborative program were valuable in the improvement process; however, the in situ simulation team was cited as the most important component of the program for their CEDs. Outreach simulation programs conducted by a pediatric AMC for their community partners have been described in the literature and been demonstrated to be a promising approach to address the disparity in care.[19,28-30] This highlights the importance of collaboration between children's hospitals and the resources inherent therein and local and regional CEDs to facilitate readiness improvement and advance the quality of care provided to pediatric patients as emphasized by the published guidelines.[6] Interestingly, in this study, 50% of these action items were completed within the 6-month intervention period, whereas 50% extended beyond the intervention period. This likely represents variances between CEDs' capabilities and resources to engage in pediatric readiness initiatives, and highlights the need for flexibility when engaging CEDs in these initiatives.

Limitations

Our study has a few limitations. First, it is a small study limited to 8 medium-size CEDs out of more than 100 CEDs statewide, making our findings less generalizable to other CEDs. However, with the marked improvement in many WPRS domains, our study sample gave us adequate power to detect a significant change in future studies. Second, despite the successful completion of action items in all participating CEDs, we did not obtain explicit details of the process used by the designated PECCs to complete these action items. Instead, each PECC was empowered to serve as a pediatric champion and provided with support from the pediatric AMC. Third, it is unclear if the improvement in the WPRS and the completion of action items would be associated with improvement in the quality of clinical care and/or patient outcomes in these CEDs. However, recent findings have associated improvement in the WPRS with improved patient outcomes.[11,12] We hope to improve patient care by increasing pediatric emergency readiness and addressing certain gaps in the process of care that can prove transferable and sustainable. Furthermore, it is not clear whether this improvement will be sustained beyond the study period. To mitigate that, the study team facilitator will continue to follow up with these sites periodically. Another limitation is that the PECC surveys were collected on the same day that the follow-up WPRS was measured by the study facilitator, which could have introduced some reporting bias. In addition, overall buy-in from the CED leadership and other staff to participate in the education sessions varied among sites, which added an additional challenge to the study team during recruitment. Our model may not be generalizable to other pediatric AMCs with limited resources or capability to establish this collaboration with their CEDs. Finally, all participating CEDs agreed to designate a nurse PECC who used an average of 2 hours per week working through this improvement study. Allocating these resources may not be feasible for other CEDs with limited staffing. However, our main purpose was to identify nurse PECCs and have their roles shared with their other administrative duties through a formal agreement with their leadership within their hospital system rather than creating a whole new position.

Our future work will focus on describing the impact of our intervention on the outcomes of patients presenting to CEDs. We are currently evaluating the impact of these interventions on the quality of clinical care provided in these CEDs and correlating the findings noted in the simulated setting to potential improvements in the clinical setting.

Conclusion

A collaborative improvement program between pediatric AMCs and CEDs facilitated by nurse PECCs is associated with an improvement in pediatric readiness and the process of simulated care. This model of collaboration can serve as a platform to enhance pediatric emergency readiness at CEDs and potentially link these improvements to downstream clinical care and patient outcomes.

Author Disclosures

This study was funded by an Indiana University Health Values grant (VFE-342: Samer Abu-Sultaneh).

Conflicts of interest: none to report.

Acknowledgments

Special thanks to Dr Marc A. Auerbach and Mr Travis Whitfill for support and contributions to this project. The authors would like to acknowledge the contributions of members of the Improving Pediatric Acute Care Through Simulation (ImPACTS) network and members of the International Network for Simulation-Based Pediatric Innovation, Research, and Education who have helped to shape this project through sharing resources and expertise. Special thanks to James E Slaven, Department of Biostatistics, Indiana University School of Medicine.

Supplementary Data

Supplementary Appendix 1Supplementary Appendix 2Supplementary Appendix 3Supplementary Appendix 4 Supplementary Appendix 5

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.06.006.

Team characteristics	Total number (%)
Number of teams	16
Number of participants	80
Number of MDs, n (%)	15 (18.5)
Number of RNs, n (%)	54 (67.5)
Number of RTs, n (%)	3 (3.7)
Number of others, n (%)	8 (10.0)
CED characteristics	
Number of emergency departments	8
CED pediatric volume	
Medium, n (%)	8 (100)

Type of CED	
Trauma center	3 (37.5)
Affiliation with the pediatric AMC	0 (0)
Presence of pediatric inpatient unit	2 (25)
Initial PRS (PRS)	53.82 (5.12)

Variable	Initial WPRS	Follow-up WPRS	Change	P value
Mean WPRS	53.82 (5.12)	70.52 (4.25)	16.7 (2.81)	0.004
Administration and coordination of care (out of 19)	3.56 (4.60)	11.81 (4.15)	8.25 (3.12)	0.008
Competencies for providers (out of 10)	1.88 (2.42)	5.63 (1.65)	3.75 (2.17)	0.016
Quality improvement (out of 7)	0 (0)	0 (0)	0 (0)	N/A
Patient and medication safety (out of 14)	10.06 (1.16)	12.70 (0.53)	2.64 (0.77)	0.004
Policies and procedures (out of 17)	8.55 (1.81)	9.18 (1.50)	0.64 (0.82)	0.125
Equipment, supplies, and medications (out of 33)	29.78 (0.34)	31.20 (0.36)	1.42 (0.54)	0.004

Checklist items	Number of teams that performed correctly (%)
Nonaccidental trauma	
Assess airway and breathing	16 (100)
Assess circulation	10 (52)
Perform neurological assessment	9 (56)
Exposure	9 (56)

Place IV/IO	16 (100)
Send BMP to lab	10 (52)
Verbalize concerns for NAT	15 (94)
Verbalize concerns of increased ICP	11 (67)
Applying C collar	1 (6)
Verbalize the need of head CT	14 (87)
Apply neuroprotective measures	3 (18)
Use appropriate hyperosmolar agent	4 (25)
Discuss potential need of intubation	10 (52)
Notify CPS social worker	12 (75)
Apply transfer guidelines	14 (87)
Overall composite score of the 15 items	57 (53, 63)
Status epilepticus	
Verbalize respiratory depression	11 (67)
Begin supplemental oxygen	16 (100)
Perform chin lift/jaw thrust	10 (52)
Verbalize seizure onset	16 (100)
Check bedside glucose	13 (81)
Send BMP to lab	10 (52)
Place IV/IO	16 (100)
Appropriate dose of benzodiazepine	14 (87.5)
Appropriate frequency of benzodiazepine used	10 (52)
Appropriate second agent	14 (87.5)

Verbalize the need for transfer/admit	9 (56)
Overall composite score of the 11 items	82 (73, 91)
Coarctation of the aorta	
Obtain weight	16 (100)
Obtain brief history	16 (100)
Perform focused exam	6 (37.5)
Attach to monitor	16 (100)
Obtain BP in UE/LE	5 (31)
Obtain CXR	11 (69)
Obtain IV access	16 (100)
Obtain labs/septic workup	13 (81)
Administer an initial fluid bolus	8 (50)
Provide supplemental O2 for hypoxemia	16 (100)
Initiate prostin infusion with correct dose	5 (31)
Recognize apnea	16 (100)
Initiate BVM with appropriate technique	16 (100)
Verbalize the need for intubation	16 (100)
Verbalize/arrange need for transfer	9 (56)
Overall composite score of the 15 items	80 (70, 83)

CED site	Action item	Related WPRS domain	Completed within 6-month period	Completed overall

CED 1	Rapid fluid resuscitation using push/pull technique	•Providers' competency•Equipment, supplies, and medications	No	Yes
CED 2	Intraosseous access training	•Providers' competency•Equipment, supplies, and medications	Yes	N/A
CED 3	Rapid fluid resuscitation using push/pull technique	•Providers' competency•Equipment, supplies, and medications	Yes	N/A
CED 4	Weight-based dosing for resuscitation	•Providers' competency•Patient safety	No	Yes
CED 5	Rapid fluid resuscitation using push/pull technique	•Providers' competency•Equipment, supplies, and medications	No	Yes
CED 6	Improved pediatric basic life support training	•Providers' competency•Equipment, supplies, and medications	Yes	N/A
CED 7	Weight-based dosing for resuscitation	•Providers' competency•Patient safety	Yes	N/A
CED 8	Intraosseous access training	•Providers' competency•Equipment, supplies, and medications	No	Yes

DETAILS

Subject:	Emergency medical care; Quality management; Health disparities; Care coordinators; Collaboration; Coordinators; Intervention; Clinical skills; Health status; Emergency services; Quality of care; Pediatrics; Health services; Evidence-based medicine; Simulation; Stakeholders; Patient safety; Clinical outcomes; Sepsis; Nursing care; Myocardial infarction; Departments; Clinical nursing; Clinical experience; Critical thinking; Children; Convulsions &seizures; Professional practice
Location:	Indiana; United States--US; California
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	167-180
Publication year:	2021
Publication date:	Jan 2021

Section:	Leadership Section
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.06.006
ProQuest document ID:	2487205902
Document URL:	https://www.proquest.com/scholarly-journals/evaluation-nurse -pediatric-emergency-care/docview/2487205902/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-08-01
Database:	Public Health Database

The Effect of Catheter Length Placed Into the Vein on Peripheral Ultrasound-Guided Catheter Survival Time: A Prospective Observational Study: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

Establishing and maintaining peripheral intravenous access in patients with no visible or palpable veins can be arduous. Intravenous catheters placed with ultrasound do not survive as long as traditionally placed catheters. This study was performed to determine the relationship between the catheter length placed into the lumen of the vein

using ultrasound and catheter survival.

Methods

This was a nonrandomized prospective observational study of admitted patients with difficult intravenous placement in 2017. Subjects had ultrasound-guided peripheral intravenous placement in the emergency department or intensive care unit. The main outcome was the time of catheter survival. Data were analyzed using descriptive statistics and Cox regression.

Results

A total of 98 patients with an average age of 63 years were enrolled. The total number of cases examined was 97 (N = 97), of which 29 intravenous catheters were removed for catheter-related problems (events). The mean (SD) survival time for catheters placed using ultrasound was 3,445 minutes (2,414) or 2.39 days. Peripheral catheter survival was not significantly related to the in-vein length of the catheter (X2 = 0.03, *P* = 0.86) nor was it significantly related to any of the covariates.

Discussion

The survival time of ultrasound-guided intravenous access doubled in the present study from 1674 minutes in a previous 2013 study. The results may have been due to clinician expertise and experience with the peripheral ultrasound-guided method and the use of updated equipment.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current state of scientific knowledge on survival time of peripheral intravenous catheters placed using ultrasound guidance indicates that variables influencing survival times of such catheters are poorly understood.

••The main finding of this research was that neither the length of catheter placed in the vein nor the catheter gauge was associated with increased catheter survival among patients whose peripheral catheter was placed using ultrasound, and it did not support our hypothesis.

••The key implication for emergency nursing practice from this research is that attempting to insert the longest length catheter or largest gauge possible into a vein specifically to increase catheter survival time may not increase catheter survival.

Introduction

Initiating intravenous (IV) access is a crucial, but sometimes frustrating, part of patient care in emergency departments. Establishing IV access in patients with vein paucity, that is, no visible or palpable veins, can be arduous.[1] Patient and family anxiety can increase with each failed attempt, and clinical care is delayed until IV access can be established.[2] In the context of vein paucity, once IV access is established maintaining access becomes a priority.[3]

In emergency departments nationally, 20% of patients needing IV placement have characteristics that promote vein paucity and contribute to difficult IV placement.[1,2] In this patient population, when the traditional palpation technique does not result in successful IV placement, bedside ultrasound is often employed to visualize veins deep within the peripheral tissues.[1] Ultrasound allows the nurse to see the anatomy of the veins, the relationship of veins to arteries and nerves, and where the veins change in size, pattern, and length.[1] Determination of which catheter to place is based on the visualization and assessment of the size, depth, and length of the vein.[1] The term 'survival time' in this context refers to the length of time a peripheral ultrasound-guided IV (PUSGIV) catheter remains in place functioning normally. PUSGIV catheter survival becomes paramount until access is no longer needed or a more stable type of catheter, such as a central line, can be placed.[1]

In 2007, in the same ED setting as the present study, a registered nurse (RN)–driven PUSGIV program was

implemented.[4] By 2011, clinicians in this department had identified concerns regarding the survival of PUSGIV catheters. In 2013, the authors completed a nonrandomized retrospective study comparing the survival of 300 PUSGIV and 300 traditionally placed IV catheters established in the study's emergency department.[5] Catheter selection was limited, and the nurse's skill level with ultrasound was in its infancy at the study site. The gauge and length of the catheter were not considered nor the experience of the RN placing the catheter. The hospital policy at that time was to rotate sites, unless indicated by a physician, every 96 hours (4 days). Allowing an IV site to remain in place for as long as possible without causing infection and to minimize pain for the patient was typical practice. At that time, the average survival time of traditionally placed IV catheters was 4320 minutes, 3 times longer than that of PUSGIV catheters. The average PUSGIV catheter survival time was 1674 minutes.[5]

Theoretical reasons for diminished survival times of PUSGIV catheters have been discussed in the literature.[6-8] One possible explanation proposed for the relatively rapid failure of PUSGIV catheters was that shorter catheter lengths placed within the veins, especially among obese patients, would be associated with shorter survival.[7] The "angle of attack" was described as the insertion of PUSGIV catheters at sharp angles in veins at depths of 2 cm or greater.[8,9] The sharper angle of insertion possibly resulted in the catheter scraping the back wall of the vein, possibly resulting in infiltration or kinking.[8,9] In addition, PUSGIV catheters placed in the larger basilic vein on the inside of the upper arm may become dislodged during muscle contraction with bending of the elbow.[8,9] The large area of subcutaneous tissue along with loose skin encountered in the upper inner arm when placing catheters in the basilic vein in older women may cause instability when anchoring the catheter.[7,9] Finally, pressure injection for computed tomography contrast has also caused failure in our facility. Although such problems have been identified as precursors to dislodgement, studies have shown that they do not explain all the variation in survival time.[8] One possible influence not yet well explored is catheter length inside the vein. A plausible hypothesis suggested in the literature is that catheter length within the vein is positively associated with catheter survival.[7]

Study Objectives

The objective of this study was to evaluate the relationship between peripheral catheter length within veins and survival time of PUSGIV catheters. Our hypothesis was that a longer length of catheter within the vein would result in longer survival times for PUSGIV catheters. ([Figure 1]).

Methods Study Design

This was a nonrandomized prospective study using electronic medical records (EMR), including ultrasound images, as the source of data. The study was approved by the Texas Health Resources Institutional Review Board located in Arlington, TX (protocol number 903294-2). Informed consent was waived.

Study Setting

The study was conducted at a 750-bed urban tertiary care center with a level II trauma center. The 100-bed emergency department has an annual patient population of 124,000. The current policy at the study hospital is to maintain functioning IVs unless symptoms develop; therefore, IVs were not routinely changed.

Sample

The sample included inpatient adults who received PUSGIV placement in the emergency department or ICU and were admitted for 60 or more hours from January 1, 2017 to January 1, 2018. Patients eligible for the study were those identified by bedside nurses as patients with difficult IV catheter placement. The bedside nurse referred the patient to nurses with special training in PUSGIV placement. Records of patients receiving PUSGIV placement but admitted for less than 60 hours were excluded because of the minimum time needed to evaluate the survival of the PUSGIV catheter. All patients were aged 18 years or older and had an 18- or 20-gauge PUSGIV catheter, 6.35, 4.5, or 3.2 cm in length, placed. Patients included in the study had the PUSGIV catheter placed either in the upper inner

arm (basilic vein), the antecubital vein, or in the forearm. The sample included all eligible records during the study period with complete data, including validated in-vein catheter length measurements. Records were retrieved consecutively until the desired sample size of 98 was obtained.

Procedures Clinician Training

Nurses who participated in the study were considered PUSGIV placement experts by both physicians and their peers. Each nurse had completed a 4-hour PUSGIV training class with 10 successful supervised PUSGIV placements and had been placing PUSGIV catheters for at least a year. Nurses who met the above criteria were invited to attend formal training on measuring catheter length within veins. Nurses who agreed to participate received 1 hour of classroom instruction from an emergency medicine physician, employed onsite, who was a recognized pioneer in sonography. They learned how to successfully visualize, capture images, and measure catheter length within the lumen of the vein in real time. The instructing physician reviewed all images captured by the nurses to validate measurement accuracy.

Insertion of Peripheral Catheter

Nurses were trained to pay special attention to avoid placing the intravenous catheter in the arm of a patient with a vascular dialysis graft or on patients post mastectomy. A tourniquet was applied to the upper extremity. The skin was cleansed using a chlorhexidine antiseptic swab, and the ultrasound probe was covered with a sterile Tegaderm dressing (3M, St. Paul, MN). Sterile lubricating jelly (MediChoice; Owens &Minor, Mechanicsville, VA) was then applied to the arm. The probe was moved across the skin surface using a small amount of intermittent pressure until the veins were differentiated from the arteries or the nerves by identifying the collapsibility of the vein. The vein selected was the nurse's preference. The nurse could use either the transverse or longitudinal plane to insert the catheter. Once a proper vein was located, the RN inserted the catheter through the tissue until the vein was punctured. The catheter was then inserted into the vein until the tip of the catheter was viewed in the middle of the vessel on the ultrasound monitor. Successful insertion was defined as nonpulsatile blood dripping freely from the IV catheter and the ability to thread the catheter into the vein until the hub reached the skin. After insertion, the nurse then turned the transducer to the longitudinal plane and moved the probe over the vein until the image of the catheter in the vein and the total length of the catheter in the vein to the tip could be captured.

Variables And Measures Independent Variable

The independent variable of greatest interest was the catheter length. After IV placement, a measurement was taken from the insertion site to the catheter tip by imaging in real time using a linear array probe (SonoSite, Inc, Bothell, WA). Measurements were then captured as an image on the ultrasound machine. Later, the image was reviewed for accuracy by the instructing physician.

Covariates

Other variables included catheter gauge, placement site, age, sex, body mass index (BMI), renal disease, and diabetes.[6] Available catheters included 4 types: (1) 20-gauge 3.2 cm and 4.5 cm; and (2) 18-gauge 4.5 cm and 6.4 cm (Bard, Inc, Murray Hill, NJ). The gauge was obtained from specifications printed on the package by the manufacturer and was logged by nurses inserting the IVs. Anatomic placement sites for the PUSGIV insertion included 3 categories: forearm, antecubital, and basilic areas. Age was measured in years, sex was determined by inspection of phenotype as listed on the medical record, BMI was calculated automatically in the EMR from weight and height, and history of renal disease or diabetes was obtained from the history section of the EMR. Although IV drug abuse, cancer, and shock[6] are mentioned in the literature as possible causes for vein paucity, IV drug abuse was not prominent in our patient population, and many patients with cancer have tunneled IV access devices that limit the use of ultrasound. Therefore, the covariates were purposefully limited to the prevalence of renal disease

and diabetes seen in our patient population.

Dependent Variable

The dependent variable was survival time, which was measured in minutes. The insertion and removal times and dates were retrieved from the EMR. Survival time was calculated as the difference in minutes. The defined event was “catheter removed for catheter-related symptoms during the first 60 hours of admission.” When the target PUSGIV catheter was removed, it was assumed that policy was followed. The reasons for removal during the first 60 hours after admission included discharge, catheter-related problems, and central line placement. The reasons for removal were documented.

Enrollment

Patients receiving PUSGIV placement in the emergency department were considered for the study only if a catheter image was obtained and recorded on placement. If the image was clear and the measurements were validated by the instructing physician, the chart was later reviewed for complete documentation. For data to be retained for the study, all of the following criteria had to be met: the measure of the catheter length was judged accurate by the physician reviewing the images, the patient was admitted from the emergency department to an ICU or other hospital unit for at least 60 hours, and there was complete documentation for each independent variable for each case in the EMR. One observation during the study was that on average, 9 ED patients per day received PUSGIV placement in the study facility. But a full year was required to obtain the desired sample because most of the admitted patients receiving PUSGIV placement in the emergency department were discharged before the 60-hour admission eligibility criterion was met.

Research Activities

Placement of a PUSGIV catheter is considered usual care at the study hospital. Research activities, in addition to usual care, were only observational and included measuring the catheter length, logging the catheter length and gauge, extracting information from the medical record, and analyzing the data.

Analysis

Descriptive statistics were used to characterize the study sample. Interaction terms were tested. Unadjusted and adjusted Cox regression models were employed to quantify the effects of the in-vein length of the catheter alone and of multiple covariates of age, BMI, sex, diabetes, renal disease, and the location of the catheter in the basilica vein on the survival time (in minutes) of the PUSGIV catheter. A priori power analysis (PASS software) indicated that at least 92 subjects would be needed to model the relationship between survival time and in-vein catheter length. Alpha was set at 0.05, and a moderate effect size for in-vein catheter length was anticipated. Before analysis, the data were examined for implausible outliers, and none were found. No cases with missing data were included in the analysis because inclusion criteria for records required complete data.

Results

The study accrued a sample of 98 subjects. There were 50 patients who received PUSGIV placement in the ICU and 48 patients in the emergency department (Figure 2). One case was removed because of the unlikely length of survival time thought to be related to being physically removed but not documented as removed in the EMR (implausible value). The total cases examined were 97 (N = 97). Of the 97 cases examined, 29 IVs were removed for catheter-related problems (events). The mean (SD) survival time was 3,445 minutes (2,414). Sample characteristics are presented in Table 1, which shows that proportions of attributes were quite similar among patients who lost their IVs owing to catheter-related problems and those who did not. No differences between groups were statistically significant. Figures 3 and 4 illustrate the insignificant effects of in-vein catheter length on IV removal owing to catheter problems and catheter dwell-times for groups, respectively.

The Cox regression revealed no statistically significant association between any covariates (including in-vein catheter length) and survival of the peripheral catheter. The addition of interaction terms did not improve the model. Model fit was poor. The model with the length of the catheter in-vein as the sole predictor was insignificant (X^2 = 0.031, P = 0.86), and the full model was as poor (X^2 = 2.79, P = 0.95). Magnitudes of covariates are presented in Table 2. The model was run with both trimmed and untrimmed outcome outliers with negligible differences in coefficients.

Discussion

The hypothesis that the in-vein catheter length was positively related to PUSGIV catheter survival was not supported by our data. Although not related to the catheter length in-vein, the PUSGIV placement survival time doubled from the 1674 minutes in the 2013 study[5] to 3445 minutes in this study. In both 2013 and 2017, the 2 types of catheters would have been managed similarly and would have had comparable reasons for removal,[5] but other plausible influences on survival time, such as infusion of caustic medications or inadequate securing of the IV site, could be associated with decreased peripheral catheter survival.[3]

There were 2 important factors that may have enhanced the longevity of catheter survival. In the initial 2013 study, there were only 3 catheters available for insertion: the 18-gauge 6.4 cm and the 18- and 20-gauge 4.5 cm.[5] By 2017, catheter sizes and lengths available for peripheral IVs doubled, allowing nurses to choose more appropriate catheters on the basis on nursing judgment of the vessel anatomy and patient needs. In addition, in 2013 our PUSGIV program was only 6 years old.[5] The program began slowly in 2007 with a small group of 4 nurses capable of inserting the catheters. Ten years later, in 2017, the program had become more robust, and the number of PUSGIV nurses had increased by a factor of 5. By 2017, some of the nurses had been inserting PUSGIV catheters for as long as 10 years. In addition, in the 2013 study, nurses used an aged ultrasound machine for PUSGIV placement, which produced a poor screen image.[5] By 2017, nurses used updated ultrasound machines with large screens allowing much better visualization of the needle entering the vein, which promoted accurate catheter placement.

Implementation of the described change in practice over time resulted in nurses becoming more confident and proficient in vessel and catheter evaluation, and more technically competent. Nurses are now able to insert shorter catheters in the veins with visibly shorter lengths and longer catheters in the larger, more straight, and sleek veins. We presume that better decision making, increased comfort in insertion, and greater variety of available catheters substantially promoted increased PUSGIV survival time in 2017. This supposition is validated by the fact that the 4.5-cm length catheter was selected most often (66.3%) showing that bedside emergency nurses are becoming increasingly confident with insertion techniques and do not require the longer catheter to reach the vein. These decision-making characteristics illustrate the concept of clinician gestalt,[2] the phenomenon in which the clinician's ability to use their expertise, along with a combination of objective measures, predict their ability to establish an IV with success.

Limitations

Potential measurement error and sampling bias limit the validity of the study. Our results depended on accurate documentation. Inherently, because of the nurses' hectic clinical pace, random errors in IV insertion and removal times occurred. Reasons for IV removal may also not be perfectly reliable. It is also possible that some relevant records were not obtained because of random or systematic documentation errors. Given the quality of the data available, our results should be interpreted with caution. Readers should also remember that all PUSGIV catheters were placed by emergency and ICU nurses, not members of organized vascular access teams.

Implications for Emergency Nurses

When placing an IV, the tendency in emergency nursing practice is to look for a vein that will hold as much catheter as possible. The reasoning is that the more catheter placed in the vein, the less likely dislodgement will occur, especially in the obese.[7] But this premise is not supported by this study's findings. Until our results have been replicated or refuted with additional evidence, we suggest that the clinician consider these elements when considering placement: (1) catheter length needed to get to the vein, (2) gauge requirement, (3) catheter length the vein will support, (4) how the catheter will be used, and (5) activity level of the patient. A shorter catheter placed in a shallow vessel in the forearm will most likely outlast a catheter placed in the antecubital or basilic vein where bending of the arm promotes mechanical displacement. The catheter selection should vary according to the vein anatomy and the reason for the insertion. An example of a consideration is serial blood sampling and the need for access large enough to draw blood or placement for rapid infusions.

PUSGIV placement is generally not an easily learned skill. There is a learning curve, and time is required to become comfortable with handling the probe and mastering the hand-eye coordination of inserting the catheter while watching the screen.[1,10-12] Expertise comes with allowing nurses time to become comfortable imaging veins. Currently, there is no consensus on training requirements for learning to place PUSGIV catheters.[1,10-12] The number of successful attempts required to be considered competent in PUSGIV placement varies in the literature from 5 to 25.[1,10-12] In our experience, because of the manual dexterity involved in handling the probe and the eye-to-hand coordination of advancing the needle while watching the screen, 20% of nurses taking the class will not be able to master the skill. In our opinion, the most important aspect of any PUSGIV training program is having the guidance of experienced clinicians in a clinical setting.

Furthermore, nurse administration needs to provide ways to support nurses who place PUSGIV catheters.[1] A frequent complaint is that when a nurse who is competent in inserting a PUSGIV catheter is asked to do so, they must often take time away from their own patients while inserting the catheter for other team members.[1] When helping out, the nurse needs to be assured that their patients will be taken care of or the nurse will soon avoid helping others.

Conclusions

In conclusion, the overall survival of PUSGIV catheters placed in the emergency department in the study institution doubled from 2013 to 2017,[5] but the increased PUSGIV survival was not related to longer catheter length placed into the lumen of the vein. A comparison of the 2 studies suggests that nurses need clinician support and time to develop their insertion skills and technique. Having a variety of catheters available to choose from and having ultrasound machines with clear images may also contribute to a longer survival time by improving the nurse experience. As more nursing-driven PUSGIV programs are being implemented, the focus appears to be moving from questioning if nurse-driven PUSGIV programs can be successful to developing evidenced-based PUSGIV placement practices.[12,13]

Author Disclosures

Conflicts of interest: none to report.

Characteristics	Censored* N = 69	Event† N = 29
Continuous variables, mean (SD)		

In-vein catheter length	2.8 (0.91)	2.8 (0.87)
Catheter survival time, min	3,771 (2,541)	2,642 (1,876)
Age, yr	62.4 (15.4)	65 (17.9)
BMI, kg/m^2	31.19 (11.1)	30.6 (7.7)
Nominal variables, n (%)		
Catheter size, 18 gauge	43 (62)	16 (55)
Location placed, basilic	38 (55)	14 (48)
Sex, male	19 (28)	9 (31)
Diabetes	15 (22)	6 (21)
Renal disease	34 (49)	11 (38)

Covariate	B coefficient	P value	Hazard ratio (expB)
In-vein catheter length	−0.031	0.90	0.969
Catheter size (18 gauge)	−0.035	0.88	0.966
Location placed (basilic)	0.063	0.88	1.065
Age	0.012	0.29	1.013
Sex (male)	−0.242	0.57	0.785
BMI	0.004	0.85	1.004
Diabetes	0.069	0.85	1.101
Renal disease	−0.505	0.3	0.603

DETAILS

Subject:	Patients; Emergency medical care; Hypotheses; Catheters; Averages; Equipment; Variables; Veins &arteries; Ultrasonic imaging; Nurses; Catheterization; Access; Emergency services; Intensive care; Observational studies
Identifier / keyword:	Difficult intravenous access; Administration, intravenous; Ultrasound-guided; Ultrasonography; Emergency nursing
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	123-130
Publication year:	2021
Publication date:	Jan 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.05.015
ProQuest document ID:	2487205895
Document URL:	https://www.proquest.com/scholarly-journals/effect-catheter-length-placed-into-vein-on/docview/2487205895/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2022-11-14
Database:	Public Health Database

Organ Donation and the Islamic Faith: JEN

ProQuest document link

ABSTRACT (ENGLISH)

The purpose of this letter is to increase awareness regarding burial practices of the Islamic faith and discuss how these beliefs may affect patients and families who are Muslim as potential organ donors in ED settings.Islam and Organ Donation Misconceptions Religion is personal and subjective to individual interpretation. [...]I didn't really know what my beliefs were in terms of organ donation until I was in nursing school. There can be a fear that if a body part is removed for any reason (in this case, transplantation), then the body has been desecrated and will not be at peace in the eternal resting place.Muslim Burial Practices (1)Very time sensitive, may not seem feasible in a hospital environment where delays are innate.

FULL TEXT

Dear Editor:

The first successful organ transplant surgery was performed on the kidney in 1954. Organ donation has evolved since then with successful heart and liver transplants in the 1960s.[1] Each organ donor has the potential to save up 8 lives.[2] Commonly acknowledged barriers to organ donation include financial concerns, fear of disfigurement of the deceased, and religious beliefs.[3] As an emergency nurse with more than 10 years of practice in the United States and the Middle East, as well as a practicing Muslim, I have personally seen various ways in which religious beliefs can affect organ donation. The purpose of this letter is to increase awareness regarding burial practices of the Islamic faith and discuss how these beliefs may affect patients and families who are Muslim as potential organ donors in ED settings.

Islam and Organ Donation Misconceptions

Religion is personal and subjective to individual interpretation. There is no unanimous consensus regarding organ donation in the Muslim faith.[4] In fact, there can be a misconception, based on clinical experiences, that Muslims do not believe in cadaveric organ donation.

In 1952, the country of Egypt ruled that organ procurement is not against the religion of Islam.[5] In fact, there is no verse in the Quran that states organ donation and even an autopsy are impermissible. However, there are still Muslims who believe it is. I admit that I fall into this category. As a practicing Muslim, I assumed that organ donation was against the religion I was raised in because it wasn't a topic that was discussed. In fact, I didn't really know what my beliefs were in terms of organ donation until I was in nursing school. It wasn't until I did my own research that I fully understood that it is not against the religion and became an organ donor myself.

In the Muslim faith, there is the belief that the body belongs to God and is a gift to the individual. There can be a fear that if a body part is removed for any reason (in this case, transplantation), then the body has been desecrated and will not be at peace in the eternal resting place.

Muslim Burial Practices

- **(1)**Very time sensitive, may not seem feasible in a hospital environment where delays are innate.
- **(2)**Difference between if a patient is on a ventilator or not. If the Muslim has already died, delaying the care of the body for the burial is considered sacrilegious. If the Muslim is on a ventilator, there is time to engage the family in the decision-making process.

Organ Procurement Agencies

Organ procurement agencies can continue to raise awareness by collaborating with local religious leaders and providing educational resources. Muslim families may not be open to speaking with procurement representatives when they are in the emergency department dealing with a loved one's passing. Timing is everything.

What Can Emergency Nurses Do? Advocate for Culturally Competent Practice in Their Workplace by Engaging in These Conversations

Advocate for education regarding the culturally sensitive considerations that are available through procurement agencies in the community before death. Encourage forums and offer individuals of different faiths the opportunity to engage in the conversation with religious leaders.

Educate Colleagues and Patients

We don't learn everything there is to know about our profession in nursing school. There are culturally respectful ways of donating organs. Patients who are Muslim should be provided information on organ donation and be offered the opportunity to discuss the implications of what donating their organs mean with a religious leader such as an Imam.

Don't assume all Muslims are not organ donors.

Engage in the Community

Encourage critical conversations regarding organ donation to occur outside of the hospital as much as possible. This includes diverse conversations with individuals of different faiths to better understand their religious reasons on organ donation.

Have a forum in which emergency nurses are afforded the opportunity to engage in a respectful conversation with the Imam of a local mosque to better understand the Muslim stance on organ donation. This can also initiate further conversations on other culturally specific Muslim practices as it relates to health care.

Conclusion

There are more than 100 000 people waiting for a second chance at a better, healthier life and in need of an organ donation.[6] Understanding religious barriers can play an important role in giving these patients a second chance. As emergency nurses, we need to advocate for culturally competent practice and educate colleagues and patients regarding the organ donation process. We can also engage in community partnerships to initiate discussion around organ donation and donor registry before patients/families are faced with this life-and-death situation. *Jamla Rizek Bergman, MSN, MBA, RN, Ascension Borgess Hospital, 315-491-7020; E-mail: jamlabergman@gmail.com.*

DETAILS

Subject:	Cultural competence; Ventilators; Religion; Transplants &implants; Muslims; Misconceptions; Nursing schools; Religious beliefs; Donors; Biological organs; Blood &organ donations; Resting; Islam; Nurses; Donations
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	17-19

Publication year:	2021
Publication date:	Jan 2021
Section:	Letter
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Letter
DOI:	https://doi.org/10.1016/j.jen.2020.10.009
ProQuest document ID:	2487205874
Document URL:	https://www.proquest.com/scholarly-journals/organ-donation-islamic-faith/docview/2487205874/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2021-02-14
Database:	Public Health Database

Health Disparities and Emergency Nursing: JEN

ProQuest document link

ABSTRACT (ENGLISH)

The nursing discipline is committed to reducing health disparities as a collective value that is clearly stated in our Code of Ethics (Provision 8).1 Within our emergency specialty, basic and expected standards of professional performance include that “the emergency registered nurse practices in a manner that is congruent with cultural

diversity and inclusion principles.” 1 The purpose of this editorial is to briefly introduce the National Institute on Minority Health and Health Disparities (NIMHD) Research Framework and a collection of health disparity–relevant papers published in this issue of the Journal of Emergency Nursing (JEN).NIMHD Research Framework The NIMHD Research Framework (Figure) organizes a shared mental model that emergency care specialists can apply to understand the causes and influences of health disparities.2 The Framework is organized by levels of influence (top rows of Figure), domains of influence (left-hand columns of Figure), and health outcomes (bottom row of Figure). The NIMHD Research Framework does not only apply to antiracism and racial health disparity interventions, but also to any health disparity for marginalized or vulnerable groups.In This Issue of JEN The impressive collective efforts of our authors, reviewers, and editorial team allowed us to assemble papers on health disparity and vulnerable or potentially marginalized populations in this issue of JEN regarding emergency care or special considerations for people who are deaf;17 transgender;18 new immigrants;19 reside in a low- or middle-income country;20 children with displaced gastrostomy tubes;21 or people who suffer from rare disease,22 sickle cell disease,15 or opioid use disorder.23 Our shared value within the specialty of providing excellent care to all patients is evident in the study by Wolf and Delao24 to ascertain the priorities for future emergency nurse triage research.

FULL TEXT

Health disparities are sustained, worsened health outcomes of a specific disadvantaged group. These health differences can be health-related quality of life, rates or severity of disease, disability, mortality, injury, or violence. Disadvantaged populations might be defined by demographic characteristics, disadvantaging environmental conditions, social vulnerability, or geography. For example, the National Institutes of Health has designated the following as United States health-disparity populations: Black/African American, Hispanic/Latino, American Indian/Alaska Native, Asian American, Native Hawaiian and other Pacific Islander, socioeconomically disadvantaged populations, underserved rural populations, and sexual and gender minorities. We also know that the health of disadvantaged populations can be affected owing to discrimination based on age, race, color, religion, sex, gender, national origin, genetic information, veteran status, and many other considerations. The nursing discipline is committed to reducing health disparities as a collective value that is clearly stated in our Code of Ethics (Provision 8).[1] Within our emergency specialty, basic and expected standards of professional performance include that “the emergency registered nurse practices in a manner that is congruent with cultural diversity and inclusion principles.”[1] The purpose of this editorial is to briefly introduce the National Institute on Minority Health and Health Disparities (NIMHD) Research Framework and a collection of health disparity–relevant papers published in this issue of the *Journal of Emergency Nursing* (*JEN*).

NIMHD Research Framework

The NIMHD Research Framework ([Figure]) organizes a shared mental model that emergency care specialists can apply to understand the causes and influences of health disparities.[2] The Framework is organized by levels of influence (top rows of [Figure]), domains of influence (left-hand columns of [Figure]), and health outcomes (bottom row of [Figure]). The civic engagement and public dialogue during the coronavirus disease pandemic has guided us to a long overdue and poignant focus on the need for individual, interpersonal, community, and societal antiracism commitments because racism has been an unjust and centuries-long determinant of health disparities. Although there are several racial disparities that require attention in emergency nursing, such as indigenous peoples’ health,[3] the following discussion applies the NIMHD Research Framework to Black or African American health disparities. Although those who identify their race as Black or African American may be more likely to share particular genetic,[4] hereditary, or biological traits (such as sickle cell trait)[5] than those with other racial identities, we also know that race is largely a social/contextual, and not biological, idea from a vast complexity of human ancestries, social structures, racial assignments, and internalized identities.[6-8] In health care, new research is needed on the potential harm and misdiagnoses created by practices such as race-based adjustments in the interpretation of biological data, such as lung function testing and glomerular filtration rate, which have largely failed to take biracial and multiracial ancestry into account.[7,9,10] Too often throughout our history, health care providers focused on individual biology or behavior as reasons for racial disparities, rather than the full multilevel range of social, community, and interpersonal influences.

For example, racial health disparities are also determined by the differences in how criminal justice policy and law,[11] public education segregation,[12] and housing discrimination[13,14] as societal structures were applied, with clear evidence of long-standing structural racism and injustices. Although a full explanation and application of each level and domain of the NIMHD Research Framework is beyond the scope of this editorial, I encourage the emergency care community to use this Framework as a shared mental model for needs assessments and interventions that prioritize eliminating racial disparities in individual clinical practices, health care organizations, educational programs, research initiatives, and policies that we lead and influence. As an example of addressing quality of care ("Health Care System" domain and "Societal" level of influence in the NIMHD Research Framework) in this issue of *JEN,* Bulgin et al[15] worked to disseminate a sickle cell vaso-occlusive episode algorithm to emergency care clinicians in North Carolina. Jonassaint[16] provides commentary on research about innovative painamations assessments, which are electronic visual depictions of sickle cell pain, to strengthen medical decision-making and patient-clinician relationship ("Interpersonal" level of influence and "Health Care System" domain in the NIMHD Research Framework). The NIMHD Research Framework does not only apply to antiracism and racial health disparity interventions, but also to any health disparity for marginalized or vulnerable groups.

In This Issue of *JEN*

The impressive collective efforts of our authors, reviewers, and editorial team allowed us to assemble papers on health disparity and vulnerable or potentially marginalized populations in this issue of *JEN* regarding emergency care or special considerations for people who are deaf;[17] transgender;[18] new immigrants;[19] reside in a low- or middle-income country;[20] children with displaced gastrostomy tubes;[21] or people who suffer from rare disease,[22] sickle cell disease,[15] or opioid use disorder.[23] Our shared value within the specialty of providing excellent care to all patients is evident in the study by Wolf and Delao[24] to ascertain the priorities for future emergency nurse triage research. From an Emergency Nurses Association (ENA) expert panel of 14 nurses, the single research question that was ranked as the highest priority was "How do cultural considerations affect triage accuracy?" We at *JEN* are committed to continuing to publish high-quality evidence to inform these cultural considerations to support personalized, compassionate care for all. This issue of *JEN* also includes 2 randomized controlled trial research papers testing interventions to reduce disparities for vulnerable groups across the lifespan on the topics of children's pain and fear during health care procedures[25] and adolescent automobile driver injury prevention.[26] In regard to gender-specific considerations and disparities in emergency care, this issue includes a manuscript on testing an external female urinary catheter as part of an organizational initiative to reduce catheter-related urinary tract infections[27] and a case review on identifying testicular torsion in teenage males.[28] Furthermore, evidence on interventions such as pictorial discharge instructions, which are promising interventions to reduce health disparities for those with low health literacy, is included here as a systematic review of randomized controlled trials.[29] For readers who wish to test their own knowledge on the care of pediatric patients with displaced gastrostomy tubes, the authors have generously provided a copy of the knowledge assessment used in their quality improvement project.[21] Although this issue contains a collection of manuscripts aligned with the theme of health disparities, the entire issue contains our usual breadth and depth of topics to support emergency workforce health, emergency clinical practice, leadership, and research methods.

As we work collectively to reduce and eliminate health disparities, ENA members can access additional professional development and education entitled "Structural Racism in Health Care" on the ENA website with their member login.[30] Not only do we collectively value the specialty culture, knowledge, skills, and attitudes to ensure fair and equitable emergency care for our patients and their families, but our work also continues to address inequalities within the emergency nursing workforce. As a specialty workforce, we do not represent the ethnic and racial diversity of the patients we serve. In a national sample analysis, we found that 13% of emergency nurses identified as Hispanic, 73% as White non-Hispanic, 6% as Black non-Hispanic, 4% as Asian non-Hispanic, only 2% as multiracial, and 6%.[31] We at *JEN* continue to welcome original research, program development and evaluation, and evidence-based commentary on achieving an ethnic and racially representative emergency nursing workforce.

DETAILS

Subject:	Emergency medical care; Health disparities; Pacific Islander people; Catheters; Gender; Opioids; Health status; Immigrants; Codes of conduct; Emergency services; Nursing; Teams; Influence; Nurses; Ethics; Hispanic Americans; Clinical outcomes; African Americans; Racism; Multiculturalism &pluralism; Transgender persons; Specialists; Triage; Ostomy; Inequality; Race; Racial inequality; Deafness; Substance use disorder; Sickle cell disease
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	6-9
Publication year:	2021
Publication date:	Jan 2021
Section:	Editorial
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Editorial
DOI:	https://doi.org/10.1016/j.jen.2020.11.004
ProQuest document ID:	2487205868
Document URL:	https://www.proquest.com/scholarly-journals/health-disparities-emergency-nursing/docview/2487205868/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Jan 2021

Last updated:	2023-08-31
Database:	Public Health Database

Finding My People: My Experience as an Emergency Nurse Scientist in a Research Postdoctoral Fellowship at an Academic Medical Center: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Postdoctoral fellowships are excellent opportunities for doctorally prepared nurses to further their research independence.1,2 Public agencies, such as the National Institutes of Health (NIH), National Science Foundation, the Veterans Health Administration, the Agency for Health Research and Quality, and the Health Resources and Services Administration offer postdoctoral fellowships to new researchers, including doctorally prepared nurses. The National Academy of Science, Engineering, and Medicine has an ambitious goal to advance the health of all United States citizens by increasing the number of nurse scientists.3 A postdoctoral fellowship could facilitate the scholarly growth of nurses during their transition from graduate school to their next professional role: tenure-track faculty, industry researcher, consulting nurse scientist for hospitals, researcher within government agencies, instructor in nontraditional teaching environments, nonprofit leader, or public policy analyst.1,4,5 For the postdoctoral fellowship, I set my own developmental goals in leadership, multidisciplinary collaboration, community engagement, teaching experience, grant writing, scholarship, and research. Here, I could draw on my clinical experience to evaluate emergency nursing research that could contribute valuable insights to nursing science, as well as see the publishing process from another perspective.Integrating Health Equity Into a Postdoctoral Fellowship As an emergency nurse in a critical access medical center, I had long recognized that an inadequate access to health promotion education often led to an increased risk for preventable chronic illnesses. Senior researchers were also available to serve as mentors for the postdocs. Mentors Serve Many Roles There is considerable evidence that success in a graduate program, as well as in a postdoctoral position, can be fostered through positive relationships with mentors.1,12 In the fast-paced environment of the emergency department, I depended on experienced emergency nurses as mentors.

FULL TEXT

What Is a Research Postdoctoral Fellowship?

Postdoctoral fellowships are excellent opportunities for doctorally prepared nurses to further their research independence.[1,2] Public agencies, such as the National Institutes of Health (NIH), National Science Foundation, the Veterans Health Administration, the Agency for Health Research and Quality, and the Health Resources and Services Administration offer postdoctoral fellowships to new researchers, including doctorally prepared nurses. Postdoctoral fellows are often supported through a Ruth L. Kirschtein National Research Service Award (NRSA), either through an F32 individual fellowship (for which the candidate submits a competitive grant application), or a T32 institutional mechanism, in which the sponsoring institution/university is awarded fellowship positions and hires

trainees directly. NRSA fellows are supported for a period of 2 to 3 years.[2] Private institutions, such as the Robert Wood Johnson Foundation, the Andrew Mellon Foundation, and the Pew Charitable Trust also fund and offer postdoctoral opportunities—both for nurses and other interdisciplinary fellows. Although many emergency nurse scientists do not complete a postdoctoral fellowship, this was the path I chose to develop the necessary skills to become an independent nursing researcher. The purpose of this editorial is to share my personal journey as a postdoctoral fellow and describe how I grew from this experience.

The National Academy of Science, Engineering, and Medicine has an ambitious goal to advance the health of all United States citizens by increasing the number of nurse scientists.[3] A postdoctoral fellowship could facilitate the scholarly growth of nurses during their transition from graduate school to their next professional role: tenure-track faculty, industry researcher, consulting nurse scientist for hospitals, researcher within government agencies, instructor in nontraditional teaching environments, nonprofit leader, or public policy analyst.[1,4,5] For the postdoctoral fellowship, I set my own developmental goals in leadership, multidisciplinary collaboration, community engagement, teaching experience, grant writing, scholarship, and research. My fellowship position was time intensive, but the transition was smoothed by having generous mentors, protected time for writing and research, and freedom from the immediate expectation to secure my own grant funding.

My Transition to a Postdoctoral Fellow

It was understood that completing a terminal degree meant that one was trained to conduct research and generate new knowledge.[6,7] Although I was interested in serving in a nurse faculty position, I had always been a clinician up to this point in my career. Being a clinically engaged researcher had become one of my core values, which may not have always aligned with the expectations of tenure-track faculty positions in nursing.[1] Reflecting on my work in the emergency department, I recognized that I was primarily focused on timeliness of care, emergency patient outcomes, and completion of ephemeral departmental tasks before the end of my shift. As a nursing researcher, I was called to address complex structural problems, such as health disparities and inequities in health outcomes.[7]

I had never heard of a postdoctoral fellowship until a mentor suggested it as a way to achieve many goals at once: publish the research from my dissertation, further my development as a researcher, expand my research networks, collaborate with scholars from other disciplines, and expand my teaching expertise. I applied for a postdoctoral fellowship in primary care research in an academic medical center. I was thrilled to be accepted in this postdoctoral fellowship but sad to take a 2-year leave from my ED position and nervous about how I would fit in as a nurse in an academic family medicine department.

Commitment to a Postdoctoral Position

As I eagerly transitioned from my role of graduate student to full-time research fellow, I would need to step away from my position as an emergency nurse and focus my energies on my newly assumed role, that of a postdoctoral fellow. Once in the fellowship, however, I soon found myself struggling with the universal problem: balancing multiple demands with limited time. As an emergency nurse, I could leave when my shift was completed, under most circumstances. In the postdoctoral fellowship, I was now surrounded by researchers, physicians, and other nonclinical support staff in a corporate-style environment.[7] There were deadlines from department supervisors and collaborating mentors, and my own urgency to complete manuscripts and stay abreast of the literature—all while conducting my research. One of my mentors gleefully pointed out that the postdoctoral fellowship would be the last time in my career that I would be paid to think! There was little time left to disconnect completely from my research. I missed the easy comradery of emergency nursing.

I was 1 of 2 nurses in this fellowship cohort. An advantage of a fellowship at an academic medical center was receiving interdisciplinary support. Having a sounding board for my ideas enhanced the rigor of my scholarship, sharpened my research focus, and broadened my perspective on how to achieve an equitable health care system. Postdocs were quick to bond with each other in this stimulating environment, a phenomenon that reminded me of the easy collegiality that arose from the fast-paced and unpredictable nature of an emergency department. In interdisciplinary fellowships, nurse scientists have opportunities to engage in collaborative research endeavors that address the social and structural determinants of health.[8]

Postdoctoral Activities and How They Prepare You for Independent Research

My postdoctoral fellowship activities included conference presentations, seminars, manuscript preparation, grant writing, teaching, and refinement of my program of research. My program of research is to advance the health of immigrant populations through public policy advocacy and to increase health-promoting behaviors through leveraging community resources. During my 2 years in the fellowship, I disseminated research findings at local and regional nursing conferences and international medical conferences. A highlight was presenting at the Saunders-Watkins Leadership Workshop at NIH in Washington, DC. At the workshop, I was surrounded by some of the brightest researchers in the nation. After hearing high-level scientists describe the evolution of their careers, I was inspired to publish.

When I embarked on my fellowship, one of my goals was that I would develop my skills as a writer and publish the findings from my dissertation research.[9,10] The fellowship allowed time for reflection, which provided the impetus I needed to write manuscripts for submission to peer-reviewed journals (it also provided a safe space to weather manuscript rejection).[6] When I received immediate “desk rejections” by editors, as well as rejections by reviewers who critiqued my work with enthusiasm and then rejected it, I viewed these as new opportunities to find the proper journal fit. I took each critique to heart and strengthened my manuscript. During the postdoctoral fellowship, I eventually was invited to serve as a journal reviewer for *The Journal of Emergency Nursing*. Here, I could draw on my clinical experience to evaluate emergency nursing research that could contribute valuable insights to nursing science, as well as see the publishing process from another perspective.

Integrating Health Equity Into a Postdoctoral Fellowship

As an emergency nurse in a critical access medical center, I had long recognized that an inadequate access to health promotion education often led to an increased risk for preventable chronic illnesses. Health education could potentially diminish dependence on emergency departments for primary care, enabling them to respond more effectively to crises from emerging threats, such as the coronavirus or bioterrorism. One of my community partners was a pastor of a predominately Spanish-speaking congregation in a limited resource community. After I presented my dissertation findings to the congregation, he shared his concerns about the increasing incidence of obesity in his congregation. I assembled a research team that included the pastor to design a health curriculum for children and adolescents that could be embedded into their current religious education classes. We applied for and were awarded funding from the local chapter of an international nursing organization to move this community-based, participatory research project forward and are currently working with our third cohort of students. Through this collaboration, I came to better understand this community’s needs and the impact of their environment on health outcomes.

Through grand round and community presentations, postdocs analyzed complex issues, such as structural racism and housing inequality. Critical discussions with senior researchers and other postdocs raised my awareness of how viewing a problem through the lens of another discipline could strengthen nursing research.[8,11] Frequently, our discussions would center on how we could apply our leadership skills in research or practice in our respective communities. Senior researchers were also available to serve as mentors for the postdocs.

Mentors Serve Many Roles

There is considerable evidence that success in a graduate program, as well as in a postdoctoral position, can be fostered through positive relationships with mentors.[1,12] In the fast-paced environment of the emergency department, I depended on experienced emergency nurses as mentors. My mentors in graduate school were emergency nursing colleagues, other doctoral students, and PhD committee members who provided support, not only as a doctoral student, but as I advanced my career.[3,13] Mentors can show you how to apply for funding to keep a research program on track and moving forward.[7] Mentors also expand professional networks by introducing young nursing scientists to others outside of nursing for collaborative research opportunities.[7]

The Outcomes of a Postdoctoral Fellowship

The goals of a postdoctoral fellowship were to produce a deliverable that could be leveraged to attain a tenure-track position, develop leadership skills, and grow your research networks.[11] The deliverable could be negotiated, either

as a published manuscript, a funded research proposal, or a mentored scholarship opportunity. The fellowship strategically positioned one for a future career through increased professional networks, additional training in statistics, and classes on how to apply for an NIH grant. We also engaged in initial phases of our career trajectory mapping.[14] This approach to career decisions was enlightening to me as I imagined my future unfolding through incremental and intentional steps. As I contemplated my evolving career trajectory, my mind returned to the advice of another mentor who said, “You are your own CEO.” I have discovered there is a caveat to that freedom, though. It takes imagination to have a worthy goal and persistence to reach it.[13,15]

What Is a T32 Center and How Can You Find It for Your Own Postdoctoral Research Opportunity?

The T32 is an institutional research training grant under the Ruth L. Kirschtein NRSA and is available for biomedical and behavioral science programs, as well as schools of nursing. Some currently funded nursing institutions with T32 grant funding are the University of Pennsylvania, Case Western Reserve, University of Utah, and Ohio State, among others. T32-funded nursing centers typically have multiple foci, with research on symptom science, improving outcomes of chronic conditions, and self- and family management. Emergency nursing is in an ideal position to collaborate with other disciplines (medicine, psychology, and social work) to improve patient outcomes. The essential work of triage in emergency nursing is currently being investigated by Dr Stephanie Frisch at the University of Pittsburg through the use of another NIH-sponsored training mechanism (an F31 training grant). Dr Frisch is using big data in the development of emergency nursing triage tools that could quickly identify acute coronary syndrome and potentially reduce patient mortality through rapid identification. Other nursing T32 centers, as well as funding opportunities, can be located on the National Institute of Nursing Research website (https://www.ninr.nih.gov/researchandfunding/desp). The National Institute of Nursing Research is a proponent of interdisciplinary nursing research and encourages incorporating biological and behavioral sciences, as well as genomic research, to better inform nursing research questions. I highly recommend T32 postdoctoral fellowships for nascent nursing scholars. They provide an environment that stimulates intellectual growth, allows for interdisciplinary collaboration, and sets you on path toward independence.

Author Disclosure

This program is funded in part by grant T32HP10030 from the Health Resources and Services Administration (HRSA), an operating division of the Department of Health and Human Services. These contents are solely the responsibility of the authors and do not necessarily represent the official views of the Health Resources and Services Administration or the U.S. Department of Health and Human Services.

DETAILS

Subject:	Emergency medical care; Scientists; Collaboration; Careers; Mentors; Health promotion; Military hospitals; Funding; Interdisciplinary aspects; Ambition; Leadership; Mentoring; Government agencies; Nurses; Access; Graduate studies; Conferences; Chronic illnesses; Publishing; Public policy; Teaching; Medical research; Primary care; Veterans; Nursing; Clinical nursing; Clinical experience; Education; Scholarships &fellowships; Emergency services; Health disparities; Occupational roles
Business indexing term:	Subject: Careers Mentors Leadership
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1

Pages:	2-5
Publication year:	2021
Publication date:	Jan 2021
Section:	Guest Editorial
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Editorial
DOI:	https://doi.org/10.1016/j.jen.2020.10.005
ProQuest document ID:	2487205858
Document URL:	https://www.proquest.com/scholarly-journals/finding-my-people-experience-as-emergency-nurse/docview/2487205858/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-08-04
Database:	Public Health Database

Consideration of Testicular Torsion in Young Males With Abdominal Pain Is Essential: A Case Review: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Testicular torsion is a surgical emergency and requires prompt recognition and treatment. Health care personnel often forget this differential diagnosis in males who present with abdominal pain as their only complaint. There is a 4- to 6-hour window from the onset of symptoms to the surgical intervention to salvage the testes. It is imperative for health care personnel to consider testicular torsion in any male presenting with abdominal pain and to complete a genitourinary examination. The purpose of this case review is to highlight the importance of a genitourinary examination in recognizing testicular torsion.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current literature on testicular torsion indicates that a testicular torsion is a surgical emergency that needs to be evaluated expeditiously to avoid loss of the testicle.

••This article contributes a review of testicular torsion and the imperative need to perform a genitourinary examination on any male who presents with abdominal pain to prevent a missed diagnosis of testicular torsion.

••Key implications for emergency nursing practice are consideration of testicular pain in any male who presents with abdominal pain and the significance of diagnosing a testicular torsion in a timely fashion.

Case 1

A 14-year-old previously healthy male with no medical or surgical history and up-to-date immunizations presented to urgent care with complaints of sudden onset of left-sided abdominal pain and vomiting. The pain started the previous hour while he was sitting in class. He stated that he felt well before the onset of pain and denied any trauma to his abdomen. He denied fever, upper respiratory symptoms, diarrhea, urinary symptoms, or any other complaints. His last normal bowel movement was that morning. On examination, the patient had pain with palpation in his left lower quadrant without any other abdominal findings. The remainder of his documented examination was benign. A genitourinary examination was not performed. On the basis of the patient's abdominal pain and the provider's suspicions, the patient was referred immediately to the local pediatric emergency department for further evaluation of suspected appendicitis.

On arrival to the emergency department with his mother, the adolescent male was alert and oriented, had pale coloring and diaphoretic skin, and was hunched over holding his abdomen. The patient reported that he continued to have severe pain on the left side of his abdomen with accompanying nausea. The triage nurse assigned the patient an emergency severity index (ESI) of 2 because of his appearance, history of sudden onset of abdominal pain, and distress. The nurse practitioner examined the patient and found that his abdomen was soft and nondistended with mild tenderness on palpation of the left lower quadrant. There was no pain on palpation of the right lower quadrant or over McBurney's point. The nurse practitioner then questioned the patient if he had testicular pain. The patient shyly admitted that his left testicle was quite painful, and the pain increased to his scrotum when ambulating. On the genitourinary examination, the patient's left testicle was found to be swollen, discolored, and tender on palpation. The patient was barely able to tolerate the examination because of the pain and stated that this was the location of the maximum point of tenderness. The examination was halted, and the nurse practitioner immediately exited the room to inform the supervising attending provider of the high suspicion for a testicular torsion. Urology was immediately consulted, presented to the bedside a short time later, and confirmed that the patient had a testicular torsion. A manual bedside detorsion was attempted by urology, which was unsuccessful in reducing the torsion. The

patient was taken urgently to the operating room (OR) for an open reduction of the testicular torsion. Owing to the short time frame between the patient's symptoms and the diagnosis of testicular torsion (approximately 3 hours), the testis was able to be salvaged.

Case 2

A 13-year-old previously healthy male with no medical or surgical history and up-to-date immunizations presented to urgent care with sudden onset of periumbilical abdominal pain. However, he admitted that he had experienced intermittent abdominal pain for the past 3 days. The patient stated that he had 1 episode of vomiting before arrival. He was unsure when his last bowel movement was but thought it was a week ago. He denied any other associated symptoms. On examination, the patient had no abnormal physical findings; his abdomen was noted to be soft, nontender, and nondistended on palpation. Of importance, a genitourinary history and examination was not completed. Because of his report of no bowel movement for a week, the patient was diagnosed with constipation and instructed to take a laxative.

Two days later the patient and his father presented to the emergency department, stating that he had experienced right-sided abdominal pain for the past 5 days. The patient reported that the pain was located on the right side of his abdomen and increased with ambulation. On physical examination, the abdomen was noted to be soft and nondistended with mild tenderness in the right lower quadrant with palpation. With the genitourinary examination, the patient had significant scrotal swelling, ecchymosis, and tenderness over the right testis. The provider noted that it was difficult to palpate the testes because of the degree of swelling. After discovering significant scrotal findings, the patient admitted to having testicular pain for the past few days but did not tell anyone else because of embarrassment. An emergent ultrasound and a urology consult were ordered. The ultrasound confirmed right testicular torsion, and urology took the patient to the OR. Unfortunately, the patient's right testis was not able to be salvaged because of the prolonged time he had the torsion that resulted in a testicular infarction, which resulted in the patient undergoing an orchiectomy.

Introduction

Testicular torsion is a surgical emergency that requires immediate attention. Delayed evaluation, identification, and reversal of the testicular torsion could result in adverse patient outcomes, including a possible loss of the testes.[1,2] If the patient endorses scrotal, groin, or testicular pain, the patient should be made a high priority and triaged as an ESI of 2. The patient needs to be seen urgently for evaluation by an ED provider so that a physical examination and the appropriate studies may be expedited to preserve the testis in the case of torsion.[3] Unfortunately, not every patient with testicular torsion presents to the emergency department with straightforward complaints of testicular pain. The patient may complain of vague abdominal or inguinal pain with other associated symptoms (ie, nausea, vomiting, shortness of breath, dysuria) that do not give health care personnel a clear indication of the etiology of the patient's pain.[2] Younger males may not be able to differentiate or focalize their pain and may be too embarrassed to admit that they have testicular pain.[4] It is imperative that every examining provider ask the patient directly if they have penile, scrotal, or testicular pain when they enter the emergency department with complaints of abdominal pain. Despite the answer they may give regarding the presence or absence of testicular or scrotal pain, the provider should perform a physical examination of the genitourinary system to assess and identify a potential testicular torsion. The consequences of missing or delaying the diagnosis of testicular torsion can be catastrophic for the patient. Permanent ischemic injury may occur within 6 hours after testicular torsion with spermatic cord occlusion.[1,2] Ischemic tissue injury related to testicular torsion and the risk of undergoing an orchiectomy are dependent on the length of time that the testis has been torsed and the severity of the torsion.[1,2] The longer the patient has pain, the higher the chance that the testis cannot be recovered.

What is a Testicular Torsion?

Testicular torsion occurs when the testicle rotates and twists on the spermatic cord.[1,2] The spermatic cord provides blood flow to the testicle. Twisting of the cord will obstruct blood flow to the testicle. If the blood flow to the testicle is compromised, there will be an equalization of the venous and arterial pressures that will compromise arterial flow to the testicle leading to ischemia, venous congestion, testicular swelling, and severe pain.[1,2] The severity of the ischemia depends on the interval of time that the torsion has been present and the degree of the spermatic cord rotation.[1,2]

The incidence of testicular torsion is greatest during the neonatal period and between the ages of 13 to 16 years; however testicular torsion can occur anytime during the lifespan.[2] Approximately 65% of all torsions occur at the onset of puberty when the prepubescent male experiences rapidly increasing testicular mass that increases the chance of testes rotation.[1] A testicular torsion can also occur after minor injury to the genitourinary area and can also be hereditary when a patient is born with an anomaly in which the testes float freely in the scrotum (referred to as Bell-Clapper deformity).[5] Other causes that may be related to testicular torsion are low temperatures and sleep causing the contraction of the cremasteric muscle, which leads to shortening and twisting of the spermatic cord.[1]

Physical Examination Findings of Testicular Torsion

Common signs and symptoms of testicular torsion include a sudden onset of scrotal/testicular pain with subsequent swelling and discoloration of the scrotum, as well as an abrupt onset of nausea and vomiting.[2] However, some patients will present with vague abdominal or inguinal pain that gradually moves to the scrotal area hours after the onset of the abdominal pain.[2] Therefore, a genitourinary examination is essential when a male presents with abdominal pain. The patient may have feelings that his abdomen is the focal point of pain, but once a genitourinary examination is completed and the testis are palpated, it is recognized where the source of the pain is radiating from. On physical examination, the patient will have tenderness over the site of the torsion, with possible radiation of pain into the groin and the abdomen. Many patients, especially young children, will only localize their pain to their abdomen. A complete abdominal examination should be performed including inspection, auscultation, palpation, and percussion of the abdomen. The scrotum may appear erythematous, swollen, and possibly discolored. The affected testis may be enlarged compared with the unaffected testis because of the venous congestion.[1] With the twisting of the spermatic cord, the cord itself will shorten, causing the testicle to become high-riding within the scrotum.[1]

Another finding with a testicular torsion is the absence of a cremasteric reflex. The cremaster muscle is found within the inguinal canal and the scrotum. If an examiner lightly strokes the inner thigh of the patient, this will normally elicit a contraction or elevation of the testis toward the inguinal canal. Almost all patients with testicular torsion will have an absent cremasteric reflex; an absent cremasteric reflex has been found to be specific for testicular torsion, but its presence does not rule out testicular torsion in the setting of genital pain.[6] Another test to evaluate for a possible torsion is the Prehn sign. If the examiner lifts the testis and the patient has relief of pain, the probability of a torsion is low because lifting the testicle will not relieve the pain with a torsion.[6] However, the occurrence of pain with lifting the testis by the examiner may be due to epididymitis.[6]

Epididymitis should be considered on every patient that presents with testicular pain. On examination of a patient with epididymitis, the spermatic cord and the epididymis will be tender and swollen on palpation causing unilateral testicular pain.[7] Many times with epididymitis, patients will have fever, erythema of the scrotal skin, involvement of the adjacent testis, and reports of gradual swelling over the past few days.[7] In most cases, an ultrasound, which can differentiate between a testicular torsion and epididymitis, is required.[7] Other differential diagnoses based on the history and age of the patient to consider include sexually transmitted infection, urinary tract infection, orchitis, abscess, cellulitis, varicocele, hematoma, or malignancy.

Diagnostic Evaluation

Any male who presents with concerns related to a possible testicular torsion should undergo an immediate ultrasound and a urology consult. If the patient has multiple signs and symptoms that make the diagnosis of a torsion highly suspicious, urology should be contacted as soon as possible. Time is valuable in these cases because of the short period of time before ischemia takes place. If your institution does not have urology on staff, make every effort to transport the patient to the nearest facility where urology is readily available.

If the physical examination does not reveal a straightforward torsion but remains on the examiner's differential diagnosis, an urgent ultrasound of the scrotum and testes should be ordered. It is crucial to note that the Doppler ultrasound is the key diagnostic tool in identifying a testicular torsion.[7] An ultrasound that reveals a "whirlpool sign" is significant in diagnosing testicular torsion.[8] The unexpected change in the progression of the spermatic cord with a spiral twist into the inguinal canal or into the scrotal sac defines what consists of a whirlpool sign ([Figures 1] and [2]).[9]

Other findings that may be consistent with a diagnosis of a testicular torsion by an ultrasound include decreased blood flow to the testis, horizontal lie of the testis, testicular enlargement, and/or heterogeneous echotexture (patchy or ill-defined tissue).[8] Normal testicular tissue has a homogenous echotexture.[8] Abnormal testicular findings on an ultrasound may show a heterogenous pattern that may indicate inflammation if there is decreased blood flow or atrophy.[8]

Other studies to consider include a urinalysis to evaluate for a possible urinary tract infection. If there is a concern of a sexually transmitted infection, urine or a urethral culture should be obtained. Blood work such as a complete blood count with differential may be helpful to differentiate between a testicular torsion and another diagnosis.[1] An elevated white blood cell count has been correlated with testicular torsion most likely because of tissue necrosis.[1] However, an ultrasound is a priority and should not be delayed because of obtaining laboratory results or waiting for the results of the blood work or the urinalysis.

Treatment

Treatment for a testicular torsion requires surgical intervention.[5] In some cases, a manual reduction may be successful at the bedside, but the procedure is very painful and should only be attempted by individuals who have been trained to do so.[10] A manual detorsion should be performed if the time to surgical intervention is unclear or will be delayed. If the manual reduction is successful, the patient should still undergo surgical intervention to secure the testes down to the scrotal sac to prevent future occurrences of a testicular torsion.[10] Most cases of torsion will go immediately to the OR for surgical exploration to salvage the testes.[5] The goal is to get the patient with testicular torsion to the OR within 6 hours from the onset of pain to detorse the testis and avoid an orchiectomy.[5] If the testicular torsion is detorsed within 4 to 6 hours from the onset of symptoms, there is a 98% probability of saving the testicle; detorsion within 12 hours leads to a 20% likelihood of saving the testicle; more than 24 hours of symptoms leads to a 0% chance of testicular salvage.[2]

Discussion

Testicular pain is a complaint that is viewed as high risk for any male patient that presents to a health care facility. Unfortunately, not every patient with testicular torsion presents with straightforward testicular pain but endorses vague abdominal pain, inguinal pain, or sudden onset of nausea and vomiting. Testicular torsion can occur at any age but is usually seen in children up to 1 year and again between the ages of 13 and 16 years.[2] Triage nurses must include testicular torsion as a differential diagnosis in all males who present with abdominal pain. Questions surrounding scrotal or testicular pain should be asked in triage to help differentiate possible diagnoses. If the patient does have scrotal pain, they should be triaged as an ESI of 2. A testicular torsion is a high-risk situation because of the danger of losing a testicle.[3]

It is imperative that every male, despite their age, who presents with abdominal pain undergo a thorough genitourinary history and examination. A genitourinary evaluation by a provider should include wearing gloves, maintaining patient privacy, and including another health care provider at the bedside to chaperone the examination. It is recommended to have a chaperone during a sensitive examination such as a genitourinary or pelvic examination. Literature supports the use of a chaperone to make the examination more comfortable for the patient by having another person present but also supports the provider in having a witness for the procedure that is performed.[11]

As noted in the case studies, adolescents may not be forthcoming with details that they find embarrassing, especially if it involves their genitals. Even if patients report no discomfort in this region, an examination by a health care provider is essential. In both cases, if the urgent care provider had examined the patient's genitourinary area, suspicions of testicular torsion may have been raised. In the second case, if the scrotum had been examined, a torsion would have been identified, and the patient would have been sent to the emergency department for immediate intervention. Unfortunately, this portion of the examination was not completed, and the diagnosis was missed for an additional 3 days until the patient went to the emergency department. Despite the examination in the emergency department, it is highly unlikely that the testis would have been salvaged because of the prolonged time that the testis had been torsed.

Emergency Nursing Implications

Emergency nurses have an important role to play in the recognition, diagnosis, and care of patients with testicular torsion. On arrival to the emergency department, patients with a chief complaint of scrotal redness or swelling should be triaged as an ESI of 2. Nurses should keep in mind that any male who presents with abdominal pain may potentially have a genitourinary issue. Timely evaluation is crucial for these patients. After placing the patient in an examination room, the emergency nurse should ensure the patient is placed in a gown, with underwear removed, to facilitate a chaperoned genital examination using gloves and appropriate personal protective equipment. Patients and caregivers will need to understand that care, including imaging and transfer to the OR, may proceed swiftly if the problem is determined to be emergent.

Therapeutic communication is essential for this patient population. Genitourinary issues can produce anxiety and cause embarrassment for pediatric patients, especially adolescents. Direct questions regarding genitourinary pain, redness, or swelling may be intimidating. Using a gentle and reassuring manner while providing privacy and real time education will promote trust and decrease psychologic trauma for patients with suspected testicular torsion. Education regarding testicular self-examination is available through online sources, including kidshealth.org and urologyhealth.org.

Conclusion

Pediatric patients presenting with abdominal or scrotal pain require a prompt and thorough evaluation to rule out testicular torsion. Males who present with abdominal pain must have a thorough genitourinary examination to ensure the evaluation for a possible testicular torsion. If this is not done, a testicular torsion may be missed, which is a life-altering event with catastrophic consequences. If testicular torsion is highly suspected, immediate surgical intervention is required to prevent the loss of the testicle. Positive outcomes are associated with patients who are evaluated and diagnosed with a torsion within 4 to 6 hours of the onset of symptoms.

Author Disclosures

Conflicts of interest: none of report.

The authors confirm that all aspects of the manuscript adhere to Elsevier's patient consent policy.

DETAILS

Subject:	Vomiting; Emergency medical care; Testes; Health care; Nausea; Urology; Young men; Medical diagnosis; Nurse practitioners; Pain; Abdominal pain; Medical personnel; Abdomen; Ischemia; Immunization; Ultrasonic imaging; Males; Pediatrics
Identifier / keyword:	Testicular torsion; Abdominal pain; Pediatrics; Case report
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	186-191
Publication year:	2021
Publication date:	Jan 2021
Section:	Pediatric Update
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.09.006
ProQuest document ID:	2487205838
Document URL:	https://www.proquest.com/scholarly-journals/consideration-testicular-torsion-young-males-with/docview/2487205838/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-08-09

The Effectiveness of Pictorial Discharge Advice Versus Standard Advice Following Discharge From the Emergency Department: A Systematic Review and Meta-Analysis: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

Failure to provide adequate discharge advice to patients on leaving the emergency department can lead to poor understanding of and noncompliance with discharge instructions and consequently postdischarge complications or hospital readmissions. The use of pictographs to complement discharge advice has the potential to enhance patient recall and comprehension. The purpose of this paper was to determine the effectiveness of pictorial discharge advice compared with standard discharge advice in the emergency department.

Methods

A systematic review and meta-analysis was conducted. CINAHL, MEDLINE, ASSIA, and EMBASE were searched from inception to March 1, 2020, combining terms related to the emergency room, pictogram, and randomized trials as appropriate. Randomized trials reporting on the use of pictorial discharge advice in the emergency department were eligible for inclusion. Outcome measures were comprehension, compliance with advice, satisfaction with advice and the ED visit, and reattendance rates. The Cochrane risk of bias tool was used to assess bias in the included studies.

Results

Four studies were identified as eligible and included in the review. Pictorial discharge advice improved comprehension, compliance, and patient satisfaction with the advice, but not satisfaction with the ED visit when compared with standard discharge advice. None of the included studies measured reattendance rates.

Discussion

The results of this systematic review support the use of pictorial discharge advice. However, few studies exist; none had a low risk of bias overall, and 3 were published over 12 years ago. This finding highlights a need for further research to inform evidence-based best practices on optimal methods for providing quality discharge advice in the emergency department.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current literature on discharge advice indicates that a lack of understanding of discharge instructions can lead to poor compliance with instructions, postdischarge complications, and hospital readmissions. The use of pictorial discharge advice has the potential to improve these outcomes for patients.

••This paper contributes to practice by showing that pictorial discharge advice improves comprehension, compliance, and patient satisfaction with discharge advice compared with standard advice alone.

••Key implications and recommendations for translating these findings into emergency clinical practice include the ongoing use of pictorial discharge where it is currently available. Clinicians in the emergency department who plan to introduce pictorial discharge advice should do so in the context of evaluation research to assess the full range of clinical and cost-effectiveness outcomes.

Introduction

Clinicians working in the emergency department regularly engage in patient education and discharge advice. The volume of patients being discharged home from the emergency department is ever-increasing and turnaround is rapid, with the time available to provide patient education often limited.[1] The main aim of discharge advice is to provide a summary of the ED visit, educate patients to self-care at home, address any remaining concerns or questions, and inform patients about the appropriate and available community supports.[2] However, studies have found that patients often go home with a poor understanding of their discharge instructions[3-5] which can consequently lead to poor compliance with the instructions, postdischarge complications, and hospital readmissions.[6]

Discharge advice can be verbal or written and should be clear, concise, and unambiguous.[7-9] However, large populations have low health literacy levels, and up to 50% of patients potentially have difficulty in understanding their discharge instructions.[10] Therefore, it is imperative that information is provided in a simple and understandable way to allow the patient to interact and participate in their health care.[11] One method of simplifying discharge advice is to reduce the reliance on text by using pictograms as a form of information sharing.[12] Pictograms can be an effective method of providing health information as they can help engage the patient's interest and improve comprehension, particularly for the at-risk patient groups such as the elderly, children, and those with low literacy.[13,14] Pictograms can incorporate illustrations (drawings, paintings, photos) with signaling and informative graphic symbols to boost and communicate information in a clear, rapid, and straightforward way.[15]

However, findings from previous studies on pictogram use in the emergency department are conflicting[16-21] with some researchers suggesting that pictograms may only be effective if they are used as an adjunct to and not as the sole means of communicating discharge advice[20,22] and that the types of illustrations used need to be tested, evaluated, and refined to ensure their success.[21] No published systematic reviews on the topic of pictorial discharge instructions in the emergency department were found. The purpose of this review was to determine the effectiveness of pictorial discharge advice compared with standard discharge advice on comprehension in the emergency department. We also sought to determine the intervention effect of pictorial discharge instructions on compliance, patient satisfaction, and ED revisits.

Methods

We performed a systematic review and meta-analysis of randomized trials.

Inclusion and Exclusion Criteria

Randomized controlled trials (RCTs) reporting on adults or children who presented to the emergency department and were discharged home with advice involving any type of pictorial information (eg, simple line drawings, pictures, photographs, paintings, or cartoons) compared with standard discharge advice (verbal, written, or both) were eligible for inclusion. Studies that evaluated other forms of communicating discharge information (eg, text, video, automated recordings, or telephone) or in other settings (eg, out-patient, in-patient, or day-case settings) even if pictorial information was used and studies that were not in English were excluded. The primary prespecified outcome measure was patient and carer's comprehension. The secondary prespecified outcomes were compliance/adherence with discharge advice, patient satisfaction with discharge advice and with the ED visit, and

ED reattendance rates within 28 days with the same complaint.

Search Strategy

The electronic databases of CINAHL, MEDLINE, EMBASE, and ASSIA were searched from inception dates to March 1, 2020, using a combination of key words and medical subject heading terms. These terms were developed and adapted across the databases as appropriate and were based on 3 search concepts: (1) pictorial images, (2) emergency department, and (3) RCTs. The key concept term was combined with its related synonyms using the Boolean operand "OR," and then the concept strings were combined using the operand "AND." This approach ensured both specificity and sensitivity in our search strategy. The complete search strategy is presented in the Supplementary Appendix. No limits were applied to ensure all relevant studies were captured. A search for gray literature, including policy documents and theses, dissertations, and conference proceedings, was also performed. In addition, searches of the reference lists of the included studies were performed to locate any potentially relevant studies not found during the database searches.

Study Selection

Following the removal of duplicates, the title and abstract of all of the remaining citations retrieved from the search were assessed against the review's inclusion criteria. The full text of potentially eligible studies was further assessed by 2 reviewers independently. Any conflicts of opinion between reviewers during the screening and selection process were resolved by discussion and consensus.

Risk of Bias

The Cochrane risk of bias (ROB) tool was used to assess ROB in the included studies.[23] ROB assessments were undertaken by 2 reviewers independently. Any differences in opinion were discussed until agreements were reached.

Data Extraction and Management

A data extraction form was developed and used to extract the relevant data from each included study. Information extracted included the study design, setting and participants, inclusion and exclusion criteria, description of the intervention and comparison, data related to the reviews' prespecified outcomes, and a summary of the study authors' findings. The data were extracted by 2 reviewers independently and cross-checked for accuracy. The data were subsequently entered into Review Manager Software (RevMan 5.3, Cochrane) for analysis.

Data Synthesis

Meta-analyses were performed when more than 1 study included the same outcome measure. For dichotomous outcomes, the relative risk (RR) and 95% confidence interval (CI) were calculated to provide an overall effect estimate. For continuous measures, the mean difference with 95% CIs were calculated, where the outcome was measured across the studies in the same way. If the same outcome was measured differently (eg, using a different scale), the standardized mean difference was used. Accepting that some clinical and methodological diversity is likely in a meta-analysis, we assessed the extent of statistical heterogeneity; that is, the extent to which the results of the studies included in a meta-analysis are consistent, using the I^2 statistic. We quantified this based on Cochrane guidance for I^2 values as follows: 0% to 40%, might not be important; 30% to 60%, may represent moderate heterogeneity; 50% to 90%, may represent substantial heterogeneity; and 75% to 100%, considerable heterogeneity.[23] Meta-analyses were performed using a fixed-effects model, except when we found substantial or considerable heterogeneity. If this heterogeneity was observed, we applied a random-effects model, which weights the studies relatively more equally, taking into account between-study variations such as small-study effects, which may influence the results. As less than 10 studies were included in the review, funnel plot tests were not performed.[23]

Results Search and Selection Process

The electronic database search yielded 3,574 citations. Of these, 150 were duplicates and were removed. Of the 3,424 records screened on title and abstract, 3,405 were excluded, leaving 19 records for full-text review. Searching the gray literature yielded 559 records, none of which met the inclusion criteria. Of the 19 records assessed at full-text, 15 were excluded as 8 did not report on pictorial discharge advice,[24-31] 5 were not RCTs,[16,32-35] and 2 were duplicates.[36,37] This resulted in the inclusion of 4 studies in the review.[14,38-40] Figure 1 illustrates the search and selection process.

Characteristics of Included Studies

Table 1 presents the summary characteristics of the included studies. All 4 studies were conducted in emergency departments in the United States. One trial, conducted in a rural level 1 trauma center, recruited 101 participants (54 in the intervention group and 47 in the control group) who presented to the emergency department with lacerations between June 1993 and July 1993.[38] The second study, involving 205 adults and children presenting to the emergency department with wounds of which 103 received wound care instructions with cartoons and 102 received instructions without cartoons, was conducted in a community hospital and tertiary care facility between April 1994 and July 1994.[14] The written text was identical on the 2 sets of instructions and was written at a seventh-grade educational level. Baseline characteristics (age, gender, level of education, and time spent in the emergency department) were similar between the groups. The third study, conducted in a large inner-city university emergency department, involved 796 participants, of which 368 were assigned the intervention, which consisted of pictures added to 2 simply worded discharge instructions.[39] The fourth study, involving pediatric patients between the ages of 30 days and 8 years (and their parents) recruited between July 2006 and December 2006, took place in an urban public pediatric emergency department in New York.[40] Of the 245 patients included, 124 were allocated to a pictogram-based intervention and 121 to standard medication advice, although 11 and 7 from each group, respectively, were lost to follow-up. The intervention consisted of plain language, pictogram-based medication instruction sheets, in English and Spanish, used to convey information about medication name, indication, dose and dose frequency, length of treatment, preparation, and storage. The control group received standard medication discharge advice regarding prescribed medications and postvisit advice by the pediatric nursing staff. The study participants were further subdivided into those that received daily dose and as-needed medications. In the pictogram-based group, 46 received daily dose medications, and 79 received as needed. In the standard medication group, 53 received daily dose, and 79 received as-needed medications. Follow-up was completed either by telephone and/or in-person 3 days to 5 days after the ED visit for as-needed medication and within 1 day of the projected end date for daily dose medications. There were no differences between the groups in terms of the child's age, sex, or type of medication prescribed.

Quality Assessment

Figure 2 presents the results for the ROB assessments. ROB on random sequence generation was low in 2 studies[14,40] and unclear in 2 studies because of limited information to fully assess ROB.[38,39] One study had low ROB on allocation concealment.[40] This was unclear in the remaining 3 studies because of insufficient information. It was impossible to blind the participants and personal administering instructions in all of the included studies, and we assessed ROB as unclear for this criterion in all studies because of the uncertainty surrounding this issue. Detection bias was low in 2 studies.[14,38] One study did not provide enough data to judge detection bias and was assessed as unclear.[39] In the remaining study, the researchers were involved in both intake (recruitment) and follow-up assessments and were aware of allocated groups; we thus judged the risk of detection bias as high in this study.[40] Two of the studies had a low risk of attrition bias,[38,40] and 2 were unclear. Three of the included studies had a low

ROB on selective reporting, as all prespecified outcomes were reported.[14,38,40] The fourth study was judged as having a high ROB.[40] Of the 4 studies, 3 were assessed as having unclear risk of other bias, and 1 was considered as high risk because the data were collected using 2 different methods; an interview before leaving the hospital or, if the interview did not occur, contacted at home via telephone which had the potential to influence responses.[38]

Data Extraction

Austin et al[38] measured comprehension only, based on participants answering 5 or more questions correctly. Delp and Jones[14] reported on 3 of the reviews' pre-specified outcomes; comprehension, compliance, and satisfaction. The authors subdivided comprehension into 2 categories on the basis of (1) a series of 4 questions and (2) the readability of the discharge advice instructions. The numbers that answered all 4 questions correctly in each group and the numbers in each group that reported readability as "very easy" were used for the outcome comprehension. Compliance with discharge instructions was defined as the numbers having cleaned the wound at least once per day with either hydrogen peroxide or commercial soap. Satisfaction with ED visit and with instructions/discharge advice was defined as the numbers reporting "very satisfied." Yin et al[40] reported comprehension and compliance only. Comprehension was measured in terms of error rates; that is, higher errors, less comprehension. They also subdivided comprehension into errors in the knowledge of dose frequency, incorrect medication preparation, and storage errors for both daily dose and as-needed medication. The data for comprehension, once extracted, were changed to reflect non-error rates. For compliance data, Yin et al[40] reported nonadherence rates based on more than 20% of the participants not taking the prescribed dose correctly and not completing the medication course. Similarly, for purposes of analyses, these data were converted to adherence rates based on 80% or greater taking the prescribed dose correctly and completing the medication course. Friedmann et al[39] was the only study that reported continuous data and reported on comprehension only. As there was considerable missing data, particularly relating to the control group, the results are presented narratively. None of the included studies reported on the outcome of readmission rates.

Findings Comprehension

As different categories of comprehension were assessed across the studies, effect estimates of comprehension overall and comprehension others are provided. The results demonstrate that comprehension overall was significantly improved with pictorial discharge advice compared with standard advice (RR = 2.53; 95% CI 1.19-5.35; I^2 = 89%; 3 studies, n = 389) (Figure 3). As statistical heterogeneity was high, we removed Delp and Jones' study,[14] which was largely contributing to this I^2 and re-ran the analysis. The results remained significant in favor of pictorial advice for increased comprehension (RR = 1.70; 95% CI 1.35-2.15; I^2 = 0%; 2 studies, n = 184).

The results for other measures of comprehension are presented in Table 2, with each result based on data from a single study. Readability of instructions, non-error rates in as needed medications, and accurate preparation of daily dose and as needed medications were all significantly improved with pictorial compared to standard discharge advice.

Reporting narratively on the results from Freidmann et al,[39] the mean score for correct answers from the intervention group was 4.55/5.00 compared with 4.36/5.00 in the control group, *P* P = 0.001.

Compliance

Participants who received pictorial discharge advice were more likely to comply with their discharge instructions than those receiving standard advice (RR = 1.44; 95% CI = 1.22-1.68; I^2 = 0%; 2 studies, n = 298 participants) (Figure 4), and to complete their medication course (RR = 1.72; 95% CI 1.18-2.50; 1 study, n = 93 participants).

Patient Satisfaction

Patient satisfaction was reported in 1 study only, and included satisfaction with discharge instructions and

satisfaction with the ED visit. The results indicate higher satisfaction with discharge instructions in the pictorial group (RR = 1.48; 95% CI 1.28-1.71; n = 205), but no difference between groups in satisfaction with the ED visit (RR = 1.02; 95% CI 0.92-1.14; n = 205).

Discussion

All 4 studies included in this review demonstrated favorable outcomes with pictorial discharge advice, in particular, increased comprehension and compliance. Satisfaction with discharge instructions, although reported in only 1 study, was also higher when pictograms were used, whereas there was no difference in satisfaction with the ED visit. The former might be linked to patients feeling more prepared or ready for discharge as a result of understanding their home-care instructions, but not necessarily with the visit overall as receiving discharge occurs toward the end of their visit. The studies all evaluated the use of pictorial advice as an adjunct to written and/or verbal advice and not as a replacement; therefore, the impact of using pictorial instructions may vary depending on the level of verbal and written instructions that are also provided. Furthermore, although reattendance rates were considered an important outcome for the review, none of the included studies measured this outcome. This finding may reflect the small numbers of included studies or the complexity in collecting data on reattendance rates as prolonged follow-up and/or retrospective data collection may be required.[41]

One of the goals of this systematic review was to generate higher-level evidence relating to pictorial discharge advice in the emergency department and make recommendations for practice based on this evidence, to potentially improve the quality of care provided to patients in the emergency department. Although the evidence is convincing for using pictorial discharge advice, particularly for comprehension and compliance, this evidence is based on a few studies, which are of variable quality, and were published between 12 and 25 years ago. Furthermore, no studies reported on reattendance rates, which is an important outcome when considering widespread practice change, and cost analysis on the use of pictorial discharge advice compared with standard advice would be required. Based on findings from only 4 studies, further research to substantiate the use of pictorial aids in the emergency department is required, a finding that resonates with recommendations from other systematic reviews of pictorial aid interventions.[22,42]

Although promising, the findings of this review highlight the limited evidence on the use of pictorial discharge advice in the ED setting, indicating that contemporary high-quality RCTs, with larger sample sizes, are needed. Future research should also consider other elements such as the varying conditions that patients present to the emergency department with and the effect of pictorial discharge advice on reattendance rates. The lack/absence of studies conducted in Europe indicates the need for research in different settings internationally.

Limitations

The lack of comparable studies for analysis is a limitation in this review. The overall quality of the included studies also limits the findings, as none were considered to have a low ROB overall. All of the studies were completed in American institutions leading to a potential risk of cultural bias and possible challenges for the transferability of the findings to other countries and settings. The lack of diversity in the conditions that were assessed using pictograms may also affect the validity of the findings. Although our search strategy was comprehensive, including a search for both published and unpublished studies, the search protocol was not preregistered, which may be considered a limitation of the review. However, the findings of the review are informative and are underpinned by a robust review process, including a thorough search strategy. As such, the findings of this review provide the basis for considering the use of pictograms to enhance discharge information in the emergency department.

Implications for Emergency Clinical Nurses

Although the findings of this review are based on meta-analyses of outcomes from only 4 studies, the findings are

still convincing for the positive effects of using pictorial discharge advice, particularly for comprehension and compliance. However, preparing pictorial discharge advice may have cost implications beyond those of standard discharge advice. These may include, in addition to the potential increased paper and printing costs for lengthier pamphlets, the need for specialist personnel such as a cartoonist to develop the illustrations, an educationalist to ensure the pictographs are age and literacy (lay language) appropriate, and a clinician to ensure the illustrations are relevant and appropriate for the health care condition or topic. Acknowledging this, we recommend ongoing use of pictorial discharge advice in the emergency department where it is currently available, while also advising the need for robust contemporary research to determine if the use of pictorial discharge advice is a viable widespread practice change option. Thus, we recommend that clinicians in the emergency department should consider the use of pictorial discharge advice, but if newly implementing their use, they should do so in the context of evaluation research or quality improvement projects whereby the full range of important clinical and cost-effectiveness outcomes can be thoroughly assessed.

Conclusions

The evidence of effect for using pictorial discharge advice in the ED setting appears promising, especially for increased comprehension and compliance with discharge advice. However, further contemporary research is required, particularly in determining the effect of pictorial discharge advice on reattendance rates and cost-effectiveness. Nurse practitioners, scientists, and researchers in emergency nursing specialties are well-positioned and should be encouraged to conduct high-quality, rigorous research on the topic, using prospective randomized trials. This research will assist in expanding the contemporary evidence base, optimizing ED discharge care, and ensuring nurse leaders engage in quality improvement projects at their practice sites.

Author Disclosures

Conflicts of interest: none to report.

The systematic review was conducted in partial fulfillment of an MSc undertaken at Trinity College Dublin by the lead author (S.D.), and who also received funding from the Office of the Nursing and Midwifery Services Director to support her College course. The funding body was not involved in planning the review, or in review methodology, data management or analytics, or manuscript preparation.

Supplementary Appendix Search Strategy Concept 1: Pictorial images

CINAHL: (MH “Pictorial Methods”) OR (MH “Graphics”) OR (MH “Picture Archiving and Communication Systems”)

MEDLINE: (MH “Multimedia”) OR (MH “Electronic Supplementary Materials”) OR (MH “Motion Pictures”) OR (MH “Books, Illustrated”) OR (MH “Medical Illustration”) OR (MH “Graphics”)

EMBASE: Multimedia/exp

EBSCO &other Databases Keywords: (media* OR multimedia OR pictorial* OR picture* OR pictogram* OR drawing* OR diagram OR illustrat* OR diagram* OR art OR cartoon OR comic* OR depiction OR visual OR icon* OR impression* OR photo OR photograph* OR sketch* OR doodle* OR symbol* OR hieroglyphs OR glyph OR artwork* OR graphic* OR artwork* OR animation* OR “comic strip*” OR “comic book*” OR portrait* OR emblem* OR logo* OR silhouette* OR “graphic novel*”) N3 (use* OR usage* OR uptake* OR roll-out* OR implement* OR utiliz* OR utilis*)

EMBASE Keywords: (media* OR multimedia* OR pictorial* OR picture* OR pictogram* OR drawing* OR diagram* OR illustrat* OR diagram* OR cartoon OR comic* OR depiction OR visual OR icon* OR impression* OR photo OR photograph* OR sketch* OR doodle* OR symbol* OR hieroglyphs OR glyph OR artwork* OR graphic* OR artwork* OR animation* OR 'comic strip*' OR 'comic book*' OR portrait* OR emblem* OR logo* OR silhouette* OR ‘graphic novel*’) NEAR/3 (use* OR usage* OR uptake* OR roll-out* OR implement* OR utiliz* OR utilis*)

Concept 2: Emergency Department

CINAHL: (MH “Emergency Service”) OR (MH “Emergency Medical Service Communication Systems”)

MEDLINE: (MH “Emergency Service, Hospital”) OR (MH “Emergency Medical Service Communication Systems”) OR (MH “Emergency Nursing”) OR (MH “Emergency Medical Services”)

EMBASE: ‘emergency ward’/exp OR ‘hospital emergency service’/exp

Keywords for all Databases: “Emergency Room*” OR “emergency service” OR “emergency department” OR “emergency room” OR “casualty*” OR “accident and emergency” OR “accident &emergency” OR “Emergency Care” OR “emergency nursing”

Concept 3: Randomized controlled trial

CINAHL: (MH “Controlled Clinical Trial+”) OR (MH “randomized controlled trial”)

MEDLINE: (MH “Controlled Clinical Trial+”) OR (MH “randomized controlled trial”)

EMBASE: ‘controlled clinical trial’/exp OR ‘randomized controlled trial’/exp

Keywords used in all Databases: randomized OR randomized OR randomly OR placebo OR “clinical trials” OR “Controlled Clinical Trial” OR “randomized controlled trial”

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.07.005.

Study	Setting	Type of participants	Presentation	Number of participants	Description of the intervention
Austin et al[38]	Rural level 1 trauma center	Not specified	Patients with lacerations	101	Discharge instructions with or without illustrations. The written text was identical on both sets of instructions
Delp and Jones[14]	Community hospital and tertiary care facility	Adults and children	Wounds	205	Discharge instructions with and without cartoon illustrations. The written text was legible and written to be understood by a person with a seventh-grade education and was identical on both sets of instructions
Friedmann et al[39]	Large inner-city university emergency department	Not specified	Not specified	796	Pictures were added to 2 simply worded discharge sheets

Yin et al[40]	Urban public pediatric emergency department	Children between 30 d and 8 y, and their parents	Prescribed liquid medications (as-needed and daily dose)	245	Plain language, pictogram-based medication instruction sheets, in English and Spanish, which used pictograms to convey information about medication name, indication, dose, dose frequency, length of treatment, preparation and storage

Comprehension measure	Pictorial Events/Total	Standard Events/Total	RR (95% CI)
Readability of instructions 'very easy'	101/103	65/102	1.54 (1.33-1.79)
Frequency of observed non-error rate of at least 80% in as needed medications	54/64	36/60	1.41 (1.12-1.77)
Numbers who accurately prepared daily dose medication	41/46	38/53	1.24 (1.02-1.51)
Number who accurately prepared as-needed medication	62/79	45/79	1.38 (1.10-1.72)
Numbers who accurately stored daily dose medication	41/46	43/53	1.10 (0.93-1.29)
Numbers who accurately stored as needed medication	57/79	56/79	1.02 (0.84-1.24)

DETAILS

Subject:	Emergency medical care; Noncompliance; Comprehension; Systematic review; Discharge; Patient satisfaction; Pictographs; Bias; Compliance; Best practice; Evidence based research; Patient education; Reattendance; Meta-analysis; Health literacy; Emergency services
Identifier / keyword:	Pictorial discharge advice; Pictograms; Emergency department; Systematic review
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47

Issue:	1
Pages:	66-75.e1
Publication year:	2021
Publication date:	Jan 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Evidence Based Healthcare, Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.07.005
ProQuest document ID:	2487205834
Document URL:	https://www.proquest.com/scholarly-journals/effectiveness-pictorial-discharge-advice-versus/docview/2487205834/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-06-12
Database:	Public Health Database

The Effect of a Cartoon and an Information Video About Intravenous Insertion on Pain and Fear in Children Aged 6 to 12 Years in the Pediatric Emergency Unit: A Randomized Controlled Trial:

JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

Intravenous insertion is the most common invasive procedure made for administering intravascular fluid and medicine. Peripheral venous catheterization may cause pain, fear, and stress in children. This study aimed to compare the effects of watching a cartoon and an information video about intravenous insertion on the pain and fear levels of children aged 6-12 years.

Methods

The study was an experimental, randomized controlled clinical trial. It was conducted with 477 children aged 6-12 years randomized into 3 groups: the informative animated video group, the cartoon group, and the control group. Fear and pain perception were evaluated on the basis of the feedback from the child, observer nurse, and parents. The Children's Fear Scale was used to evaluate the fear level and the Wong-Baker FACES Scale was used to assess pain levels. Data were analyzed using one-way analysis of variance, the chi-square test, and the intraclass correlation coefficient test.

Results

The children who watched the information video before the intravenous insertion procedure and those who watched a cartoon during the procedure had lower mean pain and fear scores as evaluated by the child (pain: F = 278.67, *P* = 0.001; fear: F = 294.88, *P* = 0.001), parent (pain: F = 279.53, *P* = 0.001; fear: F = 294.47, *P* = 0.001), and nurse (pain: F = 286.88, *P* = 0.001; fear: F = 300.81, *P* = 0.001) than children in the control group.

Discussion

This study showed that watching an animation video or a cartoon was effective in lowering children's perceived level of pain and fear during an intravenous insertion intervention.

FULL TEXT

DETAILS

Subject:	Intubation; Emergency medical care; Pain; Chi-Square Test; Anticonvulsants; Catheters; Sepsis; Intervention; Clinical research; Families &family life; Anesthesia; Clinical trials; Fear &phobias; Pediatrics; Catheterization; Invasive; Analgesics; Age; Hypotheses; Blood pressure; Cartoons; Children &youth; Chronic fatigue syndrome; Nursing; Children; Anxiety
Identifier / keyword:	Child; Pain; Fear; Intravenous; Peripheral
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	76-87
Publication year:	2021

Publication date:	Jan 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Evidence Based Healthcare, Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.04.011
ProQuest document ID:	2487205827
Document URL:	https://www.proquest.com/ scholarly-journals/effect-cartoon-information-video-about/docview/2487205827/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2022-10-10
Database:	Public Health Database

External Female Urinary Catheter: Implementation in the Emergency Department: JEN

ProQuest document link

ABSTRACT (ENGLISH)

The emergency department is a care environment in which indwelling urinary catheters are placed frequently; however, the significance of the role of the emergency department in catheter-associated urinary tract infection prevention has been overlooked. The use of an external female urinary catheter is an alternative to placing an

indwelling urinary catheter for female patients in the emergency department who are incontinent of urine or are immobile. The purpose was to describe the implementation of an initiative to decrease the number of indwelling urinary catheters and increase the use of external urinary female catheters in non–critically ill women who visited the emergency department at a 451-bed Magnet-designated community hospital in the Southeast. For this clinical implementation project, the Plan, Do, Check, Act framework was used to develop the initiative, and outcome data were collected retrospectively and included an indirect calculation of the number of indwelling urinary catheters placed in the emergency department. A total of 187 external catheters were used in place of indwelling catheters in female patients over a 3-month period. No skin irritation or breakdown was observed. This project demonstrated the initial staff acceptability and feasibility of external female urinary catheter use in the ED setting.

FULL TEXT

Learning Objectives

After reading this description of a clinical implementation project, the reader will be able to:

••Discuss how the use of an external female urinary catheter may decrease the use of indwelling urinary catheters in the emergency department.

••Describe the importance of staff collaboration in developing new initiatives and interventions.

••Explain how nursing autonomy can be promoted in the design and development of a new departmental initiative.

Patient Safety and Quality Care

Patient safety and quality care are universal aspects of today's health care environment. Many organizations have shifted their focus to become a "high-reliability organization" (HRO) in the delivery of care. The HRO approach emphasizes being accountable for building safer systems of care.[1] In the ED environment, the overall goal is to provide timely, emergent management of patients presenting for care while maintaining best practice for patient safety and quality at the forefront.

In the emergency department, the focus is often on the here and now. The long-term impact of seemingly routine procedures may be de-emphasized during emergency management. This is especially true for female patients who have urinary incontinence or poor mobility where an indwelling urinary catheter (IUC) may be placed for convenience rather than necessity.[2,3] Women are at an increased risk for a urinary tract infection (UTI) owing to the anatomical location of the urethra, near the vagina and anus. Placement of an IUC increases infection risk because the placement of the catheter can introduce bacteria into the otherwise sterile bladder, leading to a catheter-associated UTI (CAUTI).[4] This paper describes an implementation framework to reduce the number of IUCs inserted in non–critically ill women in the emergency department while simultaneously increasing the use of external female urinary catheters (EFUCs) in women in the same emergency department.

A Common Procedure with High-Risk Implications

CAUTI is a major concern in the inpatient environment owing to the significant impact on clinical outcomes, which include increased mortality, increased length of stay, and cost.[5] It is estimated that 65% to 75% of the CAUTIs are preventable.[5] The Centers for Medicare and Medicaid Services no longer reimburses hospitals for the cost of managing a patient with a hospital-acquired CAUTI.[5] The prevention of CAUTI has been a National Patient Safety Goal since 2012. Initial strategies for the prevention of CAUTI focused on the inpatient setting with the use of nurse-initiated discontinuation protocols, automatic stop orders, checklists, and daily reminders.[5] The more quickly the IUC is removed, the lower the likelihood of a CAUTI development.

However, the significance of the role of the emergency department in CAUTI prevention has often been overlooked. Annually, nearly 3 million IUCs are placed in emergency departments across the United States.[6] The common

procedure of placing an IUC in the emergency department for patients who are immobile or have urinary incontinence has several implications for the patient and the health system.[6] IUCs placed in the emergency department have been reported to have a higher risk of CAUTI than catheters placed in other clinical settings.[7]

Implementation Framework

The Plan, Do, Check, Act model was used to guide this initiative in the emergency department. The Plan, Do, Check, Act model is a framework for continuous process improvement and is useful in implementing new initiatives in health care.[8] The Template for Intervention Description and Replication model is a framework used as a guide to report the implementation process.[9]

EFUC Description

The EFUC is a cylinder-shaped external catheter covered by a soft wicking-padded material that is designed to be placed externally over the female genitalia between the legs. During initial placement, the woman has her legs abducted (Figure 1). Then the legs are brought back together during EFUC use. When placed, the EFUC covers the female perineum, from the back to the symphysis pubis, and sits snugly between the labia majora. The external catheter is enclosed within a wicking cushion and is attached to wall suction. As the patient voids on the wicking-cushioned area, the urine is suctioned away from the patient to a wall canister. This keeps the patient's perineum dry and free from urine-related moisture (Figure 1). For this initiative, the selected EFUC used was already what was available through the hospital supply chain.

Setting

The EFUC initiative took place at a 451-bed Magnet-designated community hospital in the suburban Mideastern US. The emergency department has 50 beds, cares for approximately 68 000 patients annually, and is part of the hospital's level II trauma center. In this hospital, the emergency department is 1 of the most frequent locations for IUC placement.

Implementation Champions and Stakeholders

An ED CAUTI-prevention team was developed and led by the ED clinical nurse specialist to plan the EFUC implementation process. The ED CAUTI-prevention team members became the champions for IUC insertion–prevention and included 2 emergency nurses, 1 emergency medical technician (EMT), and 1 paramedic (EMT-P). Key stakeholders were identified by the impact their role had on urinary catheter placement, supplies, and workflow (Table) and included ED and infection control leadership, ED clinical staff, the clinical quality shared governance council, and the hospital supply chain. All the stakeholders agreed that alternatives to urinary catheters were important and that alternatives should be available in the ED environment. A review of the literature was completed to validate best practices and inclusion and exclusion criteria for this initiative.[6,7,10,11]

The following criteria for EFUC use were identified:

1. ED female patients.
2. Noncritical condition and does not require precise intake and output measurement because this would require a urinary catheter with an hourly-meter urine collection bag.
3. Aged 18 years or older, with a urinary incontinence bladder control issue or immobility.
4. Alert and oriented to person and place, with the ability to follow directions.

The clinical nurse specialist met with the team champions to discuss the rationale for use of the EFUC and to demonstrate correct placement. The risk of CAUTI from IUC placement was discussed. In addition, the importance of patient advocacy and nurse autonomy was highly stressed because the EFUC does not require a prescription

order from a medical provider.

EFUC Staff Education

The champion team was tasked to educate the ED clinical staff. The champions had 5 major teaching points that all the RNs, EMTs, and EMT-Ps were educated about before using the EFUC.

1. Advocating for the patient by asking to use an EFUC when an IUC was prescribed by the LIP.
2. The EFUC does not require a prescription from a licensed independent provider.
3. The location of EFUC supplies in the emergency department.
4. Safe EFUC placement through demonstration and poster presentation. Only female staff members are permitted to place an EFUC for a female patient in this organization.
5. Patient education regarding EFUC patient comfort measures.

The education rollout was completed through 10-minute preshift huddles and a poster presentation. The poster illustrated the major criteria for EFUC placement and was placed in the huddle room for the staff to view before or after their shift.

Implementation Mentoring

After the initial education, the champions provided real-time mentoring and assistance by reviewing active patient prescription orders for IUC placement and worked with fellow nurses to determine if the patient met criteria for EFUC placement. The primary role of the champions was to mentor, teach, and assist with EFUC placement. In addition, the champions were tasked with being an expert resource for real-time decision-making.

The ED LIP team was provided with a 1-page document that included the criteria for EFUC use and were informed that an order was not needed for the staff to use an EFUC. Physicians were told to expect that RNs, EMTs, or EMT-Ps would be approaching them to discuss order cancellation when the patient was a candidate for an EFUC. The physician team, understanding the clinical importance of CAUTI prevention, embraced the plan and implementation. Once knowledge of the EFUC spread, more champions were welcomed, and the EFUC implementation team was expanded.

The nursing staff innovated further by using mesh underwear for women with an EFUC in place. The mesh underwear helped to stabilize the EFUC and eliminate the patient's feeling that she needed to hold the device tightly in place during the maintenance phase. Although not part of the initial implementation plan, the mesh underwear was a positive addition to the initiative.

Implementation Timeline

The EFUC device was introduced to the champion team in August 2018 and introduced to the staff in September 2018. Over the next 3 months, 187 EFUCs were placed on women in the emergency department. Thus, the external urine collection systems replaced 187 urinary catheters in women. The EFUC is 45% less expensive than a typical IUC used for non–critically ill patients, suggesting a cost-benefit or cost-neutral impact. During the EFUC implementation initiative, we found no occurrences of skin irritation or breakdown.

Implementation Outcome Measurement

This initiative focused only on non–critically ill female patients who needed assistance with urine elimination owing to incontinence or immobility who did not need an IUC to strictly measure urine output.

Outcome data were collected retrospectively and included the number of EFUCs placed and an indirect calculation of the number of IUCs inserted in the emergency department (Figure 2). To calculate the decrease in IUC insertion, the

number of urinary catheters with simple collection bag kits ordered from the supply chain in the 3 months before the EFUC implementation (March, April, and May 2018) was compared with the 3-month post–EFUC-implementation total (September, October, and November 2018). These specific preimplementation months (March, April, and May) and postimplementation months (September, October, and November) were used for comparison because the EFUCs were being procured and stocked during June and July and were available for demonstration and staff education in August. This ensured that the reported number of EFUCs used was precise.

The champion team wanted to calculate and compare the actual number of urinary catheters that were inserted in non–critically ill patients during the pre- and post-EFUC periods. The only available data were from the hospital supply chain, which were based on the number of IUC kits with a simple collection bag supplied pre- and postimplementation. The difficulty with these data was that they were not broken down by male and female patients, and therefore only calculated estimates were available ([Figure 2]). Fewer IUCs were inserted after EFUC implementation, as anticipated. Unexpectedly, the decrease in IUCs was greater than can be explained by use of the EFUC alone as shown by the calculations in [Figure 2]. There was a slight decrease in the number of ED visits during the implementation period. This decrease was not large enough to explain the decrease in IUCs. We surmise that the decrease in IUC placement was related to greater awareness of CAUTI and EFUC availability in the emergency department.

Discussion

The emergency department is a unique setting in which nurses are frontline leaders of HROs and drive safe and high-quality care. In the emergency department, the focus of care is on the immediate needs of the patient. However, this focus can miss long-term consequences of treatment rendered in the emergency department. This implementation initiative highlights several important areas of nursing practice in the emergency department, including nursing autonomy and teamwork, staff and patient education, financial stewardship, challenges of retrospective data collection, and lessons learned.

Frequent placement of IUCs in patients who are not critically ill is an instance in which long-term consequences of care may be overlooked. This offers opportunities for staff education and improvement of patient care in the emergency department. The successful implementation of EFUC placements in the emergency department demonstrates that CAUTI prevention strategies are feasible and appropriate for settings other than inpatient units and, overall, contribute to infection prevention within the organization. We found that non–critically ill female patients tolerated the EFUC well. Furthermore, although skin irritation or breakdown is a possible risk, no patients for whom an EFUC was placed during this initiative had skin irritation or skin breakdown while in the emergency department. This associated risk may be more likely when the EFUC is in place in a long-term setting such as inpatient or admission holds in the emergency department.

In addition to decreasing the number of IUCs placed, this initiative increased nurse autonomy and caregiver collaboration. An unanticipated effect of the EFUC implementation initiative was the realization that, at times, some nursing staff were hesitant to approach the provider when an IUC was prescribed, even when the nurse believed that the EFUC was a better option. The champions played a significant role in overcoming this communication barrier. The champions coached the nursing staff to identify the specific reasons that an EFUC may be a better option than an IUC. The opportunity to discuss alternatives with the champions empowered the nursing staff to advocate for their patient with evidence-based rationale when approaching providers.

As with all practice initiatives, staff education and re-education are vital. Staff education was extensive with written information, in-services, and hands-on application. A graphic of a strong female superhero character holding an EFUC was used to emphasize the goal of CAUTI prevention in women. This was a memorable visual to help the

staff think of the EFUC as an alternative to an IUC. The EFUC champions were available on the unit to reinforce education or discuss and problem-solve with their staff colleagues.

Patient education regarding the EFUC device was paramount to the successful application and continuation of the initiative. The nurses realized that many female patients understood how to use the EFUC, but the women felt that they needed to hold it in place with their legs, which could become tiresome. The nursing staff added the use of mesh underwear for women with an EFUC to increase patient comfort. Although not part of the original performance improvement plan, this had a positive effect on the use of the EFUC for women.

Being a good financial steward is important and financial data are often used to drive changes in health care. In this case, a single EFUC is 45% less expensive than a single IUC with a simple collection bag. However, the EFUC must be changed every 8 to 12 hours, or more frequently if soiled by blood or stool. Therefore, although an EFUC is less expensive than an IUC, the need for frequent replacement will void any initial financial benefit. A more important point is to not allow the cost of a product to determine what is considered best practice. The true benefit is the positive impact on patient outcomes.

Retrospective data collection presented challenges. When the project was initiated, the goal was to change practice in the emergency department by decreasing the number of IUCs placed. The numbers in Figure 2 show that this goal was achieved. However, unexpectedly, the decrease in IUCs was even greater than the use of EFUCs alone. The hospital supply chain provided the numbers of IUCs, but because these numbers were not linked to individual patients it was impossible to determine the exact IUC decrease in women vs men. Eckert et al[11] published similar criteria to those used in this implementation project and also used supply chain data to determine EFUC and IUC use with similar limitations.

The identification of stakeholders and creation of a support team before the implementation was very helpful to create a collaborative working environment. One important lesson we learned is the necessity of planning the data collection strategy before the implementation rather than retrospectively. For example, we were not able to assess the impact of the EFUC initiative on CAUTI outcomes in the hospital. Although the hospital CAUTI rate deceased during the ED EFUC implementation, many additional factors could have contributed to the decrease in CAUTI, including inpatient-unit use of EFUCs, new inpatient prescription order sets that included IUC removal requirements, and placement of fewer IUCs in the emergency department and in the hospital.

Conclusion

The significance of the role of the emergency department in CAUTI prevention has often been overlooked. The emergency department is an ideal environment in which to create an impact on CAUTI rates by implementing external urine collection alternatives for patients with urinary incontinence and immobility. The implementation of an initiative to place EFUCs demonstrated that they are feasible for use in the ED setting and contributed to a reduction in the insertion of IUCs.

Stakeholder	Education	Engagement	Intervention

ED leadership and infection prevention leadership	Role of emergency department in CAUTI prevention. Potential financial implications of IUC and EFUC.	ED collaboration and active role in CAUTI prevention. Potential decrease in hospital CAUTI.	Presented idea for project and request for EFUCs to be supplied to the emergency department.
Clinical quality practice council	In-person presentation of ED role in CAUTI.	Requested additional recommendations for QI project plan.	Followed through on council recommendation to collaborate with supply chain to get project started.
Supply chain	Discussion of who, what, when, where, and why an IUC or EFUC would be needed in the ED setting.	Decrease in IUC use may have a positive decrease in cost, both for the IUC product use and cost associated with supply use for patients with increased length of stay owing to CAUTI.	In-person meeting with supply chain manager. Formal written request to supply chain to have EFUCs added to ED stock inventory. Obtained data on IUC bag-only type use in the emergency department.
Emergency nurses	Poster board presentation regarding IUC, EFUC, and CAUTI presented by RN champions. In-person in-service conducted over a month during each shift premeeting. Poster remained up in break room for remainder of QI project.	Developed a collaborative CAUTI-prevention team. Used a strong female superhero character holding the EFUC in hand to further emphasize the need for UTI prevention in women and empower all staff to consider use of the external catheter device. Empowered RNs to use assessment skills with pre-established criteria to determine if patient could be a candidate for an EFUC. Encouraged nurse education role to teach in real-time setting why an IUC prescription for a female patient may not be of benefit.	Working with support staff (EMT and EMT-P) to make recommendation to the nurse when an alternative catheter should be considered. Champions' real-time mentoring on when, and when not, to use an IUC for a female patient. Collaboration with ED LIP if an IUC was prescribed for a female patient who could benefit from use of an EFUC.

ED EMTs, EMT-Ps	Included as teachers for in-services and poster board presentations. EMT and EMT-P teaching fellow medics why CAUTI is an issue and how they too can collaborate with nursing staff and LIPs regarding IUC placement.	Empowered them to mentor both fellow medics and RNs on how to apply an EFUC to a patient. Emphasized that even if a male medic they too can collaborate with RN to recommend EFUC vs IUC for a female patient.	Champions helped to teach in-services. Champions provided staff with real-time mentoring and support.
ED LIPs	Shared with ED director physician group data regarding hospital CAUTI and emergency department as 1 of top 3 areas of inserters of IUCs. Provided education regarding criteria and EFUC as an alternative to IUC.	RN ability to independently assess and determine if a female patient could benefit from an EFUC. No order without a need for a prescription. This decreases interruptions for a nursing-based intervention. The nurse, EMT, and EMT-P will document EFUC in electronic medical record.	ED CNS created a 1-page physician education flyer that was sent out to all ED LIPs to alert them of new product and criteria for use. Asked for LIP support should an RN, EMT, or EMT-P request that a prescription for an IUC be cancelled.
ED female patients	The clinical staff member placing the EFUC device is required to be female. A male or female clinical staff member before placement would show the patient the device and discuss how it is used. Additional discussion regarding IUC placement and CAUTI was part of the education.	Allowing the patient to see the device before use. Time given for the female patient to ask questions or express concern.	Through discussion with the female patient, the patient became part of the care team decision-making.

DETAILS

Subject:	Patient safety; Feasibility; Catheters; Prevention; Urinary tract infections; Initiatives; Women; Urinary incontinence; Implementation; Urine; Community hospitals; Females; Urinary tract; Nurse specialists; Education; Catheterization; Clinical nursing; Emergency medical care; Emergency services
Location:	United States--US
Identifier / keyword:	External Female Urinary Catheter; Catheter Associated Urinary Tract Infection; Hospital Acquired Infection
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia

Volume:	47
Issue:	1
Pages:	131-138
Publication year:	2021
Publication date:	Jan 2021
Section:	Clinical Nurses Forum
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.09.008
ProQuest document ID:	2487205778
Document URL:	https://www.proquest.com/scholarly-journals/external-female-urinary-catheter-implementation/docview/2487205778/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2021-04-09
Database:	Public Health Database

Perceptions of the Essential Components of Triage: A Qualitative Analysis: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

Triage is an important process to determine severity of illness and prioritize patient emergencies while also ensuring patient safety. The emergency nurse must use critical thinking and decision-making to identify life-threatening emergencies and improve patient outcomes. However, the addition of risk screenings and quality improvement initiatives has extended the triage process time, which may increase interruptions and opportunities for errors. The purpose of this descriptive qualitative study was to determine emergency nurse perceptions of current triage processes and categorize essential and nonessential triage components.

Methods

Focus groups of frontline emergency nurses who regularly conduct triage in the emergency department were conducted to discuss perceptions of triage assessments and questions. The 3 focus group discussions were digitally recorded and transcribed. Data analysis consisted of descriptive statistics of the sample and the conventional content analysis of the transcripts.

Results

A total of 12 emergency nurses participated in the study. The overall theme that emerged surrounding essential triage components was a perceived conflict between individualized care and maintaining systems and processes. This theme consisted of 4: (a) must ask, (b) actions of triage, (c) relevant but not urgent for triage, and (d) not perceived as relevant.

Conclusion

This study identified the perceptions of emergency nurses surrounding the urgency of triage components in the emergency department. Emergency nurses perceived some assessments as essential to determining “sick versus not sick,” and other triage components were able to be delayed, streamlining the triage process.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current state of scientific knowledge on triage indicates that the time to complete triage is increasing owing to additional risk-screening questions.

••The main finding of this research is that emergency nurses perceive there are essential questions that must be asked in triage, whereas some questions are not urgent or appropriate to ask during triage making them nonessential.

••Key implications for emergency nursing practice from this research are emergency departments should evaluate their triage process and determine which questions are essential to ask in triage and which questions could wait to be asked by the bedside emergency nurse.

Introduction

Each year in the United States, more than 139 million patients visit the emergency department,[1] and each one receives a triage assessment. Triage is an essential process to determine the degree of urgency and prioritize patient emergencies. The triage process has implications for safety; it is essential that the emergency nurse uses decision-making and critical thinking to determine who has life-threatening conditions and needs immediate attention. Yet, the process of triage is ever-evolving owing to influences such as throughput, fluctuating patient volumes, and health system/departmental metrics with lasting implications for patient satisfaction, quality of care,

and timeliness of the triage process.

Because every patient who visits the emergency department receives this acuity-driven assessment, triage is a likely placeholder for screening questions and assessments to ensure everyone is asked the same important questions. Yet, owing to the addition of a constellation of screening questions, point-of-care testing, interruptions, and crowding, triage assessment times have risen over the past 20 years from an average of under 5 minutes to now up to 20 minutes to finish.[2,3] These extended triage times contribute to longer patient wait times, increased patient walk-outs, and more opportunities for interruptions and errors.[3,4] In addition, these delays may have detrimental impacts on patients who are critically ill waiting in the triage queue.

The purpose of this qualitative descriptive study was to determine emergency nurse perceptions of current triage processes and categorize essential and nonessential triage components. Essential questions were defined as questions to include in the initial triage assessment, whereas nonessential questions could be delayed to later in the emergency visit. Although all questions present in triage assessments have intended purpose, we hypothesized that nurses would deem some triage questions as critical to patient triage and others as nonemergent.

Methods Design

A qualitative descriptive study was conducted in 2019 after receiving institutional review board approval from the University of Cincinnati (#2019-0467). Sites included 1 urban level 1 trauma academic health center (75 000 patient visits per year) and 1 suburban level 3 trauma center (42 000 patient visits per year), both verified by the Committee on Trauma of the American College of Surgeons[5] and within the same health system. Convenience sampling methods were used to invite frontline triage emergency nurses (ie, not in a management or clinical educator type role) from the 2 sites to participate in the study through email and word-of-mouth. Nurses interested in participating contacted the research team to be screened and determine eligibility. To be eligible, participants needed to have at least 1 year of experience in any emergency department, as well as experience in conducting triage assessments.

Data Collection

Data were collected during 3 focus groups held in August 2019 at the medical campus of the participants. Saturation was obtained during the third focus group when no new ideas were introduced; therefore, no further focus groups were conducted. Participants attended 1 of the 60- to 90-minute focus groups held in a private conference room and led by a nurse researcher (B.E.P.) with a research assistant present to collect field notes. The focus group discussion was facilitated with a semistructured interview guide discussing emergency care, which included 3 main questions: (1) What are essential parts of triage?; (2) What are nonessential parts of triage?; and (3) What questions should be asked in triage but are currently lacking in the triage assessment? Focus group discussions were digitally recorded and transcribed verbatim.

Data Analysis

Qualitative conventional content analysis guided the data analysis and consisted of 3 phases: preparation, organizing, and reporting.[6,7] During the preparation phase, the team (all with previous qualitative research experience) immersed themselves in the data by independently and then jointly reviewing transcripts to get a sense of the whole. The team agreed that the unit of analysis would be key phrases and that latent content (ie, what the text talks about) was important to consider when analyzing the data. In the organization phase, 2 researchers conducted independent line-by-line analysis of the transcripts and developed initial codes on the basis of experience and previous research. After each transcript was coded, the 2 researchers met to discuss proposed codes and obtain consensus. Descriptions for categories were generated, and the codes were organized within categories and subcategories. Finally, the reporting phase entailed finalizing the categories, the subcategories, and the overall theme and selecting exemplars reflective of the data, the categories, and the overall story line (ie, theme).

Several strategies were employed throughout the study to increase the overall trustworthiness of findings.[8] An audit trail (eg, complete study record) was maintained throughout the study and included researchers' reflexive thoughts, focus group audio files and transcripts, initial codes generated, intercoder decisions, definitions of codes and categories created by the team, and development of the overall theme to improve dependability and confirmability of findings. To ensure credibility, the verbatim focus group transcripts were verified by reviewing the audio files to ensure that they accurately reflected the discussions. Investigator triangulation was employed during data analysis by having 2 authors (B.E.P. and C.R.S.), each with experience conducting qualitative conventional content analysis, complete independent coding of the transcripts before collaborating to develop the categories and the subcategories. To address the credibility and confirmability of results, the other author (K.D.J.), who is an experienced emergency nurse and researcher and was not involved in the data analysis, conducted a peer review to ensure results represented the data and not the team's assumptions. Finally, to increase authenticity of the findings, verbatim quotes were included as exemplars in the results section to give participant voice to the categories and the subcategories generated.

Results

A total of 12 frontline emergency nurses who regularly conduct triage assessments participated in the study. No participants refused or withdrew from the study. Table describes the participant characteristics. In critically examining the data in relation to the distinct theme that emerged surrounding essential triage components, there was a conflict between individualized care and maintaining systems and processes. This theme consisted of 4 categories: (a) must ask, (b) actions of triage, (c) relevant but not urgent for triage, and (d) not perceived as relevant. Representative quotes were obtained from 8 of the focus group participants.

Overarching Theme: Individualized Care Versus Maintaining Systems and Processes

As the focus group participants discussed essential and nonessential triage components, it became clear that there was a conflict between what they were required to ask by their facility and what they needed to ask to adequately care for the patient. The focus group participants discussed the conflict between meeting patient expectations of care and following hospital protocols. There was a struggle between eliciting all the pertinent information needed "that all makes up the story of that patient" while completing the hospital-mandated questions as efficiently as possible so that they can get to the next patient in the queue. The participants described a perceived pressure that they felt so "they go through it like, I gotta get through this system to get these questions to get to the next person because it's busy." The participants also highlighted the concern of patients when asked the same questions repeatedly (eg, "They already asked me that."). Reflecting poor communication, one of the participants stated "…this is the third time [someone has] asked…. so, now it just sounds like we're not listening."

Category 1: Must Ask

Participants described specific question components that they must ask in triage as a critical piece of the assessment. This category consisted of 3 subcategories including (a) the patient's story, (b) pertinent details, and (c) hospital-mandated questions. The nurses described the **patient's story** as being crucial, "that all makes up the story of that patient and those things can …influence their care." Obtaining the patient's story is how the triage nurse gets a more holistic view of the patient's reason for coming to the emergency department.

Next, the emergency nurses stated they must ask the **pertinent details** that are related to the patient's visit today. These details, guided by the chief complaint, are necessary to determine acuity—the primary purpose of the triage interview. The nurses described the mental sorting of questions that helped them determine the severity of the illness: "We try to sift pertinent questions… whether or not somebody's up to date on their tetanus vaccine might not have anything to do with if they're having abdominal pain, and they're 70, and they're throwing up." Additional details

may include history of diabetes, blood thinners, or recent surgery as examples.

Finally, nurses described the last component of “Must Ask” questions as **hospital-mandated questions**. These questions were considered as essential to fulfilling hospital protocol but not to providing high-quality patient care. As the nurses stated, they are a priority of the hospital/department, “just hitting the ones …[I’m] gonna get an email about if …[I] don’t fill it out.” These mandated questions may vary by institution (eg, suicidal intent, fall risk, HIV risk, domestic violence). The participants felt that questions focusing on pertinent details to understand the patient’s story were essential to providing more efficient triaging and emergency care to patients and that hospital-mandated questions were not essential to triage but needed to be asked because of hospital protocol. Thus, hospital-mandated questions may become barriers to streamlined triage processes.

Category 2: Actions of Triage

The second category identified by the nurses was the “Actions of Triage,” which encompassed the physical actions every emergency nurse must take to complete the triage assessment. The physical “Actions of Triage” included (a) assign acuity, (b) visual assessment, and (c) vital signs. Emergency nurses felt that it was crucial to **assign acuity** to a patient as outlined by the emergency severity index.[9] “It’s really just sick and not sick”…“that’s the definition of triage …sorting.” Next, the nurses described the importance of conducting a **visual assessment**, the holistic aspect of a nursing assessment that takes in the picture of the patient to determine severity. “[It is] your across-the-room assessment. Make sure they’re breathing okay, how [do] they look? Are they diaphoretic? What’s their color like? How [are they] walking?” The final detail included in the “Actions of Triage” category was patient **vital signs**. This action contributed information to the triage assessments, “vital signs …do they match how [the patient] look[s]?” The participants felt that it was essential that the actions of triage focused on individualized care for each patient, which included assigning acuity, visually assessing the patient, and assessing vital signs.

Category 3: Relevant But Not Urgent for Triage

The third category identified, “Relevant but not Urgent for Triage” was a more tense and passionate discussion than the almost “clear cut” opinions of categories 1 and 2. The “Relevant but not Urgent” categories of triage were (a) Do risk factors even matter for triage?, (b) Bedside assessment is more thorough and in-depth, and (c) methods to ask questions. The first subcategory was **Do risk factors even matter for triage?** in which the nurses were conflicted as to whether they should ask about risk factors such as substance use or sexual history in the triage assessment. They concluded that although the information was important, it did not change the triage process for the patient: “[Smoking or drinking alcohol] doesn’t impact my decision when I’m deciding what bed he’s going to.” The next category outlined by the nurses was that **bedside assessment is more thorough and in-depth**. The nurses stated that many of the questions that are collected in triage assessment sections are more appropriate for the bedside assessment/primary nurse to ask: “Triage at its core is deciding who’s sick and who’s not. It’s not …information gathering ... [then] it’s not really triage anymore.” Finally, the nurses described **methods to ask questions**, stating that the questions added to triage did not have to be asked by a registered nurse: “Questions that are not triage decisions …not going to change the nursing [assessment] could be done by somebody else.” The participants emphasized that although the questions they were required to ask in triage were important, they were not urgent and could wait for a later time during the ED visit.

Category 4: Not Perceived As Relevant

The final category of the triage assessment components noted by the nurses included those questions they thought were not pertinent to the patient and not perceived as relevant. This category was composed of (a) just skip, (b) unrelated questions, and (c) What is the purpose of the question? The nurses identified many questions that they stated they “**just skip**” because they were not relevant for the patient (eg, sexual history, tetanus): “Very rarely do I

ask the question about if they're sexually active. Very, very rarely will I ask that." The next category was **unrelated questions,** and the nurses thought that these questions were unimportant for patients when their chief complaint was not related to the question being asked: "I think it's very irrelevant .... If you're not there for that, I should not ask. And if you are there for [sexually transmitted infection] related, why am I asking [about sexual history]? Of course you had sex. So, I think it's …irrelevant …I don't think it adds anything." Finally, there was a category of questions that the nurses were unsure about--what they were for and what happens with the answers: **What is the purpose of the question?** The nurses described confusion around what the question was even about and were unsure if they were ever told about the question in orientation or missed a communication about the question when it showed up in the triage assessment section. "I ask it sometimes. But I'm not quite sure the origin of that or why [and] where that information is going. I don't think we were really told. I mean we were told –I think I read that it was coming, but I'm not really sure what happens to that data or what the purpose of that question was."

Discussion

Results of this study illustrated emergency nurses' perceptions regarding the essential questions of a triage assessment and the struggle they feel in balancing between individualized care and maintaining systems and processes. Categories identified by the nurses sorted the questions asked in a triage assessment into groups: if the questions determine patient severity, or if they could wait until later in the encounter. These results mirror the results of a previous study that also identified the struggle between quickly assessing a patient to determine their acuity versus doing what would help the department processes.[10] In 2016, the boards of directors for both the American College of Emergency Physicians and the Emergency Nurses Association supported limiting the focus of triage questions to information that was pertinent to the patient's condition to prioritize patients for emergency care treatment.[11]

Emergency nurses are put in a difficult position of deciding between prioritizing care for the patient in front of them versus completing mandatory screening questions to get to the next patient. This conflict may impede emergency care. In a study of emergency nurse decision-making in triage, competing systems, fluctuating patient volume, and individual capacity/experience had a large impact on individual emergency nurse decision-making in triage.[12] In our study, nurses recognized that some questions currently asked in triage are relevant to patient care in the emergency department but may not be urgent for triage. For example, risk behaviors and lifestyle may affect the patient's current illness/injury (wound healing, medication potency, etc); however, these questions were not perceived as critical to the triage assessment.

The nurses described in clear certainty the essential component of triage, as identified by category 1 "Must Ask" and category 2 "Actions of Triage." These 2 categories comprised the essential pieces of triage that ensured an adequate assessment of severity. Once again, our study results aligned with the study by Wolf et al[10] that reported that the primary purpose of triage was to determine who is "sick and not sick." Perhaps the "Actions of Triage" are the most critical component to accurately sort patients who are sick from those who are not. A recent study from Denmark found that a quick clinical assessment was a more accurate predictor of short-term mortality in ED patients than the more formalized triage assessment.[13]

Beyond the categories of "Must Ask" and "Actions of Triage," the nurses explained hesitation with asking questions or simply skipping them because they were not pertinent to the patient's emergency care. However, it was noted that each question is of importance for the health care of the patient but not necessarily urgent and to be included in the triage process. This supports the findings of previous studies that have demonstrated that screening questions were insufficient to accurately assess risk, such as with fall assessments that require a functional test of balance to adequately assess.[14] Although a falls risk assessment is an important safety procedure, there is insufficient time in

triage to adequately assess this risk. Having such assessments done by the bedside nurse may be more feasible, efficient, and efficacious, while also ensuring adequate throughput in triage.

In 2019, best practices for ED triage were published and highlighted the need for an effective physical layout and appropriate staffing.[15] However, the results of our study introduce a novel approach to improve ED throughput through the development of a multiphased triaging system for a more efficient emergency care encounter. The essential components of triage included in categories 1 and 2 would be asked immediately and, depending on the capacity of the triage process (factors individual to ED site operations), categories 3 and 4 could be delayed for later in the emergency care visit.

Limitations

Limitations of this study included the use of focus groups to collect data and recruitment from 1 health system. Collection of data using focus groups may have limited results in that the group setting may have unduly influenced an individual participant's view expressed owing to peer pressure, groupthink, or desirability bias.[16] Although the focus group method does promote a synergistic discussion and debate among participants, it is possible that data collected using individual interviews may have resulted in data that represented everyone's opinion and experience. Another limitation was that recruitment was limited to triage registered nurses employed within 1 health system in a Midwestern US city. All triage nurses in this system obtain the same triage orientation and have a standardized electronic triage assessment shared by the hospital system. Including participants from other health systems with other triage protocols could have strengthened this study.

Implications for Emergency Nurses

According to the findings of our study, emergency departments with an increased patient volume and waiting times may want to consider adopting a phased triage assessment process. Essential questions (categories 1 and 2) would be asked immediately, and nonessential questions (categories 3 and 4) would be reserved for later in the emergency care visit. In addition, emergency departments could consider a 3-tiered triage: (1) must ask, (2) actions of triage, and (3) relevant but not urgent/not perceived as relevant. This would allow the emergency nurse to adequately assess the patient's severity and need for care, streamlining appropriate treatments to be initiated.

Conclusion

Emergency nurses are faced with a difficult burden when triaging patient severity, but they also must decide between prioritizing individualized care for the emergency patient versus juggling mandatory screening question burdens and timeliness of triage. Essential questions for triage appear to be common across ED settings; however, nonessential questions may be different based on ED demographic. Emergency departments plagued with long wait times and high volumes of patients should consider a phased patient assessment removing nonessential questions from the triage burden.

Author Disclosures

Conflicts of interest: none to report.

This work was funded by the Emergency Nurses Association Foundation for Dr Punches' study "Emergency Healthcare Providers' Perceptions of Opioids and the Emergency Department."

Characteristic	n (%)

Total participants	12
Age, y, mean (range)	42 (23-66)
Female sex	11 (92)
Caucasian/white race	11 (92)
Married/cohabitating	8 (80)
Years of practice, mean (range)	15.3 (1-44)
Years of emergency nursing, mean (range)	14.8 (1-40)

DETAILS

Subject:	Emergency medical care; Quality management; Qualitative research; Clinical outcomes; Delayed; Life threatening; Perceptions; Focus groups; Urgency; Content analysis; Components; Decision making; Triage; Individualized; Data analysis; Nurses; Critical thinking; Patient satisfaction; Interruptions; Emergency services
Identifier / keyword:	Triage; Risk screening; Essential questions; Triage nurse
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	192-197
Publication year:	2021
Publication date:	Jan 2021
Section:	Triage Decisions
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767

e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.08.009
ProQuest document ID:	2487205774
Document URL:	https://www.proquest.com/scholarly-journals/perceptions-essential-components-triage/docview/2487205774/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-08-01
Database:	Public Health Database

An Interrupted Time Series Analysis of the Dissemination of a Sickle Cell Vaso-Occlusive Episode Treatment Algorithm and a Case Management Referral Form for Individuals With Sickle Cell Disease in the Emergency Department: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Background

Sickle cell disease is associated with frequent vaso-occlusive episode and emergency department visits. Our group developed (1) a vaso-occlusive episode treatment algorithm based on the National Heart, Lung, and Blood Institute recommendations, and (2) a case management referral form to identify social behavioral health needs of patients with sickle cell disease in the emergency department. The aims of this project were to (1) disseminate the vaso-occlusive episode algorithm and case management referral form, and (2) to evaluate the individual provider-reported awareness, use, and preferred method of access to each tool among emergency department providers in North Carolina.

Methods

An interrupted time series analysis was used to study the impact that an educational effort had on the awareness of a sickle cell vaso-occlusive episode treatment algorithm and a case management referral form. A targeted list was

developed to identify the providers working in emergency departments with the largest number of sickle cell disease patient visits. In-service education was provided to targeted emergency departments in North Carolina over a period of 3 years. The vaso-occlusive episode algorithm and case management referral form were put up on the websites of professional organizations. Surveys were provided to emergency department providers at these targeted emergency departments with a baseline and post dissemination at 20 and 32 months for assessing the provider awareness, use, and preferred method of access of the tools. Additional feedback could be given by the participants through telephone interviews. Descriptive statistics were obtained, and content analysis was performed on interviews.

Results

We received survey responses for the following periods: baseline (T1, n = 190), post dissemination at 20 (T2, n = 142), and 32 months (T3, n = 93). Awareness of the tools was between 42% (baseline) and 41% (post dissemination at T2, T3) for the vaso-occlusive episodes algorithm and 25% (baseline) and 29% (post dissemination at T2, T3) for the case management referral form. However, use of these tools was found to be low as only 19% of the emergency department providers used the vaso-occlusive episode algorithm at T1 and 13% T2, while 5% of emergency department providers used the case management referral form at T1 and 6% at T2. With further education about the tools, an increase in the usage of the tools was observed T3, which was 29% for the vaso-occlusive episodes algorithm and 9% for the case management referral form. Lack of incorporation of the decision support tools into emergency department processes was observed to be an overarching barrier to dissemination of the tools identified in interviews (n = 8).

Conclusions

This study can be used to inform future strategies on dissemination of evidence-based tools to emergency department providers.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current state of scientific knowledge on care of individuals with sickle cell disease in the emergency department indicates that emergency department providers are not aware of National Heart, Lung, and Blood Institute published evidence-based recommendations for care of individuals with sickle cell disease.

••This article contributes to the efforts to disseminate these tools in North Carolina and beyond.

••Key implications for emergency nursing practice from this study are strategies to increase awareness and use of evidence-based tools to treat individuals with sickle cell disease in the emergency department.

Background

Sickle cell disease (SCD) is a genetically inherited disorder of the red blood cells that primarily affects individuals of African descent and results in multiple complications related to impaired oxygen perfusion.[1] In 2006, approximately 100,000 individuals were found to have SCD in the United States,[2] and they accounted for approximately 232,382 visits to the emergency department annually.[3] Approximately 5,500 individuals with SCD live in North Carolina.[4] A cohort of 2,790 North Carolinian Medicaid eligible patients with SCD accounted for 69.86% of the 9,075 emergency department encounters.[5] Individuals with SCD primarily visit the emergency department for vaso-occlusive episodes (VOEs), which are the hallmark symptom of SCD and are characterized by acute pain that is difficult to treat and can lead to severe complications and impaired quality of life.[1,3,6] Furthermore, VOEs are the leading cause of ED visits and hospital admissions related to SCD.[3] Despite pain and VOEs being the most common reasons for ED visits,[3,7] currently there is no consistent approach to the management of VOEs in the emergency department.[8] Also, there is a high proportion of unmet medical and social behavioral health needs of patients with SCD, including lack of transportation, unemployment, and difficulty in accessing and affording medical care.[9-11] Treating patients in the

emergency department involves evidence-based pain management, and also provides an opportunity to screen and refer their unmet social behavioral health needs. In 2014, the National Heart, Lung, and Blood Institute (NHLBI) published evidence-based recommendations for care of SCD and for addressing the need for more standardized care of SCD.[1]

In our previous work, decision support tools were developed for use in the emergency department. Adult and pediatric treatment decision support tools, containing a total of nine tools including a vaso-occulsive episode algorithm, were created based on the NHLBI recommendations, to assist providers treating individuals with SCD.[12] A case management referral form was also created for identification of patients with SCD who have unmet social, behavioral, and medical health needs.[10] In collaboration with the North Carolina (NC) Emergency Nurses Association, NC College of Emergency Physicians, and Community Care North Carolina (a managed care organization), our group developed a strategy to disseminate a VOE treatment algorithm based on NHLBI recommendations and a screening and referral process which included a case management referral form that could be administered in the emergency department. In 2019, 32.4% of 111 ED providers were found to be aware of the NHLBI guidelines on the treatment of SCD.[8] Further dissemination of these guidelines is needed to improve care of patients with SCD in the emergency department.

This paper reports the strategy used to disseminate the VOE algorithm and case management referral form to ED providers in NC. This project aimed to disseminate the VOE algorithm and case management referral form to emergency departments throughout NC, and evaluate individual provider-reported awareness, use, and preferred method of access to tools among ED providers.

Description of Decision Support Tools

The following recommendations were included in the VOE algorithm: Assignment of Emergency Severity Triage level 2, treatment with individualized intravenous push opioid pain protocols when required, treatment with a standard SCD protocol when individualized opioid doses are not available (many emergency departments use a weight-based opioid protocol as the standard protocol), administration of the opioid within 60 minutes of arrival at the emergency department, re-administration of opioids every 15 minutes to 20 minutes until pain subsides, consideration of opioid dose escalation by 25% for inadequate relief, caution with aggressive fluid management in the presence of renal or kidney failure, and administration of oral versus intravenous anti-histamines. The case management referral form was previously designed to identify the unmet medical, social, and behavioral health needs and to assess health services issues. The form was designed to be simple and administered by an ED provider, social worker, or case manager. The referral process consisted of 2 components which included the administration of the case management referral form and faxing of the completed case management referral form to Community Care NC, who would identify the patient's care manager (Medicaid patients) or a SCD state educator (all patients other than Medicaid). The patient's care manager would follow up with the patient within 72 hours to link the patient to resources for unmet services. The VOE algorithm was made available through a website (sickleemergency.duke.edu and NC Emergency Nurses Association website), on paper, and as an app (SCD Toolbox, Android and iOS). The case management referral form was available on a website (sickleemergency.duke.edu) and on paper.

Methods Conceptual Framework: RE-AIM

The Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) model was used as the organizing framework for this dissemination strategy. This framework is commonly used to organize, facilitate, and sustain changes in health care systems.[13,14] As this project was designed for dissemination and not implementation, it was not possible to evaluate all components of the RE-AIM. The following components of RE-AIM were used to guide the

dissemination of the tools: Reach (number of ED providers in NC who underwent training), Effectiveness (unable to evaluate), Adoption (proportion of the ED survey respondents who reported using the tools), Implementation (unable to evaluate), Maintenance (unable to evaluate).

Design

An interrupted time series analysis was used to study the impact of an educational effort on the awareness of a sickle cell VOE treatment algorithm and case management referral form. Surveys and interviews were used to evaluate the awareness and use of the VOE algorithm and case management referral form, at baseline (T1) and over the course of the dissemination (20 months [T2] and 32 months [T3]). The Duke Health Institutional Review Board (Pro00076048) approved the project and granted a waiver of written consent. Surveys and interviews were conducted anonymously to improve participation.

Setting and Dissemination Strategy and Content

All emergency departments in NC were eligible for in-person dissemination and in-services. While the goal was to disseminate the tools to as many ED providers across NC as possible, a list of 19 hospital emergency departments was developed for targeting for dissemination of the VOE algorithm and case management referral form. A targeted list was developed to identify providers working in emergency departments with the largest number of SCD patient visits. A short PowerPoint presentation that focused on a brief overview of the epidemiology and common complications of SCD, the VOE algorithm and case management referral form was developed and used for dissemination of the materials. Inclusion criteria were based on (1) the (high) number (the emergency departments with the highest number of visits at the time of dissemination) of SCD visits to the emergency department (based on Medicaid claims data) and/or (2) patient stakeholder expression to the study team of the emergency department's lack of adherence to a care protocol for individuals with SCD, or (3) individual ED requests. Several attempts were made to set up in-service educational sessions in all 19 emergency departments. Dissemination occurred throughout the course of the project. Targeted centers that did not receive education were either unresponsive, uninterested, or reported time constraints.

Our team also partnered with the NC Emergency Nurses Association to disseminate the algorithm and case management referral form via the NC Emergency Nurses Association website (https://ncena.nursingnetwork.com/page/60871-resources). Monthly calls were held with leadership members of the NC Emergency Nurses Association State Council throughout the research project to increase the visibility of the project and identify additional emergency departments for participation. Through this collaboration, specific Chapter and State meetings were identified to disseminate the materials, and strategies were also determined to disseminate materials and surveys through the NC Emergency Nurses Association website. In partnership with the NC College of Emergency Physicians, the algorithm and case management referral form were posted on their website (https://nccep.org/wp-content/uploads/Sickle-Cell.pdf). The overall goal was to disseminate these to as many ED providers in NC as possible.

As the project progressed, a 15-month series of monthly webinars were conducted to increase the visibility of the project with a focus on improving the care of individuals with SCD in the emergency department. Webinars were open to participation across the United States and Canada. Finally, in partnership with the Lifepoint hospitals consortium (a network of health care facilities dedicated to facilitating the delivery of high quality care) of ED nursing directors, a one-time webinar was provided on the algorithm and case management referral form.

Awareness and Use of Tools - Survey Development and Distribution

To assess provider awareness and use of the tools, a short survey was included with questions about awareness and use of the tools ([Table 1]). Surveys were disseminated at baseline before dissemination activities (T1) and post

dissemination at 20 months (T2) and 32 months (T3). These timelines were chosen to assess for changes in tool awareness and use across the timeline of the project and to assess changes based on continued dissemination activities. Surveys were made anonymous to encourage participation. A convenience sample was used as the surveys were anonymous and it was not possible to track the respondents each year. This was a descriptive study and the goal was to obtain as many responses as possible from emergency providers with a focus on using a variety of ways to disseminate the survey. Thus, sample size calculation was not performed. At baseline, surveys were distributed at NC Emergency Nursing Association Chapter meetings and via emails to emergency departments that expressed interest in in-service educational sessions. At T2 and T3, a link to complete the survey was distributed via e-mail by key stakeholders at emergency departments who had participated in the dissemination trainings. The link to complete the survey was also posted on the NC Emergency Nursing Association website after baseline. Surveys were not distributed to attendees of the monthly webinars.

Interviews

Clinicians who participated in the survey at T2 and T3 were able to participate through a telephonic interview to provide additional feedback on the use of the tools. Interviews were scheduled at a time convenient to the participant, conducted telephonically, and recorded digitally. The interview guide (Supplementary Appendix) was developed by the study team and included questions that assessed awareness, use, barriers, facilitators, and recommendations for future dissemination of the decision support tools.

Data Analysis

Descriptive statistics were used to analyze survey data. Additional analytic statistics could not be generated as the samples were not identical between time cohorts. Quantitative analysis of the data was carried out using SAS version 9.4 (SAS institute, Cary, NC) and the qualitative data analysis was carried out using NVivo 12 (QSR International).

Recordings of the interviews were transcribed, and transcripts were verified by listening to the original recording. A list of a priori codes was developed by the study team using the interview guide. Two investigators independently coded the transcripts using NVivo 12 and the weighted kappa value was 0.98.

Results

Over the 3-year period of the study, 16 in-person 30-minute to 60-minute educational sessions were conducted for 7 out of the 19 targeted emergency departments in NC. Four brief educational sessions were conducted at the NC Emergency Nurses Association Chapter meetings because of time constraints. We were only able to track in-person dissemination; it was not possible to account for the number of times the tools may have been downloaded from websites or the SCD Toolbox app. The VOE algorithm and case management referral form were disseminated in person to a total of 90 physicians, 274 nurses, 2 case managers, and 3 educators across the centers (Table 2). The tools were also disseminated electronically to 2 additional emergency departments. The VOE algorithm and case management referral form were made more widely available on the web by collaboration with NC Emergency Nurses Association and NC American Academy of Emergency Medicine. It was not possible to track how often the materials were accessed. A total of 425 individuals responded to the survey across the 3 years. However, it was not possible to verify whether the survey respondents attended the in-person educational sessions or reviewed the decision support tools online. Participant characteristics of attendees at the in-person sessions are provided in Table 3. We received survey responses for the following periods: T1 (n = 190), T2 (n = 142), and T3 (n = 93). Descriptive statistics of awareness, use, and preferred method of access to tools are presented in Table 1. Due to the variety of dissemination methods of the surveys (websites etc.), it was not possible to report the overall response rate or reasons for non-response.

No change was observed in awareness of either the VOE algorithm or case management referral form over the course of the project, or use of the case management referral form. Awareness of the VOE algorithm and case management referral form remained at about 40% and 30% throughout the project. An increase in self-reported use of the VOE algorithm from T1 to T3 was observed, with 29% of the providers reporting that they used the VOE algorithm in their emergency departments. Use of the case management referral form remained low, between 5% to 9% over the course of the project. Respondents endorsed the desire for all formats of the tools throughout the course of the project. Finally, 15 webinar sessions were conducted with the participation of 20 to 35 ED providers per session. Approximately 100 ED nursing directors from across the United States attended a webinar hosted by a health care services company, which described the VOE algorithm and case management referral form.

A total of 8 interviews were conducted (4 interviews at T2 and 4 at T3) with emergency department nurses and physicians in NC. Participants described facilitators and barriers to dissemination in their ED settings and recommended future dissemination of the VOE algorithm and case management referral form. Analysis of individual interviews with ED providers revealed themes about barriers and facilitators to dissemination.

Barriers to Dissemination

The overarching barrier to the dissemination of the tools was identified as the lack of incorporation of the decision support tools into the ED processes. The tools were not embedded in the electronic health record and there were no existing workflows or protocols for standardization of SCD care in the emergency departments, which was also reported by the ED providers.

The ED providers were also acutely aware that not having a standardized protocol contributed to the disease stigma that individuals with SCD faced. One ED provider stated, “I feel like by not having a consensus for this patient population, we almost created this epidemic of overutilization of the emergency department for their care and perpetuated and maintained the stigma that goes along with their disease.” Providers identified that the decision support tools could fulfill this need only when the tools were embedded into the ED processes, and guidelines were incorporated into new graduate education and new hire training.

During the T2 interviews, several providers stressed that it would be easier for the providers to access and use the tools if they were embedded into the electronic health records. The electronic health record was reported to be a more effective method of dissemination of the VOE algorithm because of the high patient volumes and demanding ED environment. Providers stated that embedding the tools into existing health care provider apps (ie, JournalFeed, UpToDate) in addition to the electronic health record, would lessen the barriers to using the tools.

With reference to the case management referral form, ED providers noted that it was difficult to determine the ownership of the referral process because of the high workload that ED providers experienced. One of the ED providers reflected, “The resistance that we’ve met in my emergency department, being that we’re a busy emergency department, we’re roughly 85,000 visits a year, was who was going to take ownership of the referral process.” Other ED providers stated that they were unaware of the case management referral form and believed that case management was the responsibility of social workers, though they were not certain.

Facilitators to Dissemination

Facilitators of dissemination were identified as the educational sessions, availability of the surveys in multiple formats, easy usage of the tools, and having a site champion. After being educated about the tools, ED providers were able to select their preferred format of the tools. One of the participants reflected on the ease of using the tools after attending an in-person educational session:

“The last [SCD patient] that I had, our emergency department physician, because we’d just had the meeting [in-person educational session], was very aware of the algorithm and put in orders right away for this particular patient,

so it was nice just because there was no added education.”

Providers also reported that the tools were easy to use. One of the ED nurses also explained how the simplicity of the tools also allowed her to easily disseminate evidence-based information to providers who had not received the education.

“It was very helpful for me in terms of collaborating with the providers that I was working with to give them a framework as to why I was making the recommendations about a dosage of pain medicine and why it seemed aggressive in implementing pain reductions quickly rather than later.”

Providers also mentioned that differentiation in the format of the tools would make them more accessible. For instance, 1 ED nurse noted that nurses were more likely to use a paper format, whereas other ED providers (physicians, nurse practitioners, physician assistants) found the electronic health record format more efficient, “We, as nurses, can say ‘hey, look at this, look at this,’ but if it’s not built into physician processes in the way that they treat patients you know, whether that is through an electronic medical record or what not, that’s where we’re meeting our resistance.”

A major facilitator of dissemination of the tools was having an ED physician as a champion for the project at 1 emergency department. His efforts led to widespread dissemination of the tool and the incorporation of these tools into processes at that site including embedding of the tools into the electronic health record. On interviewing the participants at that site, it was observed that many were unaware of the tools; however, on further probing, they were able to accurately detail the contents of the tools and affirm that their clinical decisions were based on the tools. The VOE algorithm and case management referral form had been incorporated so thoroughly into their processes that it was not readily apparent to them that they have been using the tools. This was mainly due to the efforts of the physician champion at that site.

Discussion

The overall aim of this study was to disseminate the decision support tools to emergency departments throughout NC and to evaluate individual provider-reported awareness, use, and the preferred method of access to the tools. Based on descriptive data collected across a 3-year-period, little or no change was observed in the awareness and usage of the tool over the course of the project. Despite this, several key stakeholder interviews were conducted for better understanding of the meaning of the survey results.

At the baseline, awareness of both the VOE algorithm and case management referral form were considered moderate at 42% and 25% respectively. This indicated that many of the respondents were already aware of the tools to some extent. Respondent bias was possible for those working at institutions already familiar with the tools as previously disseminated at 3 large emergency departments in NC. These tools were disseminated by local champions at the hospital emergency departments. In particular, there was an effort to disseminate the case management referral form that began in 2014. This moderate baseline awareness led to lesser improvement.

Valuable knowledge about the preferred format for the tools was gained. Survey results indicated that providers preferred to access the tools in a variety of formats including paper, websites, and mobile app. These data support the need for future dissemination efforts to adopt multiple formats. During the interviews, the ED providers stated that incorporating the tools into the electronic health record could improve their access. For example, owing to the efforts of a physician champion at 1 emergency department, the tools were embedded into the electronic health record, and interview respondents reported having used the tools and incorporated the NHLBI guidelines into their practice even without receiving any formal education about the tools and the guidelines. Systematizing change is an effective way of changing practice. Future dissemination efforts can be strengthened at individual sites by using ED site champions to support the use of best practice alerts, implementation of SCD VOE guidelines within electronic

health records, and having a process to screen for unmet social needs and refer patients for follow-up.

In spite of the challenges of survey dissemination, there were several aspects of this project there were considered to be successful and could be useful to others when conducting dissemination activities. These included the remarkable efforts of site champions, the close collaboration with NC Emergency Nursing Association, the opportunity to develop and conduct the webinar, and the partnership with a health care services company. We also were able to successfully broaden the reach of dissemination by partnering with the NC Emergency Nurses Association and Community Care North Carolina. Community Care NC improved accessibility of the tools by adopting the VOE algorithm on their website.[12] Our 15-month series of monthly webinars and the 1-time webinar with a health care services company allowed us to provide education about the decision support tools to ED providers and leaders across the United States and Canada. While it was not possible to assess the impact of these webinars, we consider the extended reach of our educational sessions as a success because the ultimate intention was to promote evidence-based approaches to care for individuals with SCD regardless of their location. Finally, in September 2019, 87.6% of the delegates at the National Emergency Nurses Association General Assembly approved a resolution to disseminate the NHLBI evidence-based guidelines of management of VOE in children and adults with SCD in the emergency department, to disseminate the existing education about treating SCD in the emergency department, and to explore the need for additional educational materials (GA-10-09).[15] This resolution supports the dissemination to all emergency departments in the United States. This landmark resolution and partnership with the Emergency Nurses Association allows the forum to truly transform the care of individuals with SCD in the United States. Results of this study are being used to inform the next steps that the Emergency Nurses Association will take to act on this resolution.

It is important to disseminate these evidence-based tools to ED providers for improving ED care for patients with SCD. Several suggestions have been derived from this experience for future dissemination of these tools. During the dissemination efforts, information about the ED tools was promoted through a series of educational events directed at the provider level. Future dissemination should explore implementing the use of the tools into standard practice and operating procedures of emergency departments organizationally and leverage both provider and organizational level interventions. Ideally, site champions should lead the implementation of evidence-based SCD care into standard practice in the emergency department. In future dissemination efforts, the use of organizational change champions should be considered in addition to project champions. Organizational change agents have a greater ability to influence the institutional environment, mobilize internal resources for widespread dissemination, and create policies to make changes sustainable.[16] Finally, there are implications for the integration of these tools into practice through policy implementation. Further translation of these tools into practice using policy, such as the Emergency Nurses Association resolution, could be the impetus needed to incentivize dissemination among emergency departments.

Implications for Emergency Clinical Practice

The information presented has multiple implications for emergency clinical practice at the individual, institutional, and policy-wide levels. First, individual ED providers can use these findings and knowledge of the decision support tools to champion evidence-based care of SCD in their emergency departments. Secondly, the institutional health care leaders inside and outside of NC can use this article to: (1) design a system for addressing the unmet social needs of individuals with SCD using the case management referral form, (2) embed evidence-based decision support tools into their electronic health records, and (3) design dissemination activities. Finally, this article provides valuable information about disseminating evidence-based decision support tools to guide ED care for individuals with SCD. With the approval of the National Emergency Nurses Association General Assembly's resolution to disseminate

NHLBI evidence-based guidelines for management of SCD, this study has poignant implications for Emergency Nurses Association (ENA) leaders who wish to replicate this study in their states to promote the use of evidence-based SCD care.

Limitations

Several limitations affected the results of this study. It was not possible to control the direct users and responders of the survey. Surveys were made anonymous to increase their response rate. Each emergency department sent out a link to the survey via e-mail and the survey was posted on the NC Emergency Nurses Association website. It was also not possible to accurately ascertain the awareness and use owing to the convenience sampling method. The response sample was also most likely affected by nursing staff turnover at individual emergency departments as the turnover is high nationally.[17] It was not possible to verify whether the survey respondents attended the in-person educational sessions or reviewed the decision support tools online. Some of the ED providers reported not having attended an in-person educational session or reviewing the tools online in their interviews. Finally, qualitative data were collected to evaluate barriers and facilitators of dissemination of the ED algorithm. There are limitations in the qualitative approach owing to the use of the convenience sampling method. These limitations included the generalizability of these findings as the interview participants from all ED settings did not volunteer for interviews and data saturation was not obtained.

Conclusion

An evidence-based algorithm for the treatment of VOE and a case management referral form for emergency departments throughout NC were successfully disseminated. Despite the widespread dissemination efforts, awareness of these tools did not increase over the course of the project. Use of the VOE algorithm, however, was reportedly higher over time. Importantly, it was possible to identify several facilitators to embed these tools in practice, including the use of a site champion, incorporating the tools into routine practice by embedding them in the electronic health record, and adopting the decision support tools as an ED standard of care.

Author Disclosures

Conflicts of interest: none to report.

This study was funded by the Agency for Healthcare Research &Quality (R18 RHS024501A). Support for this publication was provided by the Duke National Clinician Scholars Program, the Duke School of Nursing, and the Duke Clinical and Translational Science Institute.

Supplementary Appendix Interview Guide: Emergency Department Clinicians

Instructions: For each of the decision support tools we have distributed to you and your practice, please answer each of the questions below.

Thank you for your time. As you may or may not be aware, CCNC and NCENA developed an algorithm to treat vaso-occlusive episode (VOE) in the ED, based off of the NHLBI Recommendations for the care of persons with sickle cell disease. The algorithm makes recommendations for use of an ED observation unit and a process for case management referral. This algorithm was designed to help EDs improve the treatment of patients with sickle cell disease. The purpose of this interview is to get your feedback on if you have had the opportunity to use the algorithm and if you have found the app or website where it is housed useful. Please feel free to give us suggestions on how these tools may be more helpful to you, or other recommendations related to the algorithm or website.

1. Do you remember seeing the VOE algorithm? Via app, paper, website?

2. Have you had the opportunity to use the VOE algorithm? How did you access it?

3. If you have used the VOE algorithm, can you comment on whether or not it was helpful in managing patients with SCD?

4. Do you the prefer web, app or paper to access the VOE algorithm?

5. Do you have any suggestions as to how we could improve the tools or websites? Improve our dissemination of these tools?

6. What is your ED's current protocol for pain management of SCD patients?

7. Has your ED changed the pain management of SCD patients based on the algorithm?

8. Has your ED changed the admission process for SCD patients?

9. a.Transfer to observation status more frequently?

10. b.Triage category

9.

Does your ED screen SCD patients with the case management referral form?

10.

Do you remember seeing the Case Management referral form?

•a.Do you recall seeing it or personally using it?

•b.Other comments about the referral form? Any questions about the process?

11.

If you have used the case management referral form, can you comment on whether or not it was helpful in managing patients with SCD?

12.

Do you think there are opportunities for improvement of the care of individuals with SCD in your ED?

13.

Are you, or do you think your colleagues would be, interested in additional education? (Learning collaborative, Dr. Tanabe present at staff or leadership meetings)

14.

Do you have any other comments for us?

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.06.001.

Variable	T1 (n = 190) n (%)	T2 (n = 142) n (%)	T3 (n = 93) n (%)
Awareness of tool			

“Are you AWARE of the CCNC ED SCD Case Management Referral Form?” Responded Yes	48 (25)	40 (29)	27 (29)
“Yes” to “Are you AWARE of the algorithm to treat vaso-occlusive episode based upon the NHLBI recommendations?” Responded Yes	80 (42)	58 (41)	38 (41)
Use of tool			
“Yes” to “Have you ever USED the CCNC ED SCD Case Management Referral Form?” Responded Yes	10 (5)	9 (6)	8 (9)
“Yes” to “Have you USED the algorithm for vaso-occlusive episode?” Responded Yes	37 (19)	19 (13)	27 (29)
Preferred format of tool			
Which format would you PREFER to use to access these vaso-occlusive episode tools?			
Paper version	29 (20)	7 (5)	2 (2)
A website	46 (32)	40 (31)	36 (42)
A mobile app	45 (32)	18 (14)	14 (16)
All of the above	22 (15)	66 (50)	34 (40)

Date	Site	Length of session (min)	# of physicians (n = 90)	# of nurses (n = 274)	# of case managers (n = 2) # of educators (n = 3)
February 23, 2017	Site 1	30	NR	50	NR
March 3, 2017	Site 2	240	NR	21	NR
November 21, 2017	Site 3	60	20	NR	NR
November 4, 2018	Site 4	60	22	NR	NR

January 3, 2018	Site 5	60	15	NR	NR
May 15, 2018	Site 6	60	NR	9	NR
May 22, 2018	Site 4	60	NR	NR	NR
July 9, 2018	Site 1	30	NR	25	NR
July 9, 2018	Site 1	30	NR	25	NR
July 13, 2018	Site 1	30	NR	45	NR
July 19, 2018	Site 1	30	NR	31	NR
July 19, 2018	Site 1	30	NR	49	NR
April 17, 2018	Site 7	30	NR	7	NR
April 17, 2018	Site 7	30	NR	8	NR
August 6, 2019	Site 8	30	NR	NR	NR
September 4, 2019	Site 9	30	30	NR	NR

Demographics N (%)	T1 year 2017 (n = 190)	T2 year 2018 (n = 142)	T3 year 2019 (n = 93)
Age - Mean (SD)	40 (9)	40 (21)	37 (10)
Sex			

Unknown or NR	NR	NR	NR
Male	86 (45)	50 (35)	39 (42)
Female	101 (53)	89 (63)	53 (57)
Race			
White	164 (86)	121 (85)	78 (84)
Unknown or NR	NR	NR	NR
Native Hawaiian or other Pacific Islander	NR	NR	NR
More than 1 race	NR	NR	NR
Black or African American	NR	7 (5)	7 (8)
Asian	11 (6)	NR	7 (8)
American Indian/Alaska Native	NR	NR	NR
Ethnicity			
Unknown/NR	22 (12)	NR	NR
Non-Hispanic/Latino	156 (82)	130 (92)	88 (95)
Hispanic/Latino	13 (7)	6 (4)	NR
Professional training			
RN	57 (30)	81 (57)	33 (35)
PA	29 (15)	13 (9)	8 (9)
NP	NR	5 (4)	NR
MD	101 (53)	43 (30)	52 (56)
Has cared for a patient with sickle cell disease	187 (98)	140 (99)	92 (100)
Geographic description of where majority of providers' patients live			

Urban	99 (53)	90 (65)	62 (67)
Suburban	64 (34)	40 (29)	29 (31)
Rural	23 (12)	9 (6)	NR

DETAILS

Subject:	Continuing education; Emergency medical care; Polls &surveys; Collaboration; Medicaid; Managers; Content analysis; Time series; Sickle cell disease; Health needs; Nurses; Access; Narcotics; Case management; Algorithms; Patients; Interviews; Professional associations; Health care; Medical referrals; Dissemination; Health behavior; Health education; Pain; Nursing; Departments; Emergency services; Websites
Business indexing term:	Subject: Medicaid
Location:	United States--US
Identifier / keyword:	Sickle cell disease; Decision support tools; Emergency department; Vaso-occlusive episode; Case mana gement; Dissemination and implementation science
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	40-49.e1
Publication year:	2021
Publication date:	Jan 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966

Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.06.001
ProQuest document ID:	2487205768
Document URL:	https://www.proquest.com/scholarly-journals/interrupted-time-series-analysis-dissemination/docview/2487205768/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-08-31
Database:	Public Health Database

Document 50 of 61

If you Can't Assess It, How Can you Treat It? Improving Pain Management in Sickle Cell Disease: JEN

ProQuest document link

FULL TEXT

Pain, the most frequently reported medical symptom,[1] continues to be poorly assessed in the health care setting.[2,3] Despite advances in technology and user-centered devices, pain assessment in acute care has not changed since the introduction of the 0-10 scale 50 years ago.[4] Previously, our group introduced the concept of leveraging technology to use graphical interfaces and animations (called "painimations") to help general medical patients communicate their pain experience.[5] The article by Bulgin et al[6] draws attention to the stark need for efficient and accurate assessment of sickle cell disease (SCD) pain in the ED setting. Treatment of SCD-related pain in the acute care setting may be an appropriate target for implementing novel, technology-based approaches for managing pain. For children and adults living with SCD, pain is the number one reason for seeking medical care. Vaso-occlusive pain episodes are the hallmark of SCD and acute pain treatment for these episodes is usually sought on an emergency basis. Although sickle cell is a rare disease, disproportionately high use of acute care services by this group means that ED providers may frequently encounter patients with SCD seeking pain treatment in the acute care setting.[7] In this issue, Bulgin et al[6] appropriately highlight that despite the commonality of patients with SCD presenting with vaso-occlusive episodes in the emergency department, there is a lack of standardized, evidence-based care; pain management is often ineffective; and patient return visits are high. In fact, most ED providers are unaware of the National Heart, Blood, and Lung Institute (NHLBI) recommendations for treating vaso-occlusive episodes in SCD.[8] Owing to the unpredictable and variable quality of ED care, a population that is already

underserved continues to feel increasingly marginalized and has a growing distrust for the medical system.[9,10]

Will Disseminating the Guidelines Fill the Gap?

Bulgin et al[6] posit that this knowledge-treatment gap can be addressed by improved dissemination of the NHLBI recommendations for SCD care that include a treatment algorithm for vaso-occlusive episodes. To this end, they identified an effective strategy to disseminate the NHLBI treatment recommendations and vaso-occlusive pain episode algorithm to ED providers. The primary issue with this approach, however, is that executing the SCD pain treatment recommendations and associated algorithm relies on the ED provider first making an accurate assessment of the patient's pain. Yet no reliable, evidence-based methods exist for assessing pain in SCD.

The NHLBI treatment guidelines presented by Bulgin et al,[6] along with the recent American Society of Hematology guidelines, recommend that when a patient presents with pain, the provider must determine whether the patient is experiencing acute or chronic pain and then identify the etiology of the pain. The guidelines point out that “there are no tests to rule in or to rule out” a vaso-occlusive episode and “pain management must be guided by patient report of pain severity.”[11] Thus, clinicians are tasked with determining, solely on the basis of patient report and clinical impressions, whether a patient’s pain is caused by a vaso-occlusive event, another SCD complication such as acute chest syndrome or avascular necrosis, or a combination of factors. There is opportunity to improve upon the current NHLBI guidelines with evidence driven, patient-centered advances to effectively assess pain.

Barriers to Accurate Pain Assessment in SCD

Several barriers stand in the way of making accurate assessments of pain, particularly in the acute care setting. In the absence of evidence-based methods, patients with SCD must describe to providers, a pain experience that is highly variable and can present with both acute and chronic characteristics simultaneously.[12] One adult with SCD stated, “My pain is always different…It’s difficult to describe.” Previously believed to be only nociceptive in nature, sickle cell pain has in the past decade been shown to have various mechanisms (eg, inflammatory, neuropathic, central sensitization), any of which may co-occur in the same patient.[13,14] Although mixed-pain phenotypes exist in which patients have pain both with and without an identifiable cause, most acute pain episodes in SCD have no clear precipitant. Even patients with purely chronic pain may experience acute “breakthrough” pain, a brief flare-up of sudden pain that is unresponsive to usual therapy.[14] Breakthrough pain can be easily confused with acute pain such as that caused by a vaso-occlusive episode. Currently there are no data showing how to evaluate or identify breakthrough pain or to differentiate this type of pain from an acute episode.[14]

Not only are decisions surrounding the initiation of treatment challenging, but deciding when to conclude treatment and discharge patients can also be problematic. Although the course of vaso-occlusive pain episodes is relatively well described, determining when a pain episode has ended is “fuzzy.”[15] There are no tools for assessing when the peak of the vaso-occlusive episode has resolved and when the shift to a home pain regimen can begin. Regardless of how effective and aggressive the pain treatment, patients will continue to experience some pain after discharge and a number of patients will leave the hospital only to return days later because of unresolved pain or a new pain event.[15] An SCD pain episode can last hours or weeks, and resolution can be gradual or relatively precipitous, making planning the course of treatment a significant challenge for health care providers.[16]

Racial Bias Dilutes Accuracy of Pain Assessment

Sociodemographic factors such as race/ethnicity add an additional layer to the complexity of assessing and treating patients with SCD. Most people living with SCD in the United States identify as Black race. It is becoming increasingly well recognized that Black people in America experience racial bias in many areas of life including treatment they receive in the health care setting. Not only health care providers but the lay public as a whole tend to perceive Black patients as being in less pain or being able to endure more pain than their white counterparts.[17] Therefore, Black patients often have their pain complaints ignored or their credibility challenged.[18] Regardless of pain etiology, Black patients are less likely to be prescribed opiate analgesics[19] and can have longer wait times in the emergency department before receiving treatment[20] than white and Hispanic patients who present with the same pain symptoms. Patients with SCD often learn that in order to receive appropriate treatment, they have to convince the ED providers that their pain is real and severe enough to warrant treatment.[21,22] Unfortunately, patients’ tendency

to exaggerate their pain behaviors can present as pseudo-addiction,[23] and without any objective data, providers may be more likely to perceive patients as drug seeking.[16]

The Potential for Enabling Opioid Misuse Confuses Providers' Assessment of Pain

The NHLBI treatment guidelines address but do not present clear direction for mitigating risk of opioid misuse in SCD. To guide their practice with SCD, providers rely mostly on their experience with other pain populations that may not sufficiently resemble SCD patients, a population that is unique in that opioid pain treatment is used throughout the life course, from infancy through adulthood.[24] Providers in the acute care setting are unequipped to assess and differentiate malingering from real pain and pseudo-addiction from real addiction.[16,25] Despite the fact that only 2% of adults with SCD present with true substance dependence, which is at or below the national average, [26] biases still occur. In one study, over 60% of nurses believed that addiction was common among their patients with SCD.[27] Similarly, more than half of ED physicians believe that 1 of every 5 patients with SCD they treat has a substance use disorder.[28]

Clinicians tend to hold negative attitudes toward patients with SCD.[29] Relying on provider gestalt to determine the validity of patients' pain reports is not effective in isolation,[21,30] particularly in the midst of perceived drug-seeking behaviors and addiction concerns.[29] Without the appropriate tools and objective data for assessing pain symptoms, emergency clinicians face a unique challenge in attempting to treat pain appropriately without fear of perpetuating opioid misuse.

No Assessments Exist for SCD Pain

For almost half a century, clinicians have used the 0 to 10 numeric pain scale, or in pediatrics, the FACES scale, to assess pain in the acute care setting.[4] With these unidimensional measures, providers are tasked with determining sickle cell pain severity, type, and etiology in a population that has difficulty reporting symptoms, in the context of a kind of pain that often has unclear etiology, and in an environment that is rife with racial bias and stigma. For some non-sickle cell pain populations, asking the patient their pain level on a 0 to 10 scale can be effective for directing treatment. One study found that in the treatment of patients with long-bone fracture, for every 1-point increase in the 0 to 10 numeric pain score that patients reported, time to analgesic administration decreased by 5.6 minutes. However, when the authors tested this correlation in the treatment of patients with SCD, there was no relationship between patient-reported pain intensity and time to analgesic administration.[31] Here this suggests that either the patient-reported pain rating was ignored or the providers had to rely solely on their own clinical impression to determine how imminent the need for analgesics was in patients with SCD, a clinical impression that did not correlate with the patients' own perception of their medical need.

Multimodal Pain Measurement is Necessary but Challenging in the Acute Care Setting

It is well established that unidimensional measures alone cannot capture the complex nature of the pain experience, nor provide adequate data to guide diagnosis.[32] Multimodal assessment tools are needed to fully elucidate the underlying mechanism, degree, and impact of pain.[33] Expert clinicians in emergency care commonly use the PQRST Pain Assessment (P = Provocation/Palliation; Q = Quality/Quantity; R = Region/Radiation; S = Severity Scale; T = Timing) and this approach is being more widely adopted into standard practice.[34] It is well recognized that the assessment of complex pain conditions such as SCD pain should, at minimum, include some form of multidimensional measurement to understand pain quality and etiology.[33] Unfortunately, no multidimensional pain scale has been validated in SCD. Two SCD studies implementing a more commonly used multidimensional pain scale—the McGill Pain Questionnaire, which relies on patients describing their pain using 78 different pain adjectives—found such high variability between patients' pain descriptors that it was challenging to identify consistent patterns or delineate types of SCD pain.[13,35] The measure could not conclusively determine whether patients experienced neuropathic versus nociceptive pain alone, or a mix of the 2. Furthermore, patients took 21 minutes on average and up to 57 minutes to complete the measure.[13] In the acute care setting, where providers aim to administer treatment as quickly as possible, long, intensive multidimensional patient assessments are not feasible. More important, these traditional multidimensional pain scales that rely on long lists of adjectives or complex statements about pain may perpetuate disparities in care. The use of constrictive numerical scales and

esoteric words may alienate people with low literacy, cognitive impairment, or other communication limitations[18,36,37] while also failing to accurately represent racial differences in pain perception.[38] Patients who are the most vulnerable, such as those with SCD, can have their pain needs misinterpreted because of the traditional methods of pain assessment.[18]

Can We Leverage Technology to Solve the Pain Assessment Problem?

Technology presents an opportunity to change and improve how we conduct patient assessments in the clinical setting.[39] Regrettably, the only advancement in pain assessment thus far has been the use of electronic surveys and applications that are essentially digital copies of the traditional paper-pencil scales.[40] Assessing pain using adjectives, phrases, and numeric scales has limitations and is a mismatch with the dynamic nature of the pain experience, which is better depicted visually[41] with word pictures, analogies, and metaphors.[42,43] The Figure shows drawings by adults with SCD depicting a vaso-occlusive pain episode (unpublished data). Many patients used metaphors (eg, lightning bolts, hammers and nails) and others drew images that cannot be described in words.

A potential solution to the disconnect between how patients experience pain and how they are required to communicate it to clinicians is through the use of animations, which can be highly visual, abstract, and an expressive mode of communication that cuts across cultures and languages. We previously developed and tested the concept of a pain assessment application delivered on a tablet computer, the *Painimation* app, that allows users to report the location of their pain using a paintable body image and then the quality and intensity of their pain using 8 adjustable pain animations called “painimations.” In a general pain medicine population, we found that using these painimations to describe pain was not only acceptable to patients but also could differentiate between nociceptive and neuropathic pain etiology more accurately than scores from validated multidimensional scales such as the McGill Pain Questionnaire. In addition, completing the full painimation assessment took only 1.5 minutes on average.[5] A patient-centric pain assessment that is rapid, requires limited resources, and overcomes barriers of literacy, culture, and language can be a viable point-of-care tool to help emergency medicine providers assess and treat patients’ acute pain more objectively.

It is not yet clear whether the use of painimations is effective and can help determine pain etiology in SCD—pilot data with adults reporting chronic versus acute SCD pain are forthcoming. However, 6 adults with SCD reviewed the 8 painimations and were asked “Would you find this animation applicable to your pain?” Several painimations were endorsed but the only painimation selected by all 6 of patients was that most closely described as “electric shocks,” which was the painimation associated with the greatest pain severity in a general pain population.[5] One adult with SCD, when they viewed the “electric” painimation, stated, “that’s pain [right there], sickle cell crisis and this is the worst because it just won’t stop. Like how it moves up and down. Very sudden onset.” Another patient stated, “100% applies.”

Conclusions

Dissemination of the clinical guidelines for treating vaso-occlusive episodes in SCD has some merit for improving emergency clinical practice. The more immediate gap in acute pain care, however, is the ability of emergency health care providers to objectively and without bias assess pain type (acute vs. chronic) and etiology. A new approach to assessing pain is needed before the benefit of disseminating the treatment guidelines can be fully realized. Future studies may find that graphical, animation-based tools allow patients to more accurately express their pain experience and give clinicians multidimensional symptom data that improve their ability to quickly diagnose and treat SCD-related pain. Novel assessment approaches that fully leverage the interactive features of technology such as painimations may be the next step to revolutionizing emergency clinical practice.

DETAILS

Subject:	Pain management; Sickle cell disease; Narcotics; Analgesics; Bias; Etiology; Patients; Racism; Addictions; Health care; Algorithms; Race; Emergency medical care

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	10-15
Publication year:	2021
Publication date:	Jan 2021
Section:	Invited Commentary
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Commentary
DOI:	https://doi.org/10.1016/j.jen.2020.10.007
ProQuest document ID:	2487205734
Document URL:	https://www.proquest.com/scholarly-journals/if-you-can-t-assess-how-treat-improving-pain/docview/2487205734/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-08-18
Database:	Public Health Database

Dermal Hydrofluoric Acid Toxicity Case Review: Looks Can Be Deceiving: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Hydrofluoric acid is a caustic compound found in a wide variety of items for household and industrial uses. Dermal exposures can be visually unimpressive on presentation but still have fatal complications. This case review includes a description of a patient presenting with a dermal hydrofluoric acid burn that was effectively treated with topical calcium gluconate gel. Also highlighted are the challenges faced with recognizing the severity and appropriately treating dermal hydrofluoric acid burns in the emergency department.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current literature on the management of dermal hydrofluoric acid exposures indicates that there is limited information on how to rapidly prepare topical preparations of calcium salts.

••This article contributes a description of the successful management of a dermal hydroflouric acid exposure using a compounded preparation of calcium gluconate injection.

••Key implications for emergency nursing practice found in this article include a review of the identification and treatment of dermal hydroflouric acid exposure, and extemporaneous compounding of calcium salts.

Introduction

Hydrofluoric acid (HF) is used across a diverse set of trades, including the glass-etching, semiconductor, rust removal, and dental industries. In addition to its industrial uses, HF is found in lower concentrations in household items such as toilet bowl cleaners, automobile wheel cleaners, and insecticides.[1] Given the ease of accessibility to HF, exposures are bound to occur. Unlike burns caused by other caustics, HF burns may not appear visually impressive, but they can be acutely life-threatening. The patient reviewed in this case sustained an HF burn to the hand and presented twice to the emergency department.

Case Report

An otherwise healthy 33-year-old man presented to the emergency department after spilling a 47% HF solution on his left hand. He was treated with topical calcium carbonate paste, provided a prescription for topical calcium on discharge, and educated on when to return. The next day, the patient returned complaining of increased pain at the site of exposure and persistent fever.

On physical examination, the tips of his second and third digits were blanched with blisters and underlying white fluid, and there was bluish discoloration underneath the fingernails. He had normal radial pulses, and movement of the hand was intact. Further work-up revealed a fever of 38.6°C (101.4°F), white blood cell count of 19.1 k/mm^3, and an anion gap of 19. All other initial results were unremarkable, including the QTc interval (413 msec) and serum calcium (9.5 mg/dL). An X-ray showed no acute osseous abnormalities, and ultrasound revealed fluid collections in the area of exposure on the second and third digits.

Empiric vancomycin was given for suspected cellulitis, and he was admitted for further management. The poison control center staff recommended topical calcium to manage the patient's persistent pain. They suggested compounding a 32.5% calcium carbonate paste using 100 g of calcium carbonate (10 10-g oral tablets) and 20 mL of a water-soluble lubricant. The only crushable calcium product available in the local formulary was in the form of 500-mg calcium carbonate tablets, which complicated the preparation. Alternatively, 25 mL of 10% calcium

gluconate injection was mixed with 75 mL of a water-soluble lubricant to achieve a 2.5% calcium gluconate gel. This gel was applied to the area before placing the patient's hand in a glove.

The patient required multiple applications of the gel to alleviate his pain. On physical examination the following day, the affected second and third digits appeared dark gray, but the blanching had resolved. During his admission, his serum calcium further decreased, but did not result in any clinically significant events. The patient received a total of 3 doses of vancomycin until the underlying cellulitis was ruled out. Orthopedic surgery determined that there was no need for surgical aspiration, revascularization, or debridement. The patient was discharged after approximately 30 hours of observation, with topical calcium gluconate, nonopioid analgesics, and instructions to follow up with outpatient providers.

Mechanism of Toxicity

Aqueous HF is a weak acid with a permeability coefficient of 1.4×10^{-4} cm per second that allows it to penetrate deeply into the tissues.[2] Once dissociated, the highly electronegative fluoride ion complexes with positively charged ions such as calcium and magnesium, both intracellular and extracellular, to form insoluble salts.[3,4] Although this results in local tissue injury after dermal exposures, life-threatening electrolyte imbalances resulting in ventricular dysrhythmia and cardiac arrest are also possible.[3,4]

Dermal Manifestations

The caustic burns that manifest after most HF exposures will not appear visually impressive.[4] Unlike other caustics that result in a coagulative necrosis limiting further absorption, HF rapidly and deeply penetrates the dermal layers owing to its high permeability coefficient to cause cellular damage and/or death.[4,5] The site of exposure may initially appear benign, but as time passes the skin will become blanched, and a white discoloration will form as the calcium precipitates.[4,6] Ulceration may develop in exposures to high concentrations or after prolonged exposures to HF.[4] Although dermal HF burns may initially appear nontoxic, the patient will complain of seemingly incongruent levels of pain. The formation of insoluble calcium fluoride causes a disruption of calcium homeostasis, causing neuroexcitation and neuropathic pain at the burn site.[6,7] In addition, the abrupt change in serum and local calcium results in vasospasm-related ischemia, which may also contribute to the pain experienced by patients exposed to HF.[6,7]

Both the onset and severity of symptoms vary depending on the duration, percentage of body surface area, and the concentration of HF to which the patient was dermally exposed.[1,6] After dermal exposure to low or moderate concentrations of HF, there can be up to a 24-hour delay in pain and erythema; high concentrations (>50%), in contrast, will result in immediate tissue damage and pain.[1,4,6,8] Patients exposed to HF concentrations of 20% or higher should be monitored closely because they are at significant risk for systemic toxicity.

Systemic Toxicity

Systemic toxicity should be anticipated after dermal exposures to HF concentrations of 20% or higher, particularly if the exposure involves more than 2.5% of the body surface.[4,9] Because systemic toxicity may first manifest with hypocalcemia, hypomagnesemia, and hyperkalemia, laboratory test results should be obtained quickly and monitored hourly.[8] These electrolyte imbalances may precipitate ventricular arrhythmias, including ventricular fibrillation, and are almost always present in fatal HF exposures.[4] The resultant arrhythmias are suspected to be the primary cause of death in systemic HF toxicity, although direct myocardial damage has also been reported.[4,5] The decrease in serum calcium stores may also affect the coagulation cascade, placing patients with HF toxicity at increased risk of hemorrhage.[5] Although beyond the scope of this article, it should be noted that oral ingestions of HF are almost invariably fatal.[10]

Management

The mainstay of treatment is to limit systemic absorption with decontamination, neutralize fluoride ions, rapidly correct electrolyte imbalance, and assess for systemic toxicity.[4] Intravenous access, and serum calcium, magnesium, and potassium concentrations should be obtained. An electrocardiogram should also be evaluated for the characteristic indicators of electrolyte imbalance such as QTc prolongation in the setting of hypocalcemia. Adjunctive analgesics can be administered to control pain; they should be used cautiously, however, because pain is the main indicator of treatment failure.[11]

Decontamination is the first step of any HF exposure treatment, regardless of the concentration of HF, duration of exposure, or the severity of symptoms.[4,5,8] All contaminated clothing, jewelry, and other garments should be rapidly removed to avoid continued exposure. The site of exposure should be thoroughly irrigated with water or saline for a minimum of 15 minutes to 30 minutes, with special attention paid to easily overlooked areas of exposure such as skin folds.[1,11]

Local neutralization of fluoride ions is typically achieved with topical calcium preparations.[4,11] If a commercially available topical calcium product is unavailable, 1 can be compounded using an available source of calcium ([Table]).[4,11,12] Although calcium gluconate is the preferred calcium salt, calcium carbonate may also be used.[4] Topical gels should be applied directly to the affected area, or mixed in a sterile surgical glove and placed on the patient's hand for 30 minutes.[1,4] Topical applications can be repeated every 4 to 6 hours for 3 to 4 days.[1] On reaction with the fluoride ions, the gel turns white, and pain relief should be apparent almost immediately after application.[1,4] It is worth noting that exposures occurring 12 to 24 hours before treatment may experience limited benefit from topical therapy.[4]

Intradermal calcium injections may be considered if topical therapy provides inadequate pain relief. This should be reserved for more severe exposures owing to the increased risk of tissue damage, compartment syndrome, and infection.[4] Intra-arterial calcium gluconate infusions may be considered in the case of severe burns, pain despite topical treatment, exposure to large surface areas, or when intradermal therapy is not an option (ie, HF under the nail beds).[1,4,5] Calcium chloride is contraindicated for both intradermal and intra-arterial injections owing to increased risk of tissue damage and lack of observed benefit over calcium gluconate.[8,11] Surgical debridement should also be considered to remove blisters, and necrotic and contaminated tissues, and to trim or remove affected nails.[1,11]

In the event that systemic toxicity develops, patients should immediately receive intravenous calcium and magnesium repletion. Acidemia should be corrected with hydration and intravenous sodium bicarbonate.[4] In severe cases, hemodialysis may be warranted.[1,4] Airway status and the potential need for intubation should also be evaluated because some patients may not be able to protect their own airway.[4] It is reasonable to avoid succinylcholine if an alternative paralytic is available to avoid the potential for hyperkalemia.[4]

Discussion

The patient discussed here was discharged on his first visit to the emergency department without any laboratory monitoring despite being exposed to 47% HF. The lack of visually appreciable tissue damage at that time may explain not only his quick discharge, but also why laboratory monitoring was not performed during this initial visit. The potential for a delayed onset of severe tissue damage and life-threatening manifestations of systemic toxicity should have prompted a longer observation period for this patient. When evaluated on his second visit, there was no evidence of any clinically significant electrolyte abnormalities or cardiac toxicity.

The patient was provided a prescription for topical calcium on discharge from his initial ED visit. Because there was no evidence that the prescription was filled, it would be inappropriate to consider this a treatment failure. Furthermore, the effect of topical therapy on pain control may have been limited because it had been more than 12 hours since the exposure. Because the presentation was within 24 hours of exposure, however, it would be

reasonable to continue topical treatment and not advance to intradermal or intra-arterial routes, which are reserved for true topical-treatment failure owing to the inherent risks.

When the patient presented to the emergency department for the second time, the burn was more visually impressive, which prompted laboratory monitoring, imaging, and consultation. It is worth noting that intradermal or intra-arterial calcium therapy were likely justifiable in this patient owing to the discoloration of the fingernails. Because of the high permeability coefficient, this discoloration may have suggested deeper tissue involvement; therefore, one could argue that alternative treatment strategies were warranted. Given its limited transdermal absorption, failure to supply exogenous calcium to the deeper tissues could have resulted in a progression to systemic toxicity. Because there was no evidence of electrolyte imbalance or cardiac instability it was, again, reasonable to proceed with topical therapy.

Because calcium carbonate has limited water solubility, there was some concern that the crushed calcium carbonate tablets might not disperse throughout the available water-based lubricant, and thus have limited efficacy. In addition, the facility only had 500-mg tablets available. To achieve the final concentration recommended by the poison control center staff, this would have required the crushing of 200 tablets. This was not only a time-consuming option, but it was also surmised that there would have been poor dermal absorption of the remaining solid particulates, given the low likelihood that all of the powder would have solubilized in the lubricant.

Implications for Emergency Nurses

Patients with dermal HF burns may initially present with minimal visible tissue damage, and complain of pain seemingly disproportionate to the injury. It is imperative to appreciate the low likelihood of coagulative necrosis manifesting shortly after low-concentration HF exposures. Nonetheless, treatment should proceed with aggressive decontamination, ion neutralization, and monitoring for electrolyte imbalance. The early obtainment of an electrocardiogram can help identify life-threatening electrolyte imbalances before laboratory results become available.

The poison control center should be contacted at 1-800-222-1222. Analgesics should be used cautiously because pain is an early indicator of treatment failure. Topical calcium preparations should be used to mitigate pain at the site of exposure. Because commercially available topical calcium products may not be readily available, ED staff should know how to quickly compound a topical gel using available calcium products.

Conclusion

HF is a widely accessible caustic that can cause potentially fatal consequences if exposure is not treated promptly. Dermal exposures require immediate attention and should not be underestimated, despite the benign appearance. Fluoride ions quickly permeate the deep tissue layers to cause not only severe local tissue damage, but also potentially fatal systemic toxicity. Although there are no definitive guidelines for the management of HF exposure, calcium gluconate remains the mainstay of therapy. A 2.5% calcium gluconate gel can be easily compounded if commercial preparations are unavailable.

Author Disclosures

Conflicts of interest: none to report.

The authors certify that all elements of this case review conform to both the local and Elsevier’s patient consent policies.

Source of calcium	Amount of calcium	Amount of water-soluble lubricant, mL	Final concentration, %
Calcium gluconate powder	3.5 g	150	2.2
Calcium gluconate injection 10%	25 mL	75	2.5
Calcium carbonate tablets, 10 g	10 tablets	20	32.5

DETAILS

Subject:	Laboratories; Patients; Emergency medical care; Electrolytes; Acids; Cardiac arrhythmia; Bone surgery; Calcium; Cellulitis; Permeability; Burns; Pain; Fluorides; Debridement; Analgesics; Emergency services
Identifier / keyword:	Clinical pharmacology; Clinical pharmacy services; Emergency Services, Hospital; Toxicology; Chemical burn; Hydroflouric Acid
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	28-32
Publication year:	2021
Publication date:	Jan 2021
Section:	Case Review
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal

Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.08.005
ProQuest document ID:	2487205716
Document URL:	https://www.proquest.com/scholarly-journals/dermal-hydrofluoric-acid-toxicity-case-review/docview/2487205716/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2021-04-09
Database:	Public Health Database

Factors Associated With ED Use Among New Asian Immigrants in New Zealand: A Cross-Sectional Analysis of Secondary Data: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

New Zealand has an ethnically diverse population and continues to host immigrants from different countries. The present study aimed to examine the factors associated with ED use among new Asian immigrants in New Zealand.

Methods

A secondary analysis of 2016-2017 New Zealand Health Survey database. Univariate and multivariate logistic regression models were employed. A total of 414 new Asian immigrants were identified.

Results

Asthma, diabetes, chronic pain, anxiety, hypertension, body mass index, waist measurement, perceived health status, and distress were associated with a significantly increased likelihood to ED visits. The multivariate logistic regression analysis revealed that asthma (adjusted odds ratio = 5.29, 95% confidence interval, 1.26-22.24) and perceived health status (adjusted odds ratio = 0.81, 95% confidence interval, 0.66-0.99) were factors associated with ED use among new Asian immigrants.

Conclusion

Asthma and perceived health status were the 2 key factors associated with ED use among new Asian immigrants in New Zealand. ED use among new Asian immigrants encompassed both chronic health conditions and mental health indicators.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current state of scientific knowledge on new immigrants' accessing health care in host countries indicates challenges and difficulties in navigating the new health care system.

••The main finding of this research has identified that asthma and perceived health status are the 2 main factors among new Asian immigrants associated with using emergency care.

••Key implications for emergency nursing practice from this research are (1) many new immigrants who are challenged by changing health care systems may access emergency departments as an immediate solution for every asthma episode and (2) individuals presenting in emergency departments, particularly, those who are new to the country might have specific health and psychosocial needs and as well as service use issues, which might need a more focused assessment or referrals.

Introduction

Unique risk and protective factors affect immigrant health, raising important issues for both immigrants and the host countries. The health care services provided to immigrant groups highly depend on the health entitlements covered within their visa conditions.[1] Most of permanent immigration is composed of work-to-residence visa permits and through family reunification schemes, which in most cases have a comprehensive health care coverage.[2] Several published works address health care delivery and costs relevant to immigration policies.[3-5] Immigrants are frequently required to be "in good health" to be granted residency and work permits in the host countries. The presence of pre-existing chronic conditions such as heart and kidney problems, infectious diseases such as tuberculosis and human immunodeficiency virus, and those requiring health care services in a long-term basis are considered during visa application and visa approval.[6] The medical fitness requirement is 1 way to assure host countries that immigrants coming to work or live permanently are in a good state of health. However, the "healthy migrant effect" can diminish over time and is sensitive to the period of residence in the destination countries.[7] Different factors, such as acculturation and economic stability in the host countries, contribute to the changing health status of immigrants.[8,9] This decline in health owing to the unique challenges and vulnerabilities of immigration can create an unanticipated demand for services in the health systems and the overall public health care delivery. This study reports findings of a secondary analysis conducted on new Asian immigrants in New Zealand in terms of their ED use.

New Zealand Context

The 2018 Census revealed that 27.4% of the total population, which is approximately 1.27 million people living in New Zealand, were born overseas.[10] The New Zealand population is increasingly diverse, particularly in major cities such as Auckland.[11] The fastest growing ethnic group is the Asian–New Zealander population, predicted to reach 1.38 million in 2038.[12] The continuous growth of the Asian populations in New Zealand has been historically attributed to permanent residency after immigration and from family reunification pathways.[13] Asians from Chinese and Indian ethnicities are the 2 largest Asian groups in New Zealand.[10] Although the Chinese and Indians have been noted to have a long history of immigration to New Zealand, there are also increasing trends of new immigrants in the country.[10,14]

In terms of migrant health, the New Zealand public health system, which is primarily government-funded, caters to the health care needs and equitable delivery of health care services (eg, full hospitalization coverage) to all New Zealand citizens including immigrant groups with resident visa permits.[15] The New Zealand government has policies and specific mechanisms in providing health care services to all people living in the country with consideration of their visa or permit status. However, a recent literature review examining the status of migrant health in New

Zealand indicated challenges in aligning culturally appropriate health services to immigrants' needs, and some of the implemented health interventions were ineffective.[16] For example, many health services, particularly in mental health, were oftentimes delayed because of the inability to reach immigrant groups and the lack of understanding of the common stressors experienced by immigrants living in New Zealand.[16]

Asians living in New Zealand are noted to be generally healthy. A recent New Zealand report, which examined immigrant health against an international benchmark showed that Asian–New Zealanders have comparable and, in most aspects, better health outcomes than Asians located globally, part of which can be explained by the healthy "desirable" migrant characteristics or health status required to be allowed to immigrate in the first place.[10,14,17] However, Asian–New Zealanders, have demonstrated increasing ED use over each year with the highest peak of ED visits between 2015 and 2017.[18] An increasing trend toward emergency care use within the public health care system, particularly from immigrant populations in New Zealand, raises several implications to the current state of health and well-being of these population groups.[10]

ED use among individuals from immigrant backgrounds is associated with chronic conditions.[19] In particular, emergency use was identified as a consequence of changing lifestyles and health behaviors affecting the general health of immigrants with chronic conditions.[10] A qualitative study undertaken among late-life Asian immigrants in New Zealand noted that ED visits were influenced by the lack of awareness of health services that are available in the community such as general practitioner clinics and misunderstanding of the host countries' health systems.[20] The New Zealand Health Survey (NZHS) 2019 results generally indicated that Asian populations in New Zealand have an increasing trend of ED presentations.[18] Although lower than the national prevalence rate of ED use (14%), Asian–New Zealanders' ED use when compared with other ethnic groups did not have a significant decline since 2012 with a prevalence rate of around 9% in the last 7 years.[21] A gap in the literature was also noticeable in terms of the specific chronic diseases or demographic characteristics associated with ED use in Asian–New Zealander immigrants. With Asian–New Zealander immigrants, a focus on new or recent immigrants across age groups is important as they experience challenges associated with changing environments and cultural adjustments in their host societies.[22]

AIM

The aim of this secondary data analysis was to examine the factors associated with ED use among new Asian immigrants in New Zealand. The specific research question of this study was what are the factors associated with the ED use within the past year among new Asian immigrants in New Zealand?

Methods Study Design and Setting

Secondary data analysis was employed in this study. We used a subset of the Asian population extracted from the NZHS database, 2016-2017.

Study Sample

The original NZHS 2016-2017 dataset had a total of 13,598 adults and 4,668 children, who were interviewed face-to-face by 35 professional interviewers between July 1, 2016, and June 30, 2017. From this dataset, the inclusion criteria of our study were (1) age >15 years, (2) Asian ethnicity, and (3) new (last 5 years) immigrants.

The NZHS collected ethnicity data by asking participants to identify their ethnic affiliation using the following question: "Which ethnic group or groups do you belong to?" which included the options New Zealand European, Māori, Samoan, Cook Island Māori, Tongan, Niuean, Chinese, Indian, and other (please specify). To investigate our target sample of new immigrants, only participants who arrived to permanently live in New Zealand in the past 5 years were included. We have extracted the Asian groups from those participants who identified as Chinese, Indian and those who responded as other with specific origin from other Asian countries (eg, Philippines). The data

analyzed were all deidentified data from Statistics New Zealand.

The NZHS as a nationwide survey employed a stratified, multistage area sampling design to achieve an area-based sample as well as increase the sample size for the Māori, Pacific, and Asian ethnic groups. With our study focusing on the ED use specifically among new Asian immigrants, the NZHS sampling method allowed us to examine the national-level representative of Asian populations and further identify new Asian immigrants. Thus, a weighted analysis was not applied because of our focus on a specific ethnic group in the NZHS with small subsample sizes.

New Zealand Health Survey

The NZHS is an important data collection tool developed by the Ministry of Health, New Zealand government to monitor population health and provide supporting evidence for health policy and strategy development. The partial content that was included in this study was summarized (Supplementary Table).

Demographic Characteristics

Sex, age, educational level, annual total income, and employment status were collected. All demographic data were analyzed as categorical variables.

Diseases and Symptoms

In the NZHS database, participants' diseases and some symptoms diagnosed by a medical practitioner were collected. For example, the question used to ask participants to ascertain a formal medical diagnosis was "Have you been told by your doctor that you have diabetes." Data of diseases and symptoms (eg, chronic pain, asthma, hypertension, diabetes, anxiety) were extracted; each item was a categorical question (yes/no).

Health Measurements

The height, weight, and waist measurement data were also extracted. Body mass index (BMI) and waist circumference data were computed and analyzed as continuous variables.

Perceived Health Status

The Short-Form 12-Item Health Survey version 2 (SF-12v2) has been used widely in measuring the concept of perceived health-related quality of life. The SF-12v2 includes 2 components: physical composite scale and mental health composite scale. The questions include physical functioning, role limitations because of physical health problems, bodily pain, general health perceptions, vitality (energy/fatigue), social functioning, role limitations because of emotional problems, psychological distress, and psychological well-being. In this study, the raw scoring system from the actual NZHS questionnaire was used (details provided in Supplementary Table). The raw scores can range from 12 to 56 points, with higher scores indicating a better perceived health status. The test-retest reliability of SF-12v2 was 0.79 (intraclass correlation coefficient), and a strong convergent/divergent validity related to physical and mental indexes.[23]

Distress

Distress was screened by Kessler Psychological Distress Scale (K10) on the basis of 10 questions about anxiety and depressive symptoms that a person has experienced in the past 30 days. It has been chosen for routine public health survey in Australia.[24] The K10 scores using a 5-point Likert rating scale ranged from 10 to 50. A higher score indicates a higher possibility to have a severe mental disorder. The area under the receiver operating characteristic curve (0.87-0.88) of K10 showed a good accuracy in screening mental disorder.[25]

Data Collection Procedures

First, the researchers requested from Statistics New Zealand access to the Confidentialized Unit Records Files (CURFs) from the NZHS dataset. Statistics New Zealand asked permission from the Ministry of Health, New Zealand government to use the CURF data with the approval project reference number CURF-2018-26. Second, accuracy in data extraction was followed with 2 authors (J.M. and M.H.H.) checking the data independently and

examining the number of eligible participants and frequencies of variables. Finally, any inconsistency in the data such as agreeing with the number of total eligible participants was resolved by a consensus discussion with the authors. The subset of Asian population was used for statistical analyses.

Data Analysis

Descriptive statistics, such as means, frequencies, percentages, and SDs, were used for describing the distributions of all variables. The chi-square test and the independent *t* test were adopted to test the differences between ED users and non-ED users. Moreover, univariate and multivariate logistic regression analyses were employed to determine the most high-risk factors associated with ED use in the new Asian immigrants in New Zealand; *P* **Ethics**

The New Zealand Health and Disability Multi-Region Ethics Committee granted approval for the NZHS (MEC/10/10/103). For this current secondary data analysis, no further ethical approval was required, as data were deidentified from the CURFs requested from Statistics New Zealand, and data sources were duly acknowledged.

Results

A total of 414 participants were identified as new Asian immigrants on the basis of the selection criteria. From this group, 30 who reported they have visited the emergency department within the past year (ED users) and 384 who did not attend the emergency department within the past year (non-ED users) were used in the final analyses. The [Figure] presents the flow chart for participant selection in this study. Among the 414 participants, 30 (7.2%) went to the emergency department in the past 12 months, 215 (51.9%) were men, ages were from 15 to 84 years, with a mean age of 32.85 years (SD = 10.7). A total of 180 participants (43.5%) had attained a bachelor's degree, the annual total income of most participants was 30,001-60,000 New Zealand dollar (35.5%), and most of the participants were working in paid employment (62.0%). ED users and non-ED users were compared in relation to demographic characteristic and other health survey items in [Table 1].

To assess the important factors associated with ED use among new Asian immigrants, the variables of health survey were tested by univariate and multivariate logistic regression analyses. Results from the univariate logistic regression model showed that asthma, chronic pain, anxiety, hypertension, BMI, waist measurement, perceived health status, and anxiety and depression were associated with a significantly increased likelihood to visit the emergency department. The multivariate logistic regression analysis revealed that asthma (adjusted odds ratio = 5.29, 95% confidence interval, 1.26-22.24) and perceived health status (adjusted odds ratio = 0.81, 95% confidence interval, 0.66, 0.99) were significant factors associated with ED use among new Asian immigrants ([Table 2].) A post hoc power analysis was carried out using G*power software (version 3.1). A nonsignificant variable (history of diabetes) in the logistic regression model was chosen, and the results demonstrated a power of 60% with the current sample size.

Discussion

The current secondary analysis of NZHS data examined the factors associated with ED use of new Asian immigrants in New Zealand from 2016 to 2017. With the increasing population of Asians in New Zealand and the recent arrivals of immigrants from Asia, it is important to understand specific cohorts of the Asian populations in terms of their health service uses.[10,14] From the present study, the presence of chronic conditions was a major factor associated with ED use among new Asians immigrants. The demographic profile of new Asian immigrants in New Zealand such as age, sex, and education levels demonstrated significant differences between ED users and non-ED users. The same pattern was noted among Asian immigrants in the United States with age as the only factor associated with ED visits among many other demographic indicators.[26] In the present study, there was adequate statistical power to detect asthma and perceived health status as major factors associated with ED use.

Asthma among new Asian immigrants in New Zealand could be linked to the prevalence and increasing incidence of

asthma in Asian regions.[27] New Asian immigrants might have been diagnosed with asthma just before immigrating to New Zealand. Within New Zealand immigration health requirements, asthma is not one of those specific conditions listed for serious consideration on visa applications,[6] possibly because of its highly preventable nature. However, long-term management for asthma requires medications such as inhalers, to which new immigrants may not have access, hence accessing emergency care with asthma episodes. In addition, there are known lower enrollment rates of Asian peoples in New Zealand to Primary Health Organizations.[28,29] Moreover, factors such as financial costs for doctors' prescriptions influence medication access and use among immigrants in New Zealand,[30] which could potentially have resulted in ED use of Asian–New Zealanders with asthma.

New Zealand hospital admission rates owing to asthma were at their highest in 2015, which were 6 per 1,000 population.[31] Whereas asthma was found to be a significant factor associated with new Asian immigrants' ED use, asthma incidence in New Zealand is common in children. The Asthma Respiratory Foundation New Zealand–Adult Asthma Guidelines outlined the criteria for hospitalization referrals and predischarged considerations for asthma patients. With the referral to hospitalization, social issues such as "living alone, socially isolated, and psychosocial problems" were one of the criteria.[32] The guideline's recognition of social issues in relation to asthma management has similar implications to new immigrants in New Zealand, who might have some issues with accessing and understanding the New Zealand health care system. It is imperative to consider new immigrants as potentially isolated groups, which can be identified and assessed during ED presentations.

The perceived health status was a significant factor associated with ED use among new Asian immigrants. The self-report section of the NZHS reported physical and mental health dimensions of the perceived health status scale. New Asian immigrants who reported high-perceived health status were less likely to visit the emergency department. These findings are similar to the study on Chinese immigrants in the US, in which poor-perceived health status and existing chronic conditions were associated with higher rates of ED visits.[19] Whereas the physical components relating to the chronic conditions were identified as significant factors, a heavier weight can be interpreted within the mental health dimensions of the perceived health status. This was evident with the significant factors identified in this secondary analysis relating to mental health aspects such as the anxiety and distress scales. Previous studies reported that the frequency of ED use is associated with more severe mental health issues, and ED presentations owing to mental health conditions are increasing.[33-35] One possible reason is that new immigrants from Asia are being challenged by social changes such as health care system differences, language, and cultural views that affect their day-to-day lives in New Zealand.[20] The experience of cultural conflicts from changing dynamics of Asian immigrant families in New Zealand could result in a symptomatic conversion of anger and frustration.[36]

Internationally, it has been reported that low levels of acculturation and experiences of discrimination lead to higher depressive symptoms in Korean immigrants in the US.[37] These challenges may result in anxiety and some emotional distress, resulting in new Asian immigrants' presentations in New Zealand emergency departments.

The present study had several strengths. This was the first secondary data analysis exploring ED use among new Asian immigrants in New Zealand. Moreover, the NZHS is a national survey that targeted all ages of the population with a statistically rigorous sampling method. It can be considered as the most representative database, and many studies discussing different public health issues use the NZHS database.[38–40]

Limitations

The main limitation for this analysis was the nature of using secondary data representing a single calendar year. The Asian sample in the NZHS was predominantly Chinese and Indian Asian subgroups. With the increasing diversity of Asian population in New Zealand, particularly with the new immigrants from the Philippines, the Asian ethnicity category needs to be expanded for accuracy of reporting Asian health profiles and health care access. Owing to the

small sample size, the population weights used in a complex survey design were not applied in our analysis. The sample size did not provide adequate power to test all factors associated with ED use. For example, this study only achieved a power of 60% to test a history of diabetes in this model. Replication of our study in additional years and settings is warranted.

Implications for Emergency Nurses

Practicing emergency nurses worldwide care for patients who are more vulnerable because of their recent immigration status. Nurses and clinicians should recognize that new immigrants may be likely to access emergency care because of a combination of health and psychosocial issues. Many new immigrants who are experiencing challenges in navigating the health care system, such as not having their own family doctor, are more likely to access emergency departments as an immediate solution for every health issue. Asthma, although an acute and preventable condition, requires long-term management that may be affected by the challenges and experiences of immigration. Recognizing these concerns enables emergency nurses to provide clear and guided referral toward primary health care services available in the host country.

At a policy level, identifying the factors associated with ED use has implications to health policies, particularly in the delivery of public health services in host countries. From the findings of this study, the salient feature common between the 2 significant factors—asthma and perceived health status—is the influence of subjective physical and psychosocial status to using emergency care. From this study, high perceptions of perceived health status while living in the host country were dominated by mental health and well-being indicators and predicted lower chances for ED use. This suggested the link of positive settlement and adjustment of immigrants and their use of available health services.

Conclusions

This secondary data analysis revealed that factors such as chronic pain, anxiety, hypertension, BMI and waist measurement, and distress are associated with ED use. Furthermore, asthma and perceived health status are the 2 key factors associated with ED use among new Asian immigrants in New Zealand. The factors associated with ED use among new Asian immigrants in New Zealand encompasses both chronic health conditions and mental health indicators.

Acknowledgments

We would like to acknowledge the participants in the 2016-2017 New Zealand Health Survey and Statistics New Zealand and the Ministry of Health for assisting with microdata access.

Author Disclosures

Conflicts of interest: none to report.

Appendix

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.07.011.

	ED use n = 30	No ED use n = 384		

Variables	Mean	SD	n (%)	Mean	SD	n (%)	χ^2/t	P
Sex							.29	0.59
Female			17 (56.7)			198 (51.6)		
Male			13 (43.3)			186 (48.4)		
Age	34.3	13.4		32.7	10.5		−0.75	0.45
15–30 y			16 (53.3)			191 (49.7)		
31–44 y			11 (36.7)			147 (38.3)		
45–64 y			1 (3.3)			41 (10.7)		
≥65 y			2 (6.7)			5 (1.3)		
Educational level, n = 397							1.48	0.48
Under bachelor’s degree			14 (50.0)			166 (45.0)		
Bachelor’s degree			10 (35.7)			113 (30.6)		
Master’s degree or above			4 (14.3)			90 (24.4)		
Annual total income, n = 361							0.05	0.82
0 income			6 (25.0)			69 (20.5)		
1–30,000 NZD			6 (25.0)			107 (31.8)		

30,001–60,000 NZD			8 (33.3)			120 (35.6)		
≥60,001 NZD			4 (16.7)			41 (12.1)		
Employment, n = 410							0.05	0.82
Working in paid employment			18 (60.0)			236 (62.1)		
Not working (looking for a job, retired, a homemaker, or full-time student)			12 (40.0)			144 (37.9)		
Chronic pain, yes, n = 29			6 (20.0)			23 (6.0)	8.39	0.01
Asthma, yes, n = 25			6 (20.7)			19 (4.9)	11.75	0.005
Hypertension, yes, n = 25			6 (20.0)			19 (5.0)	11.02	0.006
Diabetes, yes, n = 14			3 (10.0)			11 (2.9)	4.30	0.04
Anxiety, yes, n = 4			2 (0.5)			2 (6.7)	5.36	0.03
BMI, n = 382	26.9	3.6		24.9	4.3		−2.77	0.01
Waist measurement, n = 378	88.8	12.0		83.7	11.9		−2.02	0.04
Perceived health status, n = 339	40.3	3.8		42.2	2.4		3.27	0.001
Distress, n = 408	3.9	6.7		2.1	3.7		−2.35	0.02

Variables	Crude OR	95% CI	Adjusted OR	95% CI

Asthma (ref: no)	5.01†	1.83-13.76	5.29*	1.26-22.24
Diabetes (ref: no)	3.75	0.99-14.24	5.53	0.41-75.22
Chronic pain (ref: no)	3.92†	1.46-10.55	1.12	0.17-7.35
Anxiety (ref: no)	13.64†	1.85-100.52	4.05	0.15-107.08
Hypertension (ref: no)	4.78†	1.75-13.07	2.84	0.55-14.77
BMI	1.10*	1.02-1.19	1.13	0.93-1.37
Waist measurement	1.03*	1.00-1.07	0.99	0.92-1.06
Perceived health status (SF-12)	0.79†	0.69-0.92	0.81*	0.66-0.99
Distress (K10)	1.07†	1.01-1.15	1.00	0.89-1.13

Variables	Original survey questions	Description
Demographic characteristics		
Gender	You are male / female…?	1) Male 2) Female
Age	Which of these age groups do you belong to?	1) 15–19 years 2) 20–24 years 3) 25–34 years 4) 35–44 years 5) 45–54 years 6) 55–64 years 7) 65–74 years 8) 75+ years

Educational level	What is your highest completed qualification?	0) None 1) National Certificate level 1 2) National Certificate level 2 3) National Certificate level 3 4) National Certificate level 4 5) Trade Certificate 6) Diploma or Certificate level 5 7) Advanced Trade Certificate 8) Diploma or Certificate level 6 9) Teachers Certificate / Diploma 10) Nursing Diploma 11) Bachelor 12) Bachelor Hons 13) Postgraduate Certificate / Diploma 14) Masters Degree 15) PhD 77) Other [Specify] _____
Annual total income	What is the total income that you yourself got from all sources, before tax or anything was taken out of it, in the last 12 months? Please read out the number next to the income group.	1) Loss 2) Zero income 3) $1 – $5,000 4) $5,001 – $10,000 5) $10,001 – $15,000 6) $15,001 – $20,000 7) $20,001 – $25,000 8) $25,001 – $30,000 9) $30,001 – $35,000 10) $35,001 – $40,000 11) $40,001 – $50,000 12) $50,001 – $60,000 13) $60,001 – $70,000 14) $70,001 – $100,000 15) $100,001 – $150,000 16) $150,001 or more
Employment status	Which of these statements best describes your current work situation:	1) Working in paid employment (includes self-employment) 2) Not in paid work, and looking for a job 3) Not in paid work and not looking for a job (for any reason, such as being retired, a homemaker, caregiver, or full-time student) 77) Other [Specify] _____

Diseases and symptoms		
Anxiety	Have you ever been told by a doctor that you have anxiety disorder? This includes panic attacks, phobia, post-traumatic stress disorder, and obsessive compulsive disorder?	1) Yes 2) No
Asthma	Have you ever been told by a doctor that you have asthma?	1) Yes 2) No
Chronic pain	Do you experience chronic pain? This is pain that is present almost every day, but the intensity of the pain may vary. Please only include pain that has lasted, or is expected to last, for more than six months.	1) Yes 2) No
Diabetes	Have you ever been told by a doctor that you have diabetes?	1) Yes 2) No
Hypertension	Have you ever been told by a doctor that you have high blood pressure?	1) Yes 2) No
Health measurements		
Height	Please stand with your back to the door. Put your feet together and move them back until your heels touch the door. Stand up straight and look straight ahead. 1st reading 000.0 (cm) (range 60.0cm–230.0cm)	
Weight	Wait until it turns zero. Please step onto the centre of the scale with your weight on both feet. Relax [take reading]. Thank you. You can step off now. 1st reading 000.0 (kg) (range 10.0kg–210.0kg)	
Waist Circumference	Please stand in a relaxed position. Please take the end of the tape, pass it around your waist and hand it back to me. Please help me to position the tape at the level of your waist. Good, now just breathe normally [take measurement at end of breath out]. Thank you. 1st reading 000.0 (cm) (range 10.0cm–200.0cm)	
Perceived health status		

SF-12v2 SF-12v2™ Health Survey © 1992, 2003 by Health Assessment Lab, Medical Outcomes Trust and Quality Metric Incorporated. All rights reserved. SF-12® is a registered trademark of Medical Outcomes Trust. (IQOLA SF-12v2 Standard, English (New Zealand), 7/03).	1. In general, would you say your health is...[Reverse coded item]	1) Excellent 2) Very good 3) Good 4) Fair 5) Poor
	2. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf. Does your health now limit you a lot, limit you a little, or not limit you at all?	1) Yes, limited a lot 2) Yes, limited a little 3) No, not limited at all
	3. Climbing several flights of stairs. Does your health now limit you a lot, limit you a little, or not limit you at all?	1) Yes, limited a lot 2) Yes, limited a little 3) No, not limited at all
	4. During the past 4 weeks, how much of the time have you accomplished less than you would like as a result of your physical health?	1) All of the time 2) Most of the time 3) Some of the time 4) A little of the time 5) None of the time
	5. During the past 4 weeks, how much of the time were you limited in the kind of work or other regular daily activities you do as a result of your physical health?	1) All of the time 2) Most of the time 3) Some of the time 4) A little of the time 5) None of the time
	6. During the past 4 weeks, how much of the time have you accomplished less than you would like as a result of any emotional problems, such as feeling depressed or anxious?	1) All of the time 2) Most of the time 3) Some of the time 4) A little of the time 5) None of the time
	7. During the past 4 weeks, how much of the time did you do work or other regular daily activities less carefully than usual as a result of any emotional problems, such as feeling depressed or anxious?	1) All of the time 2) Most of the time 3) Some of the time 4) A little of the time 5) None of the time

	8. During the past 4 weeks, how much did pain interfere with your normal work, including both work outside the home and housework? [Reverse coded item]	1) Not at all 2) A little bit 3) Moderately 4) Quite a bit 5) Extremely
	9. How much of the time during the past 4 weeks have you felt calm and peaceful? [Reverse coded item]	1) All of the time 2) Most of the time 3) Some of the time 4) A little of the time 5) None of the time
	10. How much of the time during the past 4 weeks did you have a lot of energy? [Reverse coded item]	1) All of the time 2) Most of the time 3) Some of the time 4) A little of the time 5) None of the time
	11. How much of the time during the past 4 weeks have you felt downhearted and depressed?	1) All of the time 2) Most of the time 3) Some of the time 4) A little of the time 5) None of the time
	12. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities like visiting with friends or relatives? Has it interfered?	1) All of the time 2) Most of the time 3) Some of the time 4) A little of the time 5) None of the time
Distress		
K10 The next questions are again about how you have been feeling during the past 4 weeks. Some of these questions are similar to earlier questions, but we need to ask them again.	1. During the past 4 weeks, how often did you feel tired out for no good reason - would you say all of the time, most of the time, some of the time, a little of the time, or none of the time?	1) All of the time 2) Most of the time 3) Some of the time 4) A little of the time 5) None of the time
2. During the past 4 weeks, how often did you feel nervous - all of the time, most of the time, some of the time, a little of the time, or none of the time?	3. During the past 4 weeks, how often did you feel so nervous that nothing could calm you down?	4. During the past 4 weeks, how often did you feel hopeless?

5. During the past 4 weeks, how often did you feel restless or fidgety?	6. How often did you feel so restless you could not sit still?	7. During the past 4 weeks, how often did you feel depressed?
8. How often did you feel so depressed that nothing could cheer you up?	9. During the past 4 weeks, how often did you feel that everything was an effort?	10. During the past 4 weeks, how often did you feel worthless?

DETAILS

Subject:	Emergency medical care; Population; Diabetes; Databases; Trends; Health care policy; Health surveys; Health care delivery; Chronic illnesses; Health status; Immigrants; Data analysis; Ethnicity; Immigration; Measurement; Hypertension; Asthma; Minority &ethnic groups; Permits; Chronic asthma; Confidence intervals; Body mass index; Public health; Regression analysis; Chronic pain; Health services; Health indicators; Psychological distress; Mental health; Noncitizens; Asian people
Location:	New Zealand
Identifier / keyword:	New Zealand; Secondary analysis; Emergency department; Asian immigrants; Migrant health
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	157-166.e4
Publication year:	2021
Publication date:	Jan 2021
Section:	International Nursing
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal

Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.07.011
ProQuest document ID:	2487205707
Document URL:	https://www.proquest.com/scholarly-journals/factors-associated-with-ed-use-among-new-asian/docview/2487205707/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2021-12-09
Database:	Public Health Database

Board of Directors: JEN

ProQuest document link

FULL TEXT

TVM:UNDEFINED

DETAILS

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
First page:	A8
Publication year:	2021
Publication date:	Jan 2021
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia

Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	General Information
DOI:	https://doi.org/10.1016/S0099-1767(20)30391-3
ProQuest document ID:	2487205698
Document URL:	https://www.proquest.com/scholarly-journals/board-directors/docview/2487205698/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Jan 2021
Last updated:	2021-03-01
Database:	Public Health Database

Strategies to Aid Identification of Apheresis PowerFlow Ports: A Case Report: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

The PowerFlow implantable apheresis intravenous port is a venous access device for therapeutic apheresis procedures. In this case review article, we identify key similarities and differences between apheresis PowerFlow ports and traditional ports. We also list strategies that emergency departments can implement to aid in correct port identification.

Methods

Using a case review format, we describe the clinical presentation of a 33-year-old female with neuromyelitis optica who was evaluated in the emergency department for an acute exacerbation. She had a history of outpatient apheresis procedures that made use of bilateral PowerFlow ports. Mistaken for a conventional port, the right PowerFlow port was accessed with a Huber needle rather than the appropriate catheter-over-needle device. On infusion of intravenous fluids, the patient experienced pain and swelling. Ultimately, the port malfunctioned and was eventually replaced.

Results

A subsequent root cause analysis identified opportunities for education and aids to improve port identification. To this end, strategies were implemented to appropriately identify the PowerFlow port using at least 2 of the following methods: (1) look in the patient's chart for record of an implantable apheresis intravenous port; (2) check the port identification card, bracelet, or keychain issued at insertion; (3) palpate the port to look for the rounded top and hollow concave entry point; and (4) use x-ray or fluoroscopy to identify radiopaque port markers.

Conclusion

When a patient with a history of apheresis procedures presents with an implanted port, steps should be taken to ensure correct identification and access.

FULL TEXT

Contribution to Emergency Nursing Practice

••The apheresis PowerFlow port is a new implantable venous access device that is different from other commercially available ports because it is accessed, not with a Huber needle, but with a catheter-over-needle intravenous device at a 30° angle.

••The main finding of this article is that when a patient with a history of apheresis procedures presents with a long-term access port, additional investigation and evaluation should be performed to confirm the correct port type and to select the proper access device.

••In emergency clinical practice, when a new technology such as the apheresis PowerFlow port is introduced into a hospital system, special attention should be paid to the education and training of all available stakeholders, including ED providers.

Introduction

Approved for use in the United States in 2017, the PowerFlow implantable apheresis intravenous (IV) port (BD, Tempe, AZ) has facilitated venous access in an increasing number of patients undergoing therapeutic apheresis procedures.[1-4] To this end, PowerFlow ports are used in therapeutic apheresis outpatients undergoing scheduled courses of extracorporeal photopheresis, red blood cell exchange, or therapeutic plasma exchange. Since its introduction to the US apheresis community, the PowerFlow port has been implanted in approximately 4000 patients (BD e-mail communication, September 24, 2020). With growing adoption of the PowerFlow port, adverse effects that are typical of implantable venous access devices have been reported, including infection, thrombosis, catheter rotation, and catheter-tip migration.[4,5] However, as PowerFlow ports become more common, a potential new source of adverse events is port misidentification.

Misidentification may occur when the PowerFlow port is encountered by providers who are more familiar with conventional ports. Although conventional and PowerFlow ports have the same general functions, they are fundamentally and structurally different. Conventional ports, including the Port-a-Cath (Smiths Medical, Dublin, OH) and Vortex (Angiodynamics, Latham, NY), sit parallel to the skin. Therefore, port access is achieved with a highly specialized Huber needle, which breaks the skin and pierces the port's interior septum at an angle that is perpendicular to the skin (Figure 1).[6,7] In contrast to available commercial ports, the PowerFlow port is accessed with any 14- or 16-gauge catheter-over-needle IV device. The needle enters the skin at an approximately 30° angle, and the catheter is inserted over the needle to open the internal valve[8] (Figure 1). Not only is the PowerFlow port different in access angle, but it is also shaped differently. Instead of the palpation bumps and the triangular shape of a conventional port, the PowerFlow port has a rounded funnel top and a hollow concave funnel entry point (Figure 2).[9] As outlined in Table 1, key structural differences easily distinguish the PowerFlow port from conventional ports. However, these distinguishing features may not be obvious to the uninitiated clinician encountering a PowerFlow port for the

first time.

In this article, we highlight the identifying features of PowerFlow ports, using a case review format. The objective of this case review is to identify key similarities and differences between apheresis PowerFlow ports and traditional ports as well as list key strategies that emergency departments can implement to aid in correct port identification.

Case Report

A 33-year-old female with a history of neuromyelitis optica presented to the emergency department with an acute exacerbation. Over the preceding 24 hours, she had developed the sudden onset of right (R) lower extremity numbness and weakness, beginning in her toes and extending to her thigh. At baseline, she transferred with assistance and used a wheelchair outside the home. At the time of presentation, she was experiencing difficulty with transfers, even with assistance. Her symptoms were consistent with a previous neuromyelitis optica exacerbation, for which she had been treated in the emergency department 1 year prior. As summarized in the timeline in [Table 2], she had recently been initiated on long-term immunosuppressive therapy and therapeutic plasma exchange once monthly. Approximately 1 year prior, because of poor venous access and the need for chronic therapeutic plasma exchange, she had undergone placement of bilateral PowerFlow ports, which were used during her once monthly therapeutic plasma exchange. The PowerFlow ports were last used for therapeutic plasma exchange 1 month before presentation.

On physical examination, her vital signs showed a normal temperature of 36.2 °C (97.2 °F). Her blood pressure was 125/68 mm Hg with a pulse of 90 beats per minute. Her respiratory rate was 18 with a corresponding oxygen saturation of 100% on room air (fraction of inspired oxygen 21%). A detailed neurologic examination showed the following key findings:

- **(1)** Motor: An assessment of motor strength of the left (L) and R upper and lower extremities showed decreased strength in the bilateral hip flexors (2 of 5), knee flexors (1 of 5 L; 3 of 5 R), knee extensors (1 of 5 L; 3 of 5 R), plantar flexors (2 of 5), and dorsi flexors (2 of 5).

- **(2)** Sensation: A sensory examination showed decreased sensation to light touch and pinprick in the R lower extremity from the toes to the upper thigh. Sensation was intact in the L lower and bilateral upper extremities.

- **(3)** Coordination: The finger to nose examination was intact bilaterally. Owing to weakness, the heel-to-shin examination was unable to be assessed.

- **(4)** Reflexes: Reflexes were 2+ throughout the bilateral upper extremities and 3+ throughout the bilateral lower extremities. She was noted to have sustained ankle clonus bilaterally with bilateral upgoing toes.

- **(5)** Gait: Owing to her baseline weakness, the gait examination was deferred.

After the initial evaluation, the ED provider placed a consult to neurology. For acute treatment, the neurologist recommended IV fluids and methylPREDNISolone, 1000-mg IV administered over 60 minutes. Therefore, vascular access was desired; however, peripheral venous access was difficult. Because of the presence of an implantable venous access device, the port was accessed with a Huber needle. With good blood flow and return through the Huber needle, medications were administered, and a fluid bolus was given. However, within minutes of the infusion, the patient experienced unexplained access site pain and swelling.

The patient was admitted to the neurology service and therapeutic plasma exchange was requested. When the apheresis nurse came to the room to initiate the procedure, she noticed the access site swelling and saw that the right PowerFlow port had been incorrectly accessed with a Huber needle. Further investigation with a chest x-ray

confirmed that the Huber needle was inserted perpendicular to the port, away from the port lumen (Figure 3). This placement resulted in the delivery of the IV fluids to the port pocket and not the intended vein. The Huber needle was removed safely and, over a few days, the port-site pain and swelling resolved. However, the R port developed progressive resistance to aspiration. Evaluation with fluoroscopy revealed that the catheter tip was “retracted and angled” posteriorly. Thus, the patient underwent port replacement. Over the course of a 14-day hospitalization (Table 2), the acute neuromyelitis optica symptoms resolved, and the patient was discharged home safely. A postdischarge follow-up revealed that the patient was doing well. The patient gave informed consent regarding the case review and use of the de-identified x-ray image.

Discussion

First described in 1894, neuromyelitis optica refers to a spectrum of inflammatory disorders causing immune-mediated demyelination of the central nervous system.[10,11] Neuromyelitis optica affects up to 1 in 10000 people,[12] with a median age of onset in the early 30s and 40s.[13,14] Neuromyelitis optica primarily affects the spinal cord and optic nerves, leading to clinical features of optic nerve inflammation (optic neuritis) and/or spinal cord inflammation (transverse myelitis).[15,16] In up to 90% of cases, neuromyelitis optica presents with a relapsing course of acute attacks with alternating episodes of optic neuritis, transverse myelitis, or both,[17] leading to vision loss, paralysis, and/or bladder dysfunction. Patients can also present with brainstem syndromes characterized by intractable nausea, vomiting, and/or hiccups.[18,19] Because the primary pathogenic feature of neuromyelitis optica is an immunoglobulin G autoantibody against aquaporin 4,[20] patients are treated with long-term immunosuppressive therapy. However, acute attacks are managed with high-dose steroids and/or therapeutic plasma exchange.[15]

As an important neuromyelitis optica rescue therapy, therapeutic plasma exchange works by removing plasma and plasma-based antibodies, replacing diseased plasma with donor plasma or albumin.[21] During therapeutic plasma exchange, 1.0 to 1.5 plasma volumes are processed to achieve a median of 4 to 5 treatments over a period of 1 to 2 weeks.[22-24] Within 1 to 3 days of initiating therapeutic plasma exchange, patients experience moderate to marked improvement in symptoms and functional status. Thus, early therapeutic plasma exchange initiation is recommended in acute neuromyelitis optica exacerbations that are unresponsive to steroids.[15] In addition to its role as a rescue therapy, intermittent therapeutic plasma exchange may also be used as a preventative or maintenance therapy.[21]

When therapeutic plasma exchange is used intermittently, it is essential to have stable vascular access. The preferred therapeutic plasma exchange vascular access strategy is peripheral access using a large-bore IV in the wrists or the forearm.[25] Over time, however, peripheral access difficulties may arise, requiring more advanced and/or permanent access. Available access options include arterial lines, central venous catheters, arteriovenous fistulae or grafts, and ports.[9,25] Conventional ports have been used off-label for therapeutic plasma exchange with the primary limitation of low procedural flow rates of approximately 50 to 60 mL/min.[9] With faster flow rates of up to 100 mL/min, the PowerFlow port achieves faster procedural times. In addition, the PowerFlow port’s decreased tendency to form fibrin clots avoids time-wasting preprocedural clot lysis, making the PowerFlow port the preferred port for therapeutic plasma exchange access.[3,8,9]

Because the PowerFlow port is the first commercially available port to have a different access strategy from preceding ports, there does not yet exist any literature to distinguish the PowerFlow from other ports. Nevertheless, identifying the presence of a port has previously been established using radiopaque markers.[26,27] Until this case, venous access device identification protocols were not previously established at our institution. Therefore, it was determined that the sentinel access error event warranted a root cause analysis (RCA).

An RCA is a systematic approach to understanding the nonhuman factors and systems-wide issues that may

contribute to an adverse event.[28] Because it looks beyond human errors to find systems vulnerabilities that are actionable, the RCA plays an important role in performance improvement. In our case, the RCA assembled all stakeholders involved in accessing and managing implantable venous access devices, including representatives from apheresis, bone marrow transplant, the emergency department, interventional radiology, vascular access, oncology infusion, nursing education, and nursing informatics.

During the RCA, vascular access policies were reviewed. Apheresis vascular access devices are typically reserved for access by apheresis nurses, with back-up access provided by a vascular access nurse, when the apheresis nurse is not available. Hospital policy does not permit an apheresis port to be used for common IV access without the consent of the apheresis team. In this case, an apheresis nurse should have been contacted for access; however, existing processes failed because the port was not immediately recognized to be an apheresis access port. Therefore, the RCA team recommended the use of identification alerts to notify providers of the presence of an apheresis-designated port. To this end, the informatics team implemented an identification system in the electronic health record to trigger a best practice advisory pop-up banner, which alerts providers that the PowerFlow port is present.

Secondly, the issue of appropriate training was reviewed. Consistent with hospital guidelines, when the PowerFlow port was introduced to the health system, training had been given to both the apheresis and vascular access nurses. However, because the device was in use in only a minority of patients,[29] the apheresis nurses were the most experienced users. The vascular access nurses, although trained, had not had enough opportunity to practice identifying and using the ports. To this end, it was recognized that education was needed to alert all providers that a history of therapeutic apheresis procedures should prompt providers to further investigate the presence of a PowerFlow port.

Thirdly, the issue of both provider and patient education was raised. When the patient's perspective was solicited, she indicated that she knew her port was "special," but was unable to articulate how. During the port access procedure, she had been concerned that her port was being accessed in an unfamiliar manner; however, she deferred to the provider's expertise. This perspective helped emphasize the importance of the patient's role in provider education. Noting the power differential that often exists between patients and providers,[30,31] patients undergoing apheresis are now encouraged to share their port identification card with providers who may be unfamiliar with the PowerFlow port.

For the providers, the RCA team targeted education strategies to make them aware of the availability of a new port. Furthermore, whenever providers encountered any port, the RCA team supported strategies to encourage introspection whenever a history of apheresis is present. Thus, the RCA team established a new port identification protocol, encouraging providers to identify ports using a minimum of 2 of the following methods:

- (1) Look in the patient's chart for record of an implantable apheresis IV port;
- (2) Check the port identification card, bracelet, or keychain that was issued at insertion;
- (3) Palpate the port to look for the rounded top and hollow concave entry point; and
- (4) Use x-ray or fluoroscopy to identify radiopaque port markers.

With the implementation of these strategies, incorrect access of a PowerFlow port has not recurred at our institution. Other institutions may need to tailor their strategies to their patients and their providers, including consideration of the use of a Medic Alert bracelet to inform providers of the presence of the PowerFlow port.

The strengths of this case review lay in its presentation of a novel, and yet unrecognized, catheter complication,

which may become more commonplace as the use of the PowerFlow port becomes more widespread. Nevertheless, the primary limitation of the case report was that it likely highlights process challenges unique to our institution that may not be seen at other centers. Regardless, an increased awareness of the use of the PowerFlow port in patients undergoing apheresis and a working knowledge of the differences between the PowerFlow and conventional ports may help prevent similar errors as institutions work to establish their own port identification protocols.

Conclusion

As illustrated in the case review, problems may occur when new, unfamiliar technology is introduced into hospital practice without the requisite education and training of all stakeholders, including ED providers. A history of apheresis should prompt the provider to further investigate the type of port before access. Until apheresis PowerFlow ports become more widespread in use, port identification strategies should be implemented and tailored to the institution's need.

Author Disclosures

Conflicts of interest: none to report.

Catheter parameters	PowerFlow port	Conventional ports
Apheresis indication	FDA approved in 2017	Off-label use
Radiopaque identifier	Radiographic shape is like a round bottom flask	Radiographic shape is a triangle
Differences in palpation	Funnel-shaped top and entry point	Triangular shape with palpation bumps
Access device	14- or 16-gauge catheter-over-needle	Huber needle
Access angle	30°	90°
Entry method	Intravenous catheter opens a valve	Huber needle pierces a septum
Apheresis procedure flow rates	Up to 100 mL/min	Up to 50-60 mL/min

Time		Event
Before presentation	4 y earlier	Neuromyelitis optica diagnosis
2 y earlier	Intermittent TPE initiated	9 mo earlier

PowerFlow ports placed for monthly TPE	1 mo earlier	Received scheduled TPE
24 h prior	New numbness and weakness	ED presentation with acute neuromyelitis optica exacerbation
After presentation	7-8 h later	Neurology evaluation and acceptance for admission
12 h later	R port accessed with Huber needle	14 h later
Patient complained of access site pain	18 h later	Imaging evaluation and Huber needle removed
Hospital d 1	TPE #1 aborted owing to access difficulty	Hospital d 4
TPE #1 (access facilitated by IR)	Hospital d 6	TPE #2
Hospital d 8	TPE #3	Hospital d 11
TPE #4 aborted owing to access difficulty	Hospital d 12	TPE #4 after R port replacement
Hospital d 13	TPE #5	Hospital d 14

DETAILS

Subject:	Patients; Emergency medical care; Plasma; Pain; Spinal cord; Blood; Catheters; Catheterization; Access; Ports; Apheresis; Emergency services; Venous access; Case reports
Location:	United States--US
Identifier / keyword:	Blood component removal; Plasmapheresis; Plasma exchange; Vascular access devices; Case report
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	21-27
Publication year:	2021

Publication date:	Jan 2021
Section:	Ca se Review
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Case Study, Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.10.004
ProQuest document ID:	2487205685
Document URL:	https://www.proquest.com/scholarly-journals/strategies-aid-identification-apheresis-powerflow/docview/2487205685/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2022-10-03
Database:	Public Health Database

Emergency Care Considerations for the Transgender Patient: Complications of Gender-Affirming Treatments: JEN

ProQuest document link

ABSTRACT (ENGLISH)

The transgender population presents a unique challenge for the emergency nurse. There are types of surgeries, medications, complications, and differences in laboratory testing that are unique to transgender people. In addition,

emergency nurses are increasingly encountering more transgender patients in the emergency department for care, referrals, and education. Yet, many emergency nurses lack the formal training to care for transgender patients and their families. A complete understanding of the terminology, gender-transforming surgeries, hormonal suppression and augmentation of sexual characteristics, adverse effects, complications of surgeries, and ongoing health risks owing to the altered hormonal milieu and potential risk for acquiring sexually transmitted diseases is important to provide the necessary emergency care for this emerging population.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current literature on the complications of gender-affirming treatments indicates that emergency nurses lack proper education on the subject.

••This article contributes knowledge regarding the pathophysiological complications of transgender-related treatments and procedures that may be encountered in the emergency department.

••Key implications for emergency nursing practice found in this article are an understanding of transgender anatomic variations, hormone therapy adverse effects, and complications of surgical manipulation.

As is the case with many other at-risk and disadvantaged populations, transgender individuals belong to a marginalized segment of the United States population and experience disparities in health care. For many transgender patients, emergency departments serve as their health care safety net. Traditionally, consideration of health care in the emergency setting for the transgender population has been largely overlooked. Consequently, education regarding the unique terminology and pathophysiological considerations of the transgender patients in the emergency department is crucial.

Terminology

Effective communication with patients of gender and sexual minorities improves outcomes and increases adherence to the treatment regimen. The terminology used in gender and sexuality discussions is in a state of rapid evolution and can lead to awkward interviews with patients if used inappropriately. When discussions relating to gender and sexual identity are necessary, an understanding of the correct terminology, as well as terms and phrases to avoid, can lead to more appropriate care (Tables 1 and 2).

Although nurses often use the terms interchangeably, sex and gender are not synonymous. Sex refers to the individual's biological attributes that are identified at birth. The person's external genitalia, reproductive organs, and chromosomes define sex. Gender is more abstract and often grounded in culture and personal belief. Gender identity is the internal feeling of being male, female, a combination of the 2, or neither. Gender expression is the external manifestation of an individual's gender identity. For nurses, it is important to understand that unlike gender expression, gender identity is not visible to others and may not align with socially defined behaviors and characteristics. Therefore, assuming a patient's gender identity on the basis of their appearance or behavior can lead to miscommunication, incorrect treatment, and a missed diagnosis.

Clinical Considerations Anatomy

An integral part of the patient history involves determining the patient's anatomy and whether the patient has undergone any gender-affirmation surgery. Gender-affirming treatment is defined as the treatment that transgender individuals pursue to make their bodies adapt to the gender with which they identify, which occurs by means of surgery or hormones.[1] Knowing the patient's surgical history will help the nurse determine risk factors and formulate a list of differential diagnoses. For example, determining the patient's gender identity and gender assigned at birth is

paramount to ordering the correct diagnostic tests for abdominal pain. The differential diagnosis may change vastly on the basis of the patient's gender assigned at birth as opposed to their gender identity. It is important to note that some transgender patients may not use any medical or surgical interventions but identify as transgender. Regardless of transgender status, this does not necessarily correlate with a choice of romantic or sexual partner. Thus, the risk of sexually transmitted infections is based on which body orifice is used for sexual pleasure. Because transwomen do not have a cervix, uterus, or fallopian tubes, they cannot acquire pelvic inflammatory disease (from penile-neovagina penetration). However, they may contract gonorrhea, chlamydia, trichomonas, herpes, hepatitis, and human immunodeficiency virus (HIV) through their neovagina. Likewise, a transman who has undergone genital surgery to make a neopenis would be at risk for contracting any disease present in the receptive orifice. In response to the HIV epidemic, the World Health Organization asked for a review to identify the most vulnerable populations who are at a high risk of HIV infection. Five key populations were identified, which include people in prisons, sex workers, people who inject drugs, men who have sex with men, and transgender people. Transgender women are 49 times more likely to have HIV than other adults of similar age. In some countries, the rate is 80 times higher. The worldwide HIV prevalence is 19% among transgender women, yet there is little information known for transgender men.[2]

Hormone Therapy

Given the rising number of transgender individuals seeking hormone therapy, nurses must understand the formulations, dosing, intended effects, and adverse effects of estrogens, antiandrogens, and testosterone. Using hormone therapy to align the individual's gender identity with their physical appearance has been shown to reduce mental health problems such as gender dysphoria in the transgender population.[3] According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, gender dysphoria is the discomfort or distress caused by a discrepancy between a person's gender identity and their sex assigned at birth, that is, genital anatomy.[4] However, the diagnosis of transgender is no longer considered a mental health condition.[5] Some transgender patients may obtain hormone therapy through illicit means without a prescription and self-medicate for a variety of reasons, including the cost of treatment, lack of insurance coverage, and fear of rejection by health care providers.

Laboratory Values

The emergency department is rarely the place where serum hormone levels will be ordered, but they may be a part of the patient's past medical history. Because estrogen and testosterone may alter other laboratory readings, it is often difficult to interpret whether to follow a male or female set of laboratory values. The most commonly affected laboratory values are hematocrit and creatinine readings, both of which should be close enough in value to one another that an intervention would not be undertaken unless the values were significantly above or below the normal values for either gender. As a general rule, complete blood count and blood chemistry results should reflect the gender identity of the patient rather than biological gender, depending on the use of exogenous hormones.

A transgender man on testosterone for more than 6 months is compared with a cisgender man with regard to the normal reference range for a complete blood count. Likewise, a transgender woman on estrogen therapy for more than 6 months should be compared with a cisgender woman with regard to the normal laboratory values.[6] Creatinine levels in transgender women using estrogen therapy are decreased, whereas creatinine levels in transgender men taking testosterone therapy are increased. Creatinine is directly correlated to muscle mass.[7] Awareness of the hospital's order entry system and an "intuitive" canceling of tests based on sex is essential to avoid miscommunication downstream regarding transgender patients. A transgender man presenting with abdominal pain may need a pregnancy test to rule out ectopic pregnancy, but the test may be canceled by the system because of the presenting sex on file.[6]

Estrogen Therapy

For transgender women, estrogen therapy causes an elevated risk of venous thromboembolism (VTE), such as pulmonary embolism and deep venous thrombosis. The degree of increased thrombogenic effect is related to the estrogen formulation, duration of estrogen use, method of delivery, and other risk factors such as obesity and smoking. Transdermal estrogen tends to confer less risk.[7] Estrogen obtained from nonprescription sources, such as underground or illicit dealers, has a higher risk for complications. When determining the risk for VTE and the need for VTE prophylaxis, classic risk-assessment models such as the Padua tool (used to determine the risk for venous thromboembolism) may not be applicable because it is not clear if the validation of such instruments included transgender individuals. There is no evidence supporting the routine cessation of estrogen therapy in transgender women for potential complications such as VTE. However, a change in dose or mode of delivery should be considered. Regardless of the reason, abrupt cessation of estrogen therapy can cause substantial discomfort, but no serious adverse events have been reported.[7] The effects of estrogen therapy in the transgender woman are highly variable. The changes include breast growth, increased body fat, decreased testicular size, and poor erectile function.[8]

Antiandrogen Therapy

For complete feminization in transgender women who have not had an orchiectomy, antiandrogen agents help block the effects of androgenic hormones released by the testes. Multiple medications are used for their antiandrogen properties and can be associated with a multitude of adverse effects. Spironolactone, a potassium-sparing diuretic and mineralocorticoid receptor antagonist commonly used to treat congestive heart failure, has antiandrogen properties and is the most widely used medication in gender-affirmation therapy. Spironolactone, when used as an antiandrogen agent, requires doses 2- to 4-fold higher than the dosage range for congestive heart failure and liver disease.[7] These high doses of spironolactone may cause hyperkalemia, severe dehydration, and acute kidney injury. Spironolactone should be immediately discontinued if any of these complications develop.

In pediatric transgender patients, antiandrogen therapy may be used to suppress puberty or stop menstruation. Gonadotropin-releasing hormone analogues such as leuprolide acetate (Lupron) are commonly used to suppress the hypothalamic-pituitary-gonadal axis.

Leuprolide acetate is used in men to treat prostate cancer because it lowers testosterone production, and in women to treat uterine fibroids and endometriosis by lowering estrogen levels. Gonadotropin-releasing hormone agonists are typically a second-line agent owing to their high cost.

Testosterone

Just as in cisgender men, the use of testosterone in transgender men may confer potential adverse effects related to polycythemia, elevated serum triglycerides, higher low-density lipoproteins, and lower high-density lipoproteins. For the emergency nurse, thrombosis from erythrocytosis and vascular disease from altered cholesterol and triglyceride levels should be a priority concern when treating transgender men. In the emergency department, testosterone therapy should be stopped in transgender men with significant erythrocytosis or its associated complications. Abrupt cessation of chronic testosterone therapy may cause mood fluctuation, hot flashes, and extreme fatigue. Although no study has indicated an increased risk of poor cardiovascular outcomes, there is an increased risk of metabolic syndrome in transgender men undergoing testosterone therapy.[1]

Furthermore, certain preexisting medical conditions such as migraine headaches and acne may be exacerbated by hormone therapy. The initial effects of testosterone therapy are seen within 3 months and include cessation of menses, increased body hair, increased muscle mass, acne, and changes in fat distribution.[8]

Surgical Manipulation

It is recommended that patients who wish to undergo an irreversible surgery such as metoidioplasty, phalloplasty, or vaginoplasty should live 12 months in their gender identity per standards of care guidelines and must take their gender-specific hormones for reversible estrogen or testosterone suppression for 12 months.[9] Transgender individuals may augment their bodies in a number of ways. Transgender women may undergo a vaginoplasty (creation of a vagina and vulva that are functional), orchiectomy (removal of testes), female chest reconstruction (breast augmentation), and/or facial feminization (reshaping of the face to achieve more feminine features).[6] Furthermore, transgender men may undergo a phalloplasty (creation of a functional penis), metoidioplasty (creation of a penis from the clitoris—may not be functional), hysterectomy and salpingo-oophorectomy (removal of uterus and ovaries), and/or male chest reconstruction (removal of breast tissue to appear more masculine).[6]

Surgical augmentation of the body can result in a number of complications. Illicit silicone injections into any part of the body have the potential to result in silicone embolization, silicone migration, bleeding, pain, and necrosis.[10] Management of these issues related to silicone injections is the same as for non–gender-related augmentation and is primarily supportive and guided by symptoms.[10] Transgender men may undergo masculinizing breast augmentation or top surgery. Regardless of indication, complications of mastectomy are managed the same as for nontransgender patients. Early complications that may be seen in an emergency setting are hematoma, seroma, and nipple complications.[10] These complications must be managed by a plastic surgeon as soon as possible. Furthermore, transgender women who undergo feminizing breast surgery may have complications, including swelling, pain, erythema, and deformity, that should be managed by a plastic surgeon.[10] All complications after mammoplasty should be managed in close consultation with a plastic surgeon who has experience in the procedure. Inappropriately managed mammoplasty complications may cause malposition, asymmetry, and capsular contracture leading to dissatisfaction with the cosmetic appearance.

Genital augmentation, often referred to as bottom surgery, is rare but can have unique complications. Transgender women may elect to have a vaginoplasty by penile inversion or with the use of a segment of the sigmoid colon or large intestine and scrotal skin. The length of the neovagina depends on the degree of dissection, the bony anatomy, and the amount of tissue available in the form of flaps. The urethra must be shortened and constructed to avoid cephalad urine flow.[11]

Complications of vaginoplasty depend on the type of surgery performed. Complications of penile inversion for vaginoplasty include bleeding, infection, skin or clitoral necrosis, suture line dehiscence, urinary retention, or vaginal stenosis or prolapse.[10] Bleeding can usually be controlled with applied pressure; however, if bleeding continues despite pressure, placing a large Foley catheter (at least 20 Fr) and inflating the balloon or a vaginal pack will normally stop the bleeding. Postoperative rectovaginal or pararectal abscess may also occur and should be considered in the differential. Vaginal spotting can occur in the neovagina owing to granulation tissue forming but is not a cause for alarm and can be removed or dissolved in the office. These patients require lifelong dilation of the neovagina with vaginal dilators, in addition to regular sexual activity. In addition, a small number of patients may develop fistulae between the rectum and neovagina because the dissection carries the risk of injury or devascularization to the anterior rectum. Owing to the lack of original pelvic support that cisgender women will possess at birth, the transgender woman, after surgery to create a neovagina, will be at risk for vaginal prolapse, particularly as time goes on. Approximately 4% of neovaginas will prolapse, which will require surgical repair in the form of a sacrocolpopexy or sacrospinous fixation.[12] Yeast vaginitis may occur and can be treated with standard-dose fluconazole.

Phalloplasty and metoidioplasty are surgical options for transgender men. Phalloplasty is a more complex procedure that allows for increased penile length so that it can accommodate a penile prosthesis to aid in penetrative

intercourse. Phalloplasty has been described using various local skin and muscle flaps.[13] Transgender men undergoing phalloplasty also require the creation of neourethra because of their desire to have the ability to urinate while standing.[14]

Complications of transmasculine genital reconstruction usually involve the regions of urethral anastomoses. Although the complication rate has decreased from approximately 80% to approximately 40%, urethral strictures and fistulae are still widespread.[11] Complications for phalloplasty include wound infections, wound breakdown, urinary catheter difficulties, flap loss, pelvic or groin hematomas, and rectal injury.[10]

Complete blockage of the entire phallic urethra from scarring can lead to decreased urinary stream, hesitancy, and urinary retention. Patients with these complications may be initially treated with suprapubic catheter drainage if necessary because a Foley catheter requires blind placement. Ultimately, if the patient desires repair, a urethroplasty will be required.[15]

If the vulvectomy or colpocleisis is not complete, a pelvic cavity remnant may be left behind. This remnant can become a reservoir for urine, which can result in a urethral diverticulum. This can cause total urinary incontinence or severe postmicturition dribbling. These persistent vaginal cavities may increase the risk of urethrocutaneous fistula formation.[15] Complications for metoidioplasty include wound breakdown, infection, urethral stricture, and fistula.[10] All complications should be immediately reported to the surgeon who performed the procedure.

Nonsurgical Manipulation

If transgender men choose not to alter their bodies surgically, binding may be used as a way to reduce chest dysphoria and promote mental health. Binding is the practice of wrapping the chest to give the appearance of a flat chest. Transgender men may present to the emergency department with musculoskeletal, neurologic, and pain-related concerns secondary to chest binding.[16] Emergency nurses may find that a patient is using duct tape and Ace bandages (3M) that are wrapped so tightly that skin breakdown results. Binding with tape and Ace bandages can also restrict breathing, thus limiting tidal volume. Similar chest binders were historically used as a treatment for rib fractures. Binding also has the potential to break ribs if a patient binds their chest too tight. Transgender patients are encouraged to give their chest a break and only bind their chest for 8 hours to 12 hours maximum at a time. Binders should never be worn during sleep. Washing the binder frequently helps to prevent skin breakdown. If patients are experiencing skin breakdown owing to binding, they should stop binding for a while and use skin barrier protection.

Implications for Emergency Nurses

Gender identity can heavily affect a patient's overall health and the manner in which they seek emergency medical care. With the evolution and advancement of transgender medical care, emergency nurses are more likely to encounter transgender minority patients. Emergency nurses should know how to engage and communicate with transgender patients regarding their unique health care needs. Anatomical variations and hormone therapy are prevalent in the transgender population, and the emergency nurse must be prepared to manage their complications. Knowledge in these areas will improve effective and appropriate care for transgender patients.

Conclusion

Emergency nurses can help play a vital role in the care of transgender patients by learning about the health challenges they face and offering nonjudgmental care and education about their risk factors such as sexually transmitted diseases, specifically HIV. Understanding the effects of hormones and surgical complications, and applying the appropriate use of tests, nurses in the emergency department are the first-line health care workers who have the highest potential to have a favorable impact on the health of transgender people and make sure that they are getting the most advanced evidence-based medicine, comparable to their "cis" cohorts. Their knowledge and triage role can be the link to other health care professionals for ensuring that the complete physical and mental

health issues of transgender patients are addressed, and appropriate follow-up care is arranged.

Author Disclosures

Conflicts of interest: none to report.

Term	Definition
Cisgender	A term used to describe a person whose gender identity aligns with the sex assigned to them at birth. “Cis” is the opposite of “trans.”
Gender dysphoria	Clinically significant emotional distress caused when the birth gender is not the same as the gender identity.
Gender-expansive	Conveys a wider, more flexible range of gender identity and/or expression than typically associated with the binary gender system.
Gender expression	External appearance of one’s gender identity, expressed through behavior, clothing, haircut, or voice; may not conform to socially defined feminine and masculine behaviors and characteristics.
Gender-fluid	A person who does not identify with a single, fixed gender; rather, has an unfixed or fluctuating gender identity.
Gender identity	One’s innermost concept of self as male, female, a blend of both or neither—and what they call themselves. It may be the same as or different from their sex assigned at birth.
Gender nonconforming	A broad term referring to people who do not behave in a way that conforms to the traditional expectations of their gender, or whose gender expression does not fit neatly into a category.
Genderqueer	Genderqueer people typically reject notions of static categories of gender and embrace a fluidity of gender identity and often sexual orientation. They may see themselves as being both male and female, neither male nor female, or as falling completely outside these categories.
Gender transition	The process that some people go through as they strive to more closely align their internal gender with its outward appearance. Some people socially transition—by dressing and using names and pronouns—and will be socially recognized as another gender. Others undergo physical transitions in which they modify their bodies through medical and surgical interventions.
Intersex	An umbrella term used to describe a wide range of natural bodily variations. In some cases, these traits are visible at birth, and in others, they are not apparent until puberty. Some chromosomal variations of this type may not be physically apparent at all.

Nonbinary	An adjective describing a person who does not identify exclusively as a man or a woman. Nonbinary people may identify as being both a man and a woman, somewhere in between, or as falling completely outside these categories. Many also identify as transgender.
Transgender	An umbrella term for people whose gender identity and/or expression are different from cultural expectations based on their sex assigned at birth. Being transgender does not imply any specific sexual orientation. Therefore, transgender people may identify as straight, gay, lesbian, bisexual, and so on.

Affirming language
What name would you like me to call you?
What sex was assigned to you at birth?
What pronoun should I use when referring to you?
May I use this name and pronoun to communicate with your visitors during this visit?
I need to ask you questions about your sexual health and activity because it may be related to the problem you are here for. Is this okay?

DETAILS

Subject:	Sexually transmitted diseases--STD; Emergency medical care; Terminology; Hormones; Professional training; Thromboembolism; Transgender persons; Health risks; Surgery; Side effects; Nurses; Emergency services; Gender; Gender identity; Complications; Medical referrals; Gender-affirming care
Identifier / keyword:	Transgender persons; Gender identity; Sexually transmitted diseases; Emergency care
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	33-39
Publication year:	2021

Publication date:	Jan 2021
Section:	Clinica l
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.07.009
ProQuest document ID:	2487205645
Document URL:	https://www.proquest.com/scholarly-journals/emergency-care-considerations-transgender-patient/docview/2487205645/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2022-11-14
Database:	Public Health Database

Communicating With the American Sign Language User in the Emergency Department: JEN

ProQuest document link

ABSTRACT (ENGLISH)

In North America, adults who are deaf communicate primarily through ASL and consider themselves part of a unique culture with their own language, values, rules, and traditions.2,3 ASL is a visual language with no vocal component, and it has the potential for hearing individuals to perceive it as a visual representation of English because it has an

alphabet that correlates with English; however, ASL has its own grammar, syntax, and style.3-7 Therefore, it is crucial for health care providers to communicate with the ASL user through a qualified interpreter to practice cultural sensitivity. Some individuals may be considered proficient conversationally rather than fluent. [...]a risk of error is possible if these individuals are used as interpreters. The information that is available in the published literature demonstrates that the accuracy of lipreading varies significantly, from 12.4% to 50%,9,10 with the higher accuracy value from artificial intelligence. [...]it can be concluded that it is unsafe to rely on this method of communication with patients.

FULL TEXT

Dear Editor:

Emergency nurses interact with individuals from various backgrounds every day. Some of these individuals may be part of a different culture and/or communicate through a different language. There is literature that discusses the importance of communication as well as the importance of cultural competence. Crowe[1] defines communication as "the key to nurse-patient relationships and the ability to deliver patient-centered care" (p. 316). Communication is vital for nurses to obtain relevant data, provide education, and promote general growth.[1] A patient population not commonly discussed in the literature consists of those who identify with Deaf culture. There is little guidance in the literature for nurses on how to properly communicate with individuals who are deaf and whose primary language is American Sign Language (ASL). This oversight may be due to a lack of understanding of the difference in the 2 languages (English and ASL).

In North America, adults who are deaf communicate primarily through ASL and consider themselves part of a unique culture with their own language, values, rules, and traditions.[2,3] ASL is a visual language with no vocal component, and it has the potential for hearing individuals to perceive it as a visual representation of English because it has an alphabet that correlates with English; however, ASL has its own grammar, syntax, and style.[3-7] Therefore, it is crucial for health care providers to communicate with the ASL user through a qualified interpreter to practice cultural sensitivity.

In addition to practicing cultural sensitivity, health care providers have a duty to practice safe care. Health care providers obtain data to guide the treatment of patients through communication. If a health care provider misunderstands the differences between English and ASL and chooses to communicate through written English or slang gestures, there is a potential for information to be lost in translation. Individuals who are deaf may understand the words written on a piece of paper; however, ordering the words on the paper by following English grammar rules may confuse the ASL user who has a low written English literacy level and lead to an error in communication. In addition, just because an individual has some experience with a language does not mean that that individual is qualified to interpret. Some individuals may be considered proficient conversationally rather than fluent. Therefore, a risk of error is possible if these individuals are used as interpreters. The risks of using an unqualified person include omission, addition, condensation, role exchange, or risks to confidentiality.[2] Individuals with no formal training serving as interpreters have the potential to add to the information present, remove or simplify information owing to a limited vocabulary, or answer for the patient.[2] There is also a risk of breaching a patient's confidentiality by allowing someone without a need to know to attempt to relay information. Incomplete or inaccurate information may lead to improper or unnecessary diagnostic testing. Individuals who are deaf are more likely to seek health care from the emergency department than people who have spoken English fluently since early childhood.[7] For that reason, it is paramount to ensure that communication among patients, families, and health care providers is effective to reduce the risk of errors. In 1 study regarding the chief complaint of abdominal pain, non–English-speaking patients received more diagnostic testing than English-speaking patients.[8]

Another communication technique that health care providers may be tempted to use is to force the patient to receive information from the clinician through lipreading. This, again, is an unsafe practice because of the risk of lost information. There is not much published literature on the accuracy of lipreading. The information that is available in the published literature demonstrates that the accuracy of lipreading varies significantly, from 12.4% to 50%,[9,10] with

the higher accuracy value from artificial intelligence. Therefore, it can be concluded that it is unsafe to rely on this method of communication with patients.

Health care providers not only have a duty to provide an effective means of communication to be culturally sensitive and to ensure safe delivery of care; it is also the law. The Americans with Disabilities Act of 1990 requires nonprofit public service providers to ensure that persons with hearing, vision, and speech disabilities have the right to effective communication.[11]

Owing to limited access to preventative services, patients who are deaf are more likely to seek care from the emergency department.[4] For this reason, emergency nurses should be cognizant of their duty to provide safe care to this population. Emergency nurses should review policies regarding communication with patients who speak a different language than their own. If proper communication resources are not available, emergency nurses should advocate for the safe delivery of care and adequate means of communication by requesting those resources.

Depending on the location of the emergency department, there is a variety of options to access interpreters for patients who are deaf, from employed interpreters and contracted agencies to freelance interpreters. With the increase in technology use in health care, many companies are incorporating video-interpreting services into their interpreting services. Gone are the days of interpreting services offered only via standard telephone. Now there is an option to have the same spoken-language interpreting services with the addition of video-interpreting services via a mobile computer or tablet. Within minutes a qualified interpreter can be on a screen ready to provide an effective means of communication with a patient.

My experience as an interpreter for individuals who are deaf before becoming an emergency nurse has allowed me to have a unique perspective on the care of patients whose primary language is ASL. It is our responsibility to ensure appropriate care for the patients who seek care in our departments. It is my hope that emergency nurses who read this article will evaluate their own practice and identify ways to improve care in this population.—*Brett Pickens, DNP, MSN-Ed, RN, CEN, CPEN, CNE, ENA Mississippi State Council, Assistant Professor of Nursing, Mississippi University for Women, Columbus, MS; E-mail: bapickens@muw.edu.* ***ORCID identifier:*** *0000-0001-6319-1025.*

DETAILS

Subject:	Accuracy; Culture; Lipreading; Communication; Diagnostic tests; Unsafe; Deafness; Interpreters; Nurses; Intelligence; Artificial intelligence; Patients; Grammar; Sign language; Confidentiality; Cultural sensitivity; Syntax; Health education; Visual representation; Medical personnel; Health information; American Sign Language; Alphabets; Traditions; Emergency services; Americans with Disabilities Act 1990-US
Business indexing term:	Subject: Americans with Disabilities Act 1990-US
Location:	Mississippi; United States--US
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	16-17
Publication year:	2021

Publication date:	Jan 2021
Section:	Letter
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Letter
DOI:	https://doi.org/10.1016/j.jen.2020.09.004
ProQuest document ID:	2487205630
Document URL:	https://www.proquest.com/scholarly-journals/communicating-with-american-sign-language-user/docview/2487205630/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-06-02
Database:	Public Health Database

Establishing Research Priorities for the Emergency Severity Index Using a Modified Delphi Approach: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

The accuracy of an initial ED triage decision has been reported to drive the clinical trajectory for ED patients, and,

therefore, this assessment is critical to patient safety. The Emergency Severity Index—a 5-point score assigned by a triage nurse and based on disease acuity, patient potential for decompensation, and anticipated resource use—is used both in the United States and internationally. In the US, the Emergency Severity Index is used by up to 94% of the academic medical center emergency departments. In 2020, the Emergency Nurses Association acquired the intellectual property rights to the Emergency Severity Index and is responsible for its maintenance and improvement.

Objective

The purpose of this study was to establish a research agenda for the improvement of individual and institutional understanding and use of the Emergency Severity Index.

Methods

Modified Delphi process was used with 3 rounds of data collection.

Results

Round 1 yielded 112 issues, which were collapsed into 18 potential research questions in 4 general categories: education and training (6 questions), workplace environment (3 questions), emergency care services (7 questions), and special populations (2 questions). These questions were used in round 2 to establish importance. Round 3 yielded a rank ordering of both categories and research questions.

Discussion

The research priorities as set through the use of this modified Delphi process align well with current gaps in the literature. Research in these areas should be encouraged to improve the understanding of educational, environmental, and process challenges to emergency nurses' triage decisions and accuracy of Emergency Severity Index assignments.

FULL TEXT

Contribution to Emergency Nursing Practice

••The Emergency Severity Index (ESI) is the most widely used triage system in the United States; correct use of the ESI to assign acuity varies on the basis of training, education, experience, and workplace environment.

••The main finding of this paper is that research priorities, as established by a group of clinical experts around the ESI, align well with known gaps in the literature.

••Recommendations for translating the findings of this paper into emergency clinical practice include a wide dissemination of established priorities, support for researchers working in this area, and continual update of the ESI using the findings from these studies.

Introduction

Triage is derived from the French "trier" (to sort) and is a crucial component of proper acuity assignation and resource allotment in the emergency care setting. Triage nurses generally perform initial assessment and a focused physical examination and may order initial diagnostic studies according to standing orders or protocols. The process of triage and acuity assignment is dynamic and should involve multiple reassessments focused on identifying the patient who is decompensating.[1] In practice, however, the criteria used to assign patient acuity levels at the initial patient encounter in the emergency department (triage) vary among emergency nurses and their respective emergency departments. Patient acuity decisions are sometimes made in the absence of physiological data and are dependent on nursing knowledge and skills and the social context in which the decision occurs.[2-5] The correctness of the initial triage decision has been reported to drive the clinical trajectory for ED patients,[6] and therefore this step in patient care is critical to patient safety. The Emergency Severity Index (ESI)—a 5-point score assigned by a triage nurse and based on disease acuity, patient potential for decompensation, and anticipated resource use[7]—is used both in the United States and internationally. In the US, the ESI is used by up to 94% of the academic medical center emergency departments.[8] Originally, a group of emergency physicians and nurses devised the ESI concept;

later, the Agency for Healthcare Research and Quality funded the initial research on the application of the ESI in emergency care settings. In recent years, the Agency for Healthcare Research and Quality has maintained and supported this evidence-based system, now in its fourth edition; in 2020, the Emergency Nurses Association acquired the intellectual property rights to the ESI and is responsible for the index's maintenance and improvement. The ESI classification implicitly allows for variation and relies heavily on individual triage judgment by emergency nurses and other clinicians, and thus the triage decision is reliant on the nurse's education, experience, and expertise in identifying patients classified as high risk. The ambiguities in the ESI algorithm[9-12] make it particularly susceptible to variability in clinician training and experience as well as to other human and institutional biases, ultimately leading to under-triage (risk to patients) and over-triage (inappropriate use of resources). In reliability studies, the highest agreement measured between triage nurse and expert nurse was at sites that reported initial ESI training, ongoing ESI training, and quality monitoring of triage decisions,[8] suggesting that a consistent approach to training and quality follow-up is important to safe and accurate triage processes.

Errors in triage can challenge safe patient care; specifically, under-triage (assignment of an inappropriately low acuity score) can result in dangerous delay of necessary medical care, and over-triage (when patients who are less critical are assigned a higher priority) can lead to resource overuse and delays in providing care for those with more urgent needs. Research findings[11-14] suggest that not only do emergency triage nurses demonstrate high error rates on average, but that the nurses' errors are also clustered around specific presentations, including those that would be high risk. More research needs to be conducted on both the process and application of the ESI when making a triage assignation to improve the use of the ESI.

The purpose of this study was to develop a research agenda for the improvement of individual and institutional understanding of, and use of, the ESI.

Methods

We used a modified Delphi process with 3 rounds of data. The Delphi technique has 4 main characteristics: anonymity, iteration with controlled feedback of group opinion, statistical aggregation of group response, and expert input.[15] The Delphi method is recommended for use in the health care setting as a reliable means of determining consensus for a defined clinical problem.[16-19] Before the first round of the Delphi process, a literature review was circulated to a work group of emergency nursing triage experts.

Sample

The study sample (N = 14) was recruited from expert emergency nurses participating in a work team on ESI triage (Table 1). Expertise was determined by the work group selection committee as a function of engagement, education, teaching, and scholarship on the ESI. The sample of 14 comprised the entire work team.

Protection of Human Subjects

This protocol was reviewed by the Advarra Institutional Review Board (Pro00044686) and designated as exempt from institutional review board oversight. The participants were given a description of the study, noting that their return of the online questionnaires constituted consent.

Data Collection

Data were collected using 3 rounds of questions in a modified Delphi process and entered into an online form by the participants using Qualtrics (Qualtrics LLC, Salt Lake City, UT); the data were then analyzed using SPSS version 27 (IBM Corp, Armonk, NY). The 3 rounds of questions sought to identify general areas of need, followed by scoring the importance of statements about the process and application of the ESI and, finally, a rank ordering of research questions.

Round 1: Open-ended Questions

Q1: What do you see as the most pressing research gaps in the process of ESI triage?

Q2: What do you see as the most pressing research gaps in the application of the ESI algorithm?

Q3: What do you see as the most pressing research gaps in the triage of ED populations?

Q4: Are there any other emergency care issues related to ESI that you weren't able to address in the previous questions?

Round 2: Agreement With Research Questions

Four categories emerged from the answers to the round 1 questions: education and training, workplace environment, emergency care settings, and special populations. These 4 categories were converted to research questions (Table 2). The second round asked the participants to indicate how strongly they agreed that the question was important to investigate. Statements that had the most "agree/strongly agree" (cutoff 4.0) answers were used in the third round.

Round 3: Rank Order

The participants were asked to rank order the statements within each category to determine priority research areas.

Results

Round 1 (N = 13) yielded a total of 112 issues (Q1 = 34; Q2 = 39; Q3 = 24; and Q4 = 15). These 112 issues were examined by the research team for repetition and similarity and ultimately collapsed by consensus into 18 potential research questions in 4 general categories: education and training (6 questions), workplace environment (3 questions), emergency care services (7 questions), and special populations (2 questions). In round 2 (N = 14), the participants reported their agreement with the importance of each research question. In round 3 (N = 14), the participants rated the categories as a whole as well as the questions within each category (Table 3), yielding a rank order of both categories and questions that focused on the factors that affect educational efficacy and competency. These factors centered around environmental conditions, staffing, and the length of shifts for triage nurses.

Discussion

The purpose of this study was to develop a research agenda for the improvement of individual and institutional understanding and use of the ESI.

Using a modified Delphi process, we were able to develop a rank-ordered list of priorities. The focus of the list is on education and training, ranked as the highest priority category (1.38/4), which aligns with much of the extant literature.

Studies of triage education are well represented in the literature. Delnavaz et al[20] report in their review of literature that, in a number of studies, triage education is reported as inadequate for the depth and breadth of the knowledge required to make a clinical decision in a patient population that is unknown and potentially acutely ill. A scoping review[21] suggests that there are more problems with under-triage in rural areas and also in control groups that have no triage-specific training. We suspect that an educational approach may be necessary that focuses on both the breadth and depth of the knowledge required for accurate decision-making and the environmental challenges of the emergency care environment. This educational approach was supported by our Delphi participants who rated education as the highest priority topic area. Some literature suggests that along with triage-specific education, a breadth and diversity of nursing experience may be more useful than ED experience,[21] and 1 of the top educational priorities noted by our Delphi participants recommends exploration of the components of triage competency. A concept analysis by Moon and Park[22] suggests that triage competency in emergency nurses comprises 5 attributes: clinical judgment, expert assessment, management of medical resources, timely decision, and communication. "Competency" is defined as the comprehensive ability to prioritize patients' urgency and allocate limited medical resources. Further work in this area can be framed using this concept as defined.

It has been reported that periodic refresher education may also be of use to maintain triage skills throughout a nurse's career.[23] Most importantly, the ESI Handbook (2012) states the following: (1) "Nurses who participate in an ESI educational program are expected to be experienced triage nurses and/or to have attended a separate, comprehensive triage educational program" (page vi); and (2) "triage nursing staff will need a full orientation to the ESI" (page 55).

The second-highest priority topic area (2.46/4) focused on special populations (pediatric, geriatric, obstetric, and psychiatric) and, specifically, the process of assigning a triage score to those groups. Historically, these groups can be viewed as somehow being "outside" the ESI algorithm. Although there are no specific considerations for these populations in the ESI Handbook itself (with the exception of pediatric-specific vital signs), perceptions of stability should be congruent with adult medical or surgical patients. It is known that considerations of physiological and development processes, immune response, medications, chronic conditions, and past medical history create conditions in these special populations under which challenges to physiological and psychological stability can present differently.

The literature suggests that pediatric triage resources and education are inadequate;[24] the only study to look specifically at the use of the ESI algorithm with pediatric patients found a 27% rate of mis-triage.[25] There is clearly a need to examine the use of the algorithm in this population and develop educational interventions to improve the triage of children.

Similarly, at the other end of the lifespan, geriatric triage is also challenging. Wolf et al[26] report a lack of geriatric readiness in US emergency departments. Older patients may present with subtle and atypical signs complicated by medication and impaired immunity.[27] Ageism and provider bias also can complicate triage decision-making in this population. Currently, geriatric-specific triage education is not common.

There are few studies examining accuracy in patients who are pregnancy-capable. As with pediatric and geriatric triage, a lack of knowledge may underlie challenges to accuracy; Rashidi Fakari and Simbar[28] and Wolf et al[29] both identify knowledge and process challenges. Further research is warranted to clearly identify actionable factors.

Finally, special populations include patients with psychiatric/behavioral health issues. The ESI does not specifically have criteria for behavioral health/mental health triage, aside from the idea of "psychological instability." Wolf et al[30] reported that emergency nurses describe almost no postlicensure education in the triage or care of the patient presenting in a behavioral health crisis. Further work in this area[3,5,31] describes a patchy understanding of the risks of patients who are suicidal. There is a clear need to develop specific triage criteria for patients presenting with behavioral health complaints.

The third-highest priority topic area was emergency care services (2.54/4), identified as triage processes outside the ESI algorithm. This category included questions about the assessment process, the effect of 2-step and "split triage" processes on triage accuracy, the impact of staffing on triage accuracy, and other conditions under which inaccurate triage may occur.[3,5,29] Wolf et al report that some triage processes can have a negative impact on accuracy, citing specifically "pull to full" and 2-step practices where a full assessment cannot be made.[3,29] Ponsiglione et al[32] conclude that formal procedures and guidelines may be useful for newer nurses to build their confidence when making decisions, whereas expert nurses find these guidelines chafing. In addition, maintaining the structure of triage through policies and the process of triage through procedures may bolster the effectiveness of the ESI.[8] The formality of the decision-making process, then, may contribute in some way to the "goodness" of the triage decision.

The ESI Handbook also addresses the importance of quality assurance and improvement, stating that "at a minimum [for evaluation and quality improvement], always monitor accuracy of the triage level" (page 64).

The lowest priority focus area is the work environment and its effect on triage accuracy and processes (3.15/4). The

work of Wolf,[2,4] Zavala et al,[33] and Cannavacciuolo et al[34] focuses on the intersection of the workplace environment and clinical decision-making processes; the general conclusions of these studies are that the socioclinical environment can affect both triage decision-making and other clinical decision-making processes and the way in which nurses and physicians act on their clinical judgment. Other researchers[35,36] also report the effect of the emergency care environment on triage decision-making. Resources such as adequate staffing and appropriate ongoing training[8,29,32,37] are also important to accurate triage decision-making. The literature highlights the potential negative effect of nurses' workload and continual interruptions on their assessment function.[38-40] ED crowding and patient volume[4,41] could significantly affect the level of stress experienced by triage nurses and, consequently, the accuracy of patient acuity assignment. Our priorities results suggest that further examination of the relationships between environment and triage accuracy are warranted to further explicate the research conclusions reached in these mostly qualitative and mixed-methods studies.

Limitations

The participants in this study were a self-selecting group who applied to be part of a work team focused on how the Emergency Nurses Association can best maintain and improve the ESI scale. The participants had varying levels of nursing expertise and experience in triage. However, some of the limits imposed by the variety of expertise and triage experience may be mitigated by the fact that they work in different areas of the US and in different hospital settings, thus bringing a broad range of views on current needs in the practice and application of the ESI. The incompleteness of round 1 of the Delphi process (N = 13/14) may also be a limitation.

Implications for Emergency Clinical Care Nurses

Establishing priorities for research into the use of the ESI delineates a necessary knowledge base for clinical nurses using the ESI as they perform triage functions.

Conclusions

The research priorities as set through the use of this modified Delphi process align well with current gaps in the literature. Research in these areas should be encouraged to improve the understanding of educational, environmental, and process challenges to emergency nurses' triage decisions and accuracy of ESI assignments.

Author Disclosures

Both authors are employees of the Emergency Nurses Association.

Variable	Round 1 (N = 13)	Round 2 (N = 14)	Round 3 (N = 14)
Highest nursing degree, %			
BSN	15.4	14.3	14.3
MSN	69.2	71.4	64.3
Doctorate	15.4	14.3	14.3
Missing	0.0	0.0	7.1

Primary role in emergency department, %			
Staff nurse	15.4	14.3	14.3
Charge nurse	7.7	7.1	7.1
Manager	7.7	14.3	7.1
Clinical educator	7.7	35.7	35.7
Other ED role	7.7	7.1	7.1
Non-ED role	23.1	21.4	21.4
Missing	0.0	0.0	7.1
Mean years of emergency nursing experience, mean (SD)	16.3 (8.4)	16.9 (8.7)	18.1 (8.9)
Mean years of emergency nursing experience in current emergency department, mean (SD)	7.0 (7.9)	8.1 (7.7)	7.8 (7.8)
Emergency department currently uses ESI, %			
Yes	76.9	78.6	71.4
No	0.0	0.0	0.0
Primary role not in emergency department	23.1	21.4	21.4
Missing	0.0	0.0	7.1

Mean rankings by topic area	Mean (Highest priority = 1, lowest priority = 4)
Education	1.38
Special populations	2.46
Emergency care services	2.54
Work environment	3.15

Education (6 questions)	Mean (Highest priority = 1, lowest priority = 6)
What are the effects of emergency nursing experience and triage-specific education on triage accuracy?	3.23
What constitutes “competency” in triage assessment?	3.23
What is the minimal standard for triage education to ensure competency?	3.23
How can competency in triage be measured?	3.54
What are common cognitive errors in triage decision-making?	3.85
What is the effect of a pathophysiologically-based triage education course on accuracy?	3.92

DETAILS

Subject:	Research; Patients; Emergency medical care; Property rights; Intellectual property; Health care; Decision making; Severity; Triage; Workplaces; Nurses; Emergency services; Nursing; Delphi method; Education; Clinical assessment; Clinical decision making
Business indexing term:	Subject: Delphi method
Location:	United States--US
Identifier / keyword:	Emergency Severity Index; triage; emergency nursing; modified Delphi process
Publication title:	Journal of Emergency Nursing:; JEN; Phila delphia
Volume:	47
Issue:	1
Pages:	50-57
Publication year:	2021
Publication date:	Jan 2021

Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi .org/10.1016/j.jen.2020.09.005
ProQuest document ID:	2487205622
Document URL:	https://www.proquest.com/scholarly-journals/establishing-research-priorities-emergency/docview/2487205622/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-08-01
Database:	Public Health Database

Displaced Gastrostomy Tube in the Pediatric Emergency Department: Implementing an Evidence-based Algorithm and Quality Improvement Project: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

ED visits for gastrostomy tube–related complications are common, and many are related to tube displacement.

Evidence-based practices can provide standardized care.

Methods

This study was an evidence-based project to develop and implement an algorithm for the care of patients with a displaced gastrostomy tube in the emergency department. Providers were educated on the algorithm, and clinical practice change was evaluated. Provider knowledge was assessed using pretest and posttest; analyses included paired *t* test. Descriptive statistics of electronic medical record data on confirmation method, documentation, and referral were reported.

Results

Provider knowledge was improved after the education (n = 22; $t(21) = -3.80$; $P = 0.001$). After the education, procedure notes were used and completed in 95% of the cases. Appropriate use of the confirmation method was present in 95% of the cases, and all cases were referred to the gastrostomy/specialty clinic.

Discussion

Educating providers regarding care for displaced gastrostomy tubes increased their knowledge. A standardized algorithm improved care by decreasing the use of contrast studies, improving documentation, and referring patients to the gastrostomy/specialty clinic. This evidence-based algorithm offered health care providers a protocol to ensure consistent care for children in the emergency department and support for families.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current literature indicates that many patients are seen in the emergency department with a displaced gastrostomy tube and receive inconsistent care and support.

••The main finding of this paper is that the use of an evidence-based algorithm for displaced gastrostomy tubes in the emergency department improved the care provided to patients by decreasing the use of unnecessary contrast studies and improved documentation and referral patterns.

••Recommendations for translating the findings of this paper into emergency clinical practice include the finding that an algorithm guiding the use of contrast studies can decrease unnecessary exposure to radiation, lower costs, and ensure better care.

Introduction

Gastrostomy tube (GT) displacement in children leads to ED visits in up to 61% of the patients within 30 days of initial placement.[1] Although commonly treated in the emergency department, emergency medical care for displaced GTs inconsistently addresses replacement, confirmation of placement, and documentation, and reinforces ED use rather than access to health care through specialty clinics or advanced practice providers. The aim of this project was to improve the care of children in the emergency department with a displaced GT. An algorithm was developed and implemented to educate providers and guide care in the emergency department.

Background

Up to one-fifth of the children with special health care needs have difficulty feeding or caring for themselves,[2] representing a high number of children who may require a GT. GT placement is a common procedure,[3,4] with a variety of complications that require clinical intervention. Minor complications include tube displacement, obstruction, malfunction, balloon rupture, granulation tissue, bleeding, infection, leakage around stoma site, and gagging/retching/vomiting.[5-7] Serious complications can include malposition or tract disruption, which may lead to peritonitis or sepsis.[6] The incidence of minor complications has been reported in up to 73% of the patients,[8] whereas major complications have been reported in up to 5%, requiring reoperation.[3]

Gastrostomies are primarily managed in the ambulatory setting; however, 15% of the patients were seen in the

emergency department within 90 days of placement in a large retrospective cohort study from 38 hospitals (N = 15 642) using the Pediatric Health Information System database.[5] In a recent study of 215 patient charts with GT-related complaints in pediatric patients who visited the emergency department, GT displacement made up 86% of the encounters (ie, 261 GT dislodgments in a total of 302 encounters).[9] The reasons for the visits included recent surgical placement, difficulty replacing tube, parent insecurity, lack of education or equipment, and timing of incident outside of clinic hours.[10]

Chart reviews from the practice site and discussion with the nursing staff identified inconsistent practices related to caring for patients with a displaced GT, including variable confirmation methods, poor documentation, and lack of referral to a gastrostomy/specialty clinic. The first concern after replacement of a GT is the confirmation of placement in the stomach before discharge. The methods of confirmation include aspiration of stomach contents, instillation of 10 to 20 mL saline followed by aspiration, and contrast studies.[11] A contrast study (ie, GT study) is a procedure where contrast is injected into the tube while a radiograph of the abdomen is taken to look for extravasation of contrast and confirm its position in the gastric lumen.[12] In the emergency department, contrast studies have been commonly performed to confirm the placement of GTs, although this has not been widely reported in the literature. In 2 studies involving pediatric patients, confirmation with a contrast study ranged from 35% to 40% of the cases.[9,10] In adult patients accessing the emergency department, the use of contrast studies for confirmation was up to 58%.[13]

Evidence supports the use of the clinical confirmation of GT placement by aspiration of gastric contents in asymptomatic patients or in those with mature tracts.[1,10,13] For symptomatic patients, or for those with tract trauma, immature tracts, or when gastric contents cannot be aspirated, a contrast study is indicated.[13]

Inconsistency in confirmation methods is common in the emergency department. Some patients undergo unnecessary contrast studies, which expose them to radiation, potential increased cost, and increased length of stay (LOS) in the emergency department.[1,13] This, along with the financial burden of GT complications, prompts the development of protocols to prevent ED visits.[6]

Another concern is poor documentation in the medical record. Studies have shown incomplete documentation of physical examination, replacement procedure, and confirmatory method in more than half of the patients presenting to the emergency department.[10,13,14] Poor documentation can have professional and legal ramifications. A standardized form can assist in meeting required documentation,[10,14] capturing the steps to replace a GT and prevent complications.

Routine referral to the gastrostomy clinic provides a resource for comprehensive care. When patients have more information and a provider, they tend to schedule appointments rather than use the emergency department for care.[15] Educating families, setting realistic expectations, offering reinforcement, being available, and empowering families are key to success for caregivers to be comfortable with the care required for their child.[16] Consequently, there are also decreased return ED visits and hospitalizations.[16]

Purpose

The purpose of this project was to improve the care of children who visited the pediatric emergency department with a displaced GT. On the basis of chart reviews and discussion with the nursing staff at the project site, the following interventions were identified to improve care: (1) develop an evidence-based algorithm for tube replacement, (2) educate providers, and (3) evaluate the implementation of the algorithm. The project addressed the following clinical question, which was framed using the Problem/Patient/Population, Intervention/Indicator, Comparison, Outcome model: In pediatric patients with displaced GTs in the emergency department, does education and implementation of an evidence-based algorithm, compared with past standard care and provider knowledge, improve the knowledge of

providers and standardize the care, including confirmation methods of placement, documentation, and referrals provided to patients in the emergency department?

Methods

This was a quality improvement project with a single group design, including pre- and posttest of clinicians and no control group. There was a comparison after the implementation of the protocol with historical controls through record review. The institution's Healthcare Professionals Research Council approved the project, and it was labeled exempt by the institutional review board at the academic institution (IRB number: 211696). No ethical considerations were identified. Both assessment of providers' knowledge and change in practice were evaluated. The data obtained through review of the electronic medical record (EMR) did not have any patient identifiers attached.

A protocol was developed, titled "Care of the Child with Displaced GT in the Emergency Department" ([Figure 1]). The assessment criteria included identification of the length of time that the GT was displaced, interventions attempted, and date of gastrostomy placement. The maturity of the tract was determined by the length of time that the stoma had been in place or whether the GT had been changed previously. The confirmation method was determined on the basis of tract maturity and whether there was tract trauma. A procedure note for feeding-tube placement in the EMR was identified to complete the documentation ([Figure 2]). Finally, the providers were prompted to refer patients to the gastrostomy/specialty clinic after the emergency visit.

Procedure

The participants were recruited as a single convenience sample cohort. An email was sent to 31 health care providers in the emergency department to introduce the project and educational offerings. The eligible participants included 20 nurses, 4 Advanced Practice Registered Nurses (APRNs), and 7 physicians. The assessment of provider knowledge was conducted using a pretest and a posttest after the education. The participants' tests were de-identified using numerical data. The education was offered immediately after the pretest to keep the participants engaged. The duration of the assessment and education component of the project was 1 month. The change in practice was then evaluated over the following 13 months.

A retrospective EMR audit was performed of children aged 0 to 18 years who presented to the pediatric emergency department using a data extraction form developed by the primary author. The preimplementation chart reviews were completed over 13 months (August 1, 2017, to August 30, 2018), and the post implementation chart reviews were completed over 13 months (December 1, 2018, to December 31, 2019). Descriptive data analyses were conducted on the confirmation method, documentation, and pattern of referrals.

Setting/Context

The setting for this project was the pediatric emergency department of a large suburban community hospital in the Midwest. Approximately 17 000 children visit the emergency department annually at this institution, which has 17 pediatric ED beds. When the pediatric emergency department is closed, children are triaged in the adult/main emergency department. Health care providers (physicians, nurse practitioners, and staff nurses) who staff the pediatric emergency department participated in this project voluntarily, and the recruitment of participants was based on a list of these providers and engagement. The goal was to have 80% of the staff participate in the project. The nurse manager supported the project, allowing time for the participants to engage in education and test completion.

Evaluation Plan Staff Knowledge

The participant education focused on patient status and GT care. This included the history of events, medical status, clinical exam, tract maturity, process of tube replacement, confirmatory methods, and documentation. The integration of parental needs into the plan of care and referral to the gastrostomy/specialty clinic were also included. In addition to the educational session regarding the protocol for displaced GTs, the providers were instructed to

engage parents by assessing support systems, providing resources, and handling care-management expectations. These instructions were organized in a model referred to as the Support, Emotional Guidance, and Expectation Management (SEE) model. The providers supported parents by asking about available family support systems, exploring family resources and external support, and answering questions about care. The emotional needs of the families were addressed by connecting the families to resources such as respite services, social work, and chaplains. Finally, for expectation management, the providers discussed GT care, replacement, emergent concerns, follow-up, and home care needs. These concepts were important to be included in the care of families; however, this model had not been validated.

The training consisted of discussion and review of a case study. The education was offered 10 times (eg, 9 huddles and 1 quality improvement meeting), and a session lasting 15 to 20 minutes was allocated for the education. The pediatric surgery nurse practitioner provided consistent education over a 2-week period.

Knowledge Assessment

A baseline assessment of knowledge was determined using a pretest before the education regarding the algorithm (Table 1). The participants' knowledge was assessed after completion of the education with a posttest. The same test questions used in the pretest were used for the posttest, which was completed by the 22 participants over a 2-week period. The pre- and posttests were 10-question paper and pencil tests in a format of structured questions allowing for statistical analysis.[17] The test was developed by the project director and 6 clinical experts who reviewed each test question for content validity. The criteria for evaluation included item clarity and relevance to the protocol. The item content validity index was 1.0 for 6 of the questions and 0.83 for the other questions. The scale content validity index was 0.93. Item content validity index and scale content validity index are considered acceptable for content validity.[17] The test had good internal consistency reliability ($\alpha = 0.94$).

Program Evaluation

The participants who completed the testing and education were asked to complete a program evaluation using a 5-point Likert scale to determine if the objectives were met. The response options ranged from "strongly disagree" to "strongly agree." The objectives focused on understanding the process for replacing the GT, confirmation methods, documentation, and referral pattern. Finally, a query regarding a change in practice on the basis of the education and additional comments provided open-ended responses.

Adherence to Protocol

On completion of the education and testing, the algorithm was implemented. Laminated copies of the algorithm were made available at staff workstations and break rooms to serve as a guide. The EMR audits were then completed on a monthly basis to determine adherence to the algorithm.

An audit of the EMR was completed for patients identified by a triage nurse as those with a "GI tube problem" and those who had a displaced GT. Patients with gastrojejunal or nasojejunal tubes were excluded because they required replacement in interventional radiology. Nasogastric tubes were also excluded because confirmation methods differed from those used for GTs. The data obtained included documentation using the procedure note, confirmation method, and referral to gastrostomy/specialty clinic. The data retrieved also included tract maturity, time since displacement, difficulty with replacement, trauma, bleeding, need for dilation owing to stoma stenosis, and LOS in the emergency department. These clinical data specifically were necessary to make the decisions in the algorithm that determined the method of confirmation after replacement. The data collected before and after the implementation of the algorithm were compared to evaluate algorithm adherence and determine if there was a decrease in the use of contrast studies, increase in documentation, and increase in referrals to the gastrostomy/specialty clinic.

Data Analyses

A paired samples *t* test was performed to assess for the statistical mean difference between pre- and posttests. Data analyses were completed using SPSS version 24.0 (IBM Corp).[18] A descriptive statistical approach was used to analyze the EMR data.

Results Staff Knowledge

In the pediatric emergency department, 26 participants (17 nurses, 4 APRNs, and 5 physicians) completed the pretest before the education over a 2-week period. The posttest was completed by 22 participants (14 nurses, 4 APRNs, and 4 physicians). Overall, the response rate was 84%; 85% (22 out of 26 participants) completed both the education and pre/post tests. The participants who did not complete both the pre- and posttests were excluded from the statistical analysis to determine knowledge change using the *t* test. These 4 participants were withdrawn owing to a leave of absence or because they left the institution before completion of the testing.

The paired *t* test showed a significant difference in staff knowledge ($t_{(21)}$ = –3.80; P = 0.001; 95% CI, –16.17 to –4.73). The pretest mean score was 80.45 (SD = 10.45), and the posttest mean score was 90.91 (SD = 8.11). The mean difference was 10.45 (n = 22). Specifically, there was an overall increase in knowledge of understanding tract maturity and dilation of the tract as well as the implementation of SEE in the care of the patient/family. Before the education, 59% (13/22) identified the definition of a mature tract, and only 36% (8/22) of the participants identified stomas that could be dilated. After the education, these scores improved to 95% and 86%, respectively. Only 1 participant scored lower in the posttest than in the pretest. The other participants scored the same or had an increase in their score.

The program evaluations were completed by 68% (15/22) of the participants after the posttest. The results were reported on the basis of scores of 4 or 5 on the Likert scale, indicating that the participants agreed or strongly agreed with the statement. Most (96%) of the participants stated that they had a better understanding of GT care, including the process for replacement, confirmation methods, documentation, and algorithm use after the education. Most (86%) of the participants committed to practice change on the basis of the algorithm. In addition, most (93%) of the providers reported satisfaction with the education and algorithm to guide their practice. During the education process, it was identified that many providers were unaware that a procedure note for feeding-tube placement existed or that interventions were based on tract maturity.

EMR Audit

Before the implementation of the algorithm, there were 34 patients seen in the emergency department with displaced tubes compared with 19 patients after the implementation of the algorithm (Table 2). The audit revealed that most of the patients had confirmation of GT placement through aspiration of gastric contents. However, before the algorithm implementation, 4 of the 9 contrast studies performed were clinically indicated on the basis of the criteria outlined in the algorithm, such as trauma, immature tract, or symptomatic patients compared with 3 of the 4 contrast studies after the implementation. Approximately half of the contrast studies before the implementation (56%) were inappropriate, whereas after the implementation of the algorithm 25% were not appropriate. The patients who underwent a contrast study after the implementation did spend more time in the emergency department than those without a contrast study (n = 17 cases; median = 148 minutes vs 110 minutes). However, the algorithm did not improve the LOS when compared with the cases evaluated before the implementation (median LOS with contrast study = 108 minutes). Over time, although the integration of the algorithm as part of routine care would be expected to decrease LOS, this was uncertain owing to the multiple factors that affected ED workflow: overcrowding, staffing, and other unknown conditions.

Documentation using the standardized procedure note doubled during this project. All patients were referred to the

gastrostomy/specialty clinic at the study site or their specialty provider after the implementation. Before the implementation, 4 of the 34 patients returned at least twice for a displaced GT, and 1 returned 4 times with a displaced tube. In contrast, after the implementation, only 1 patient returned to the emergency department.

Discussion

The lack of evidence-based guidelines for tube displacement led to the development of the current algorithm. Expert consensus and evidence supporting confirmation methods,[13,19] proper documentation,[14] education of health care providers and parents,[1] referrals to clinics, and parental support can improve the care provided. This algorithm addressed GT replacement to decrease variability and promote the standardization of care across providers. In this project, a decrease in return visits to the emergency department with a displaced GT was noted after the implementation of consistent patient referral to their gastrostomy/specialty clinic.

Visiting the emergency department for care of a displaced GT results in fragmented, episodic care. The consistency of health care interactions with nurses and APRNs in a specialty clinic over time strengthens the relationship and promotes family-centered care. These health care interactions allow for parents to partner with nursing to reinforce the education and gain confidence in the skills needed to manage care. When a coordinated educational protocol was used by nurses for GT care, parents were equipped with the knowledge and supplies to change the GT at home.[20] The current algorithm reinforced the engagement with specialty clinic providers after the ED visit for follow-up care while acknowledging the opportunity to support parents at the point of care.

At the study site, a procedure note was available in the EMR for use regarding replacement of the GT but was not routinely used before the project implementation. This procedure note identified all elements of comprehensive documentation for this type of visit. It was user-friendly and met all criteria for documentation. Without this procedure note, poor documentation could have led to confusion among providers regarding the GT type and size. Parents may not always remember the tube size their child had in place; therefore, providers must rely on the medical record for this information. This project ensured consistent use of the provider note.

In a review of the EMR data and procedure note, only 1 provider ordered an unnecessary contrast study. The provider acknowledged not adhering to the protocol after the contrast study was performed. By using the algorithm and procedure note, the staff were encouraged to evaluate the status of the gastrostomy (ie, tract maturity and trauma) and replacement, which would then prompt the appropriate confirmation method. Overall, a practice change was generated after the education of the staff as noted by the use of the procedure notes in the EMR and support from the providers for referral to gastrostomy clinics. A review of the EMR documentation determined adherence to protocol practice. All patients received a referral to the gastrostomy/specialty clinic.

There was a statistically significant change in the participants' knowledge regarding general gastrostomy care, confirmation methods, and determination of tract maturity. For example, more providers were able to identify mature tracts and which stoma tracts could be dilated. This education and review of the algorithm had an impact on confirmation methods (ie, use of contrast studies), documentation, and referrals.

To sustain change of this project, education will be provided to all new staff serving ED pediatric patients during orientation, and there will be quarterly quality monitoring of the use of confirmation methods and dot phrases for documentation. Dot phrases (ie smart phrases) are documentation codes that populate a template for a note. The algorithm has been in place in the pediatric emergency department for a year, and the participants have shared their comfort with caring for patients with a displaced GT. The most noted helpful components of the protocol have been the implementation of the procedure note and guidance for the appropriate use of contrast studies. The participants also reported a decrease in patients with displaced GTs in the emergency department (K. Zebold and J. Quinn, personal e-mail communications, November 1, 2019).

The costs associated with this project were minimal. Resources were allocated for staff education time offered during huddles and a meeting. Nominal costs included lamination of the protocol and copies of the tests and evaluation forms. The LOS in the emergency department may be increased when using more staff and resources to perform a gastrostomy contrast study. In this project, the LOS was found to be longer for those who underwent a contrast study. Contrast studies can cost up to $6000 per study at this institution; reducing the use of unnecessary studies supports containment of health care delivery costs.

Limitations

There were several limitations to this project. First, there was a small convenience sample of cases identified in the pediatric emergency department at 1 community hospital. This may not be generalizable to other settings. Second, the cases were identified by the triage nurse coding the complaint as a "GI tube problem." This classification may not have yielded all patients with a displaced GT. Further limiting the sample was that after the implementation of the algorithm, the EMR data were analyzed for a short period of time. Data collection over a longer period of time may reveal different outcomes.

Other limitations included the potential for maturity or history bias by taking the same pre- and posttest within the time frame of a month. This could be improved by reordering questions or introducing a new test. Increasing the sample size in a future study can be done by including staff from the larger emergency department and other departments that may float to the emergency department or using a multisite design. A future study can evaluate provider knowledge in a comparison group with an alternative educational module to evaluate the intervention. Finally, although this study detected a significant change from the baseline in the knowledge of the provider (M_{diff} = –10.45), the precision of this change score was quite wide owing to our small sample size (95% CI, –16.17 to –4.73). Therefore, we recommend replication of the study and hope that the data provided in this article can partially inform power analyses for future prospective research in this area.

Implications for Emergency Clinical Care Nurses

This nurse-led project facilitated standardized and consistent care for children with a displaced GT in the emergency department. The algorithm established a process for confirmation studies that will decrease unnecessary exposure to radiation, lower costs, and ensure better care. The model for SEE serves as a reminder for ED staff to engage families when addressing GT concerns in the emergency department. Nurses have a vital role in triaging patients with GT displacement. They obtain critical information of GT size, the length of time the tube was out, and what interventions parents have implemented, and prepare other team members for what to expect. Nurses can also support families by sharing online educational resources to reinforce care (eg, Feeding Tube Awareness Foundation,[21] Applied Medical Technology Patient Education Guide for Mini ONE,[22] and Avanos TubeFed.com by Avanos[23]). Providers, including licensed independent providers, can intentionally work to increase referrals to the gastrostomy/specialty clinic for continuity of care in appropriate settings, use consistent confirmation methods, and complete documentation.

Nurse managers can implement processes to improve care using algorithms and promoting complete documentation practices. One such example is supporting the use of dot phrases in the EMR that prompt all of the data elements important to include in the procedure notes. Managers can work with the informatics team to implement these phrases and monitor their use. The algorithm could be part of mandatory emergency nurse training and may improve care with the goal of decreasing LOS and cost.

Another implication for practice is that children with GTs often have other medical conditions such as respiratory, cardiac, or neurologic issues,[6] which make them susceptible to illnesses. In emergency departments, there is often exposure to many illnesses, which could be detrimental to these patients. Promoting follow-up in a clinic can limit the

child’s exposure to potential secondary complications or illnesses and contribute to better allocation of resources while increasing parental confidence to change the tube or replace the tube at home when possible.

Conclusions

Education and implementation of an evidence-based algorithm improved the knowledge of providers and standardized the care of patients with displaced GTs in the emergency department. This algorithm was found to be useful and sustainable within our facility as evidenced by provider acceptance and commitment to change practice. The provider education and algorithm improved confirmation methods for placement and increased complete documentation and referrals to gastrostomy/specialty clinics for care management, education, and support of the child and parents.

Author Disclosures

Conflicts of interest: none to report.

1.Who should replace the Gastrostomy tubes that the parents could not replace at home?a.RNb.APRNc.MD [or DO]d.B and C2.When the patient comes into the emergency department with GT dislodgement, which of the following should be obtained?a.Length of time tube has been outb.Attempt to replace tube by parent/caregiverc.Initial gastrostomy tube placementd.All of the above3.Which of the following should be gathered as part of the history and physical?a.Health issues, medications and hydrationb.Hydration and nutritional statusc.A and Bd.None of the above, you only need to replace GT4.How do you confirm placement of Gastrostomy tube after replacement?a.KUBb.GT studyc.Aspiration of gastric contentsd.B and Ce.All of the above5.How could you determine the maturity of the GT tract?a.Chart review of procedure dateb.Parent states that the GT was placed a few weeks agoc.Parent informs you of the exact date of procedure and that the GT was changed once by providerd.All of the above6.What should be included as part of standardized documentation of GT reinsertion?a.GT sizeb.Confirmation methodc.Patient toleranced.All of the above7.What constitutes a mature tract for a gastrostomy?a.A tract that is twelve weeks oldb.A tract that is two weeks oldc.A tract that is four weeks oldd.All of the above8.Can all GT stomas be dilated?a.No, GT should never be dilatedb.No, only if they have a mature tractc.Yes, only with a foley catheter the size of GT tubed.Yes, start with a small foley and increase the foley size until able to replace GT9.What resources are available for GT for management?a.Pediatric Surgeonb.Pediatric Surgery APRNc.Pediatric Hospitalistd.A and B10.What do parents need to receive from providers when they visit the emergency department?a.Supportb.Emotional Guidancec.Expectation Management Supportd.All of the above									
Answer key	1. d	2. d	3. c	4. d	5. d	6. d	7. a	8. b	9. d	10. d

Variables	Preimplementation (N = 34)	Postimplementation (N = 19)
Procedure note, %	47	95

Appropriate use of contrast study on the basis of the algorithm, n	4	3
Total contrast studies, n	9	4
Referral to gastrostomy/specialty clinic, %	35	100
Age of tract >12 wk, number of cases	30	17
Dilation of the tract with a Foley catheter, number of cases	0	3
LOS in emergency department, min (median)	23-327 (82)	51-380 (117)
LOS with contrast study, min (median)	51-327 (108)	118-380 (148)
LOS without contrast study, min (median)	23-219 (66)	51-251 (110)

DETAILS

Subject:	Evidence-based medicine; Algorithms; Medical records; Patients; Emergency medical care; Quality management; Health care; Documentation; Medical referrals; Nursing care; Ostomy; Medical personnel; Evidence-based practice; Pediatrics; Nurses; Education; Emergency services; Quality control; Quality improvement; Clinical medicine
Business indexing term:	Subject: Quality control Quality improvement
Identifier / keyword:	Gastrostomy; Emergency department; Evidence-based practice
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	113-122
Publication year:	2021
Publication date:	Jan 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia

Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.09.007
ProQuest document ID:	2487205610
Document URL:	https://www.proquest.com/scholarly-journals/displaced-gastrostomy-tube-pediatric-emergency/docview/2487205610/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2023-09-13
Database:	Public Health Database

Table of Contents: JEN

ProQuest document link

FULL TEXT

TVM:UNDEFINED

DETAILS

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	A1-A4

Publication year:	2021
Publication date:	Jan 2021
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Table Of Contents
DOI:	https://doi.org/10.1016/S0099-1767(20)30389-5
ProQuest document ID:	2487205583
Document URL:	https://www.proquest.com/scholarly-journals/table-contents/docview/2487205583/se-2?accountid=211160
Copyright:	Copyright Elsevier Limited Jan 2021
Last updated:	2023-05-23
Database:	Public Health Database

Development and Feasibility Testing of a Contextual Patient Movement Intervention: JEN

ProQuest document link

ABSTRACT (ENGLISH)

Introduction

Nurses and emergency medical services workers frequently suffer musculoskeletal injuries at a disproportionate rate in relation to the rest of the population. The most common form of this musculoskeletal injury is lumbar spine injury.

The purpose of this study was to develop and conduct phase 1 feasibility testing of a contextual lifting intervention that reduces the risks of low back injury.

Methods

This study was an intervention development and phase 1 feasibility test. The intervention was created on the basis of weightlifting techniques to specifically reduce the incidence injury related to valgus knee, asymmetrical lifting technique, and rotation of the trunk and pelvis. Motion capture technology (Xsens; Xsens Technologies) was used while 17 nursing students completed the direct patient lift from the floor, the lift from the floor with a manikin attached to a rigid spine board, the push portion of the horizontal transfer, and the pull portion of the horizontal transfer. Pre- and postintervention data were collected. Linear mixed model regression, with pairwise comparisons, was conducted for each lift at the time points of preintervention, immediately after the intervention, and 1-month postintervention.

Results

Significant changes were noted between the initial lifting techniques used and those used after the intervention. The maximum lever arm distance, defined as the distance from L5-S1 to the center of the force applied to the load, showed a significant reduction after the intervention in 3 of the 4 movements.

Discussion

Our results support the idea that injury risk can be reduced through appropriate contextual training methods.

FULL TEXT

Contribution to Emergency Nursing Practice

••The current literature on low back injury prevention among nurses indicates that the elimination of manual handling of patients is the best practice; yet, this approach is not always practical in the emergency setting. Little evidence guides the emergency nurse in the safe handling and moving of critical, emergency patients.

••This article contributes the finding that a contextually based training module was acceptable to students and reduced 1 key risk factor related to lifting a patient from the floor and during the horizontal transfer.

••Key implications for emergency nursing practice found in this article focus on the feasibility of a safer method for moving a patient during emergency patient care.

Introduction

When caring for critically sick or injured patients, the physical well-being of the health care worker is often a lower priority, placing workers at a high risk of musculoskeletal injury, specifically the low back.[1] Emergency nurses must often lift sick or injured patients from the floor and place them onto a bed manually, or lift patients while they are secured to a rigid backboard, or transfer them from an emergency medical services stretcher to the gurney. The use of mechanical transfer equipment has given indication of a decrease in injury rates when used,[2-5] but using this equipment is not always practical or available in the emergency setting, creating the need for manual handling of the patient that may physically overload the nurse. The repetitive overloading of the body while using improper techniques to lift and move patients and equipment[6] creates microtrauma to lower back tissues and leads to pain and long-term injury.[6]

When evaluating the risk of low back injury, one must account for the fatigue failure process[7] associated with the angle of the spine relative to the load while lifting. Gallagher et al[8] created a tool to assess the risk associated with cumulative loading of the lower back, the Lifting Fatigue Failure Tool (LiFFT). The LiFFT measures the amount of strain on the muscles of the back using elements of the biological physics of rotational torque: the frequency of a lifting activity in a shift, the weight of the load, and the horizontal distance from the hip to the center of the working load (lever arm distance).[8] Although the frequency and weight of patients vary unpredictably for emergency nurses,

the reduction in the lever arm distance can be controlled with proper training and reduce the risk of low back injury. Although the industry teaches to hold the load close to the body when lifting,[9,10] this practice is not always an option in nursing.

Improper body positioning was found to account for 80% of the force exerted on the lower back when using devices to assist with patient movement.[11] The use of contextual training allows the nurse to have the knowledge required to position themselves during the lifting process while receiving hands-on application of the skill. The reduction in loading of the knees and hips has been shown to be affected by the stance of the lifter[12] and, through inverse dynamics, can be assumed to translate to a reduction in the force exerted on the lower back.

Current preventative methods are loosely based on the findings of Engkvist et al[13] and their conceptual model that addresses the accident process, showing the links among the organization, the workplace, the patient, and the nurse. These methods have driven workplace interventions such as ergonomic adaptations,[14,15] mechanical lifting devices,[16-18] institutional zero-lift policies,[5,19] and educational models teaching improved lifting techniques to health care workers.[20,21] However, injury rates remain high. Although engineering controls can reduce lever arm distance in many occupational settings, the pace of emergency nursing does not always allow for such accommodations, and current educational models do not address this need. The purpose of this study, therefore, was to develop and conduct phase 1 feasibility testing of a contextual lifting intervention designed to teach nursing students proper lifting techniques that can reduce their risk of low back injury.

Methods

This study was an intervention development and phase 1 feasibility trial. The study used a single test group in a pre-post repeated measures design with a 1-month follow-up. No control group was used in this study; instead, a test-retest experimental approach investigated the effectiveness of the contextual intervention. The institutional review board at the University of Alabama reviewed and approved all study procedures (approval number: 18-OR-456-A).

Participants

The participants were 17 students (65% women) recruited from approximately 300 upper division Bachelor of Science in Nursing program students who had completed their initial education in lifting and moving patients ([Table 1]). A convenience sampling method used face-to-face recruitment among all cohorts within the college of nursing. No recruited participant met the exclusion criteria of pregnancy, preexisting medical conditions that prohibited exercise, or a current injury that restricted exercise. Although pregnancy alone is not an indication to reduce lifting requirements, to limit the risk during the testing, pregnant women were excluded from the study. All enrolled participants completed the study (100%).

Motion Capture

Three-dimensional motion capture is the gold standard for kinematic analysis.[22] The technology used for this research study, the Xsens motion capture system (Xsens Technologies), uses the orientation of 17 inertial measurement units placed on the body to identify body segment and joint angles ([Figure 1]). The researchers employed the Xsens system according to the manufacturer's recommendations. First, body measurements for the 17 inertial measurement units were collected. Then, after practicing the study's lifting motions, the participants received sensors on the foot, shank, thigh, pelvis, sternum, shoulder, upper arm, forearm, hand, and head bilaterally ([Figure 1]). Finally, the motion capture system was calibrated in the standing N-pose and through a walking trial. Data were processed using Xsens motion capture software and Visual 3D (C-Motion Inc) to calculate the primary outcome, the maximum lever arm distance (LAD).

For each lifting movement, the LAD—also called the moment arm—was calculated by creating a virtual marker at the level of the lumbosacral joint (spinal location L5-S1) that tracked with the tips of the right hand ([Figure 2]). The right

hand was chosen for all participants to represent the location where the force was being applied to the load for the movement. The risk of back injury increases as torque increases, computed by multiplying the length of the LAD from the rotational axis by the force applied perpendicular to the rotation. The research team processed raw data to determine the maximum LAD throughout the lift, and then they determined the mean value of both for the 3 repetitions of each lift for statistical analysis. The mean of 3 trials for each movement was used to create the average score. The LAD scores were obtained by taking the maximum distance from the 3 trials.

Intervention

In the light of the existing knowledge relating injury risk to core stability, body positioning, and LAD, the Safe Handling and Applied Efficiency contextual training intervention was developed (Table 2). The movements used in this intervention are considered high risk:[23,24] a direct patient lift (DL), a lift from the floor with the patient secured to a rigid backboard (BB), and the push (PUSH) and pull (PULL) portions of the horizontal transfer. The intervention followed a contextual learning format of didactic lessons, practice, and coaching, and lasted approximately 30 minutes. All members of the research team received training in the intervention from a senior member of the research team who was a certified personal trainer. In the first step, the intervention demonstrated the proper lifting technique to all participants, which they then practiced by themselves. Then, the team delivered one-on-one coaching with demonstration until the participants achieved the proper lifting techniques. This face-to-face coaching on the proper lifting methods while the participants practiced provided the key contextual learning aspect of the intervention.

Procedure

The eligible participants were asked to report to the environmentally controlled Clinical Practice Laboratory at the college of nursing during business hours and to wear comfortable clothing for the data collection. All participants were well rested. The initial data collection and intervention lasted approximately 60 minutes with the 1-month follow-up lasting 30 minutes per participant. The data collection and intervention used a 34-kg manikin.

All participants received detailed information about the study and provided informed consent. After an orientation, they practiced the 4 study movements using their existing knowledge until they were ready to proceed. After the Xsens calibration, the participants established their baseline performance by completing 3 repetitions of the 4 study movements. Then, the participants received the contextual training intervention (Table 2). Afterward, the participants completed 3 repetitions of the same movements to obtain postintervention data. The participants returned 1 month later for follow-up data collection, completing the 3 repetitions of the same series of lifts without additional training.

Statistical Analysis

The analyses described the sample and investigated the impact of the intervention. Time was set as a fixed variable because it was tightly controlled and represented 3 specific levels—before the intervention, immediately after the intervention, and 1 month after the intervention—whereas participant was set as a random variable because it varied without limits and did not represent all the potential levels of variation. IBM SPSS version 27 (IBM Corp) and Microsoft Excel for Mac version 16.37 (Microsoft Corporation) were used to employ linear mixed effects modeling for each lift movement on the repeated measure maximum LAD at preintervention, postintervention, and follow-up 1 month after the intervention. Pairwise comparisons detailed the pattern and significance of identified change across time. The hypotheses were that the intervention would produce a significant linear trend showing a reduction in the LAD at post and follow-up. Inferential analyses were used to investigate the effectiveness of the intervention.

Results

Descriptive data for the analyses are presented in Tables 3 and 4. The participants were 11 female and 6 male college students *(*n = 17), with an average age of 20.6 years, average height of 170 cm, average weight of 68.5 kg, and

average duration of 2.5 hours spent lifting weights each week (Table 1). A low attrition rate (0%) was achieved throughout the study.

Intervention Analysis: Maximum Lad Scores

To assess the intervention's effects on the BB lift, a linear mixed model analyzed the maximum LAD scores with time entered as a fixed effect and participant as a random effect (Table 3). The parameter estimates for time indicated a significant change in scores across time points, β = –0.035, SE = 0.007, *P* P Figure 3 A shows a diminishing trend in the LAD scores among preintervention, postintervention, and follow-up 1 month after the intervention for the BB group. Pairwise comparisons detailing this pattern (Table 4) showed that, compared with the preintervention scores, the LAD scores were significantly lower at post, *t* (16) = –5.93, *P* t (16) = –5.13, *P* t (16) = –0.47, *P* > 0.05.

To assess the intervention's effects on the DL movement, an identical linear mixed model analyzed the effects of the intervention on the LAD (Table 3). As depicted in Figure 3B, the maximum LAD scores showed no significant effect for time, β = –0.003, SE = 0.009, *P* = 0.72, 95% CI [–0.02, 0.01], but they did for participant variability, β = 0.494, SE = 0.018, *P* Table 4), showed that the LAD scores worsened after the intervention but returned to the baseline at follow-up.

To assess the intervention's effects on the PUSH, a horizontal transfer movement, an identical linear mixed model analyzed the maximum LAD scores for time (fixed) and participant (random) effects. Again, the parameter estimates were significant for both time, β = –0.086, SE = 0.012, *P* P Figure 3C). To detail this pattern, pairwise comparisons compared the mean scores for each time point (Table 4). Compared with the baseline, the scores were significantly lower at post, *t* (16) = –6.31, *P* t (16) = 9.38, *P* t (16) = –0.84, *P* = 0.41.

To assess the intervention's effects on the PULL, a horizontal transfer movement, an identical linear mixed model analyzed the maximum LAD scores for time (fixed) and participant (random) effects. Time was again significant, β = –0.061, SE = 0.013, *P* = 0.007, 95% CI [–0.10, –0.03], as was participant, β = 0.756, SE = 0.028, *P* Figure 3D). To better understand this trend, pairwise comparisons compared the mean scores for each time point (Table 4). As for the BB lift and PUSH movement, the scores at preintervention were higher than at post, *t* (16) = –5.59, *P* t (16) = –8.81, *P* t (16) = 1.55, *P* > 0.05.

An identical analytic strategy investigated the related measure of the average LAD scores for each movement but is not reported in this paper. The results followed the same pattern as the maximum LAD and are included as supplementary online material.

Discussion

The purpose of this study was to develop a contextual lifting intervention to reduce the risks of low back injury in nurses and conduct phase 1 feasibility and initial effectiveness piloting of the intervention with nursing students. The primary outcome was the LAD as measured using the Xsens motion capture system. The study found that the intervention showed a reduction in the LAD during the BB lift and both the PUSH and PULL movements in a horizontal patient transfer, but not during the DL. As explained by the LiFFT model,[8] this decrease in the LAD instills a reduction in injury risk to nurses on the job.[8] This novel pilot study addresses the need to improve teaching strategies for health care workers because these strategies relate to the health worker's body positioning while performing patient movements, both with and without the ability to use mechanical lifting devices.

Significant decreases in the LAD during the lifting movements emerged after the intervention, and these improvements persisted to the 1-month follow-up for most participants. This finding gives hope that the contextual training produced lasting change in the way the lifters moved after 1 brief practice session. This is possible with procedural memory if participants are able to use a new skill regularly. The retention of a skill and development of muscle memory through practice of that skill are important factors to look at when moving forward with this

intervention.

The data for the DL showed it worsening immediately after the intervention and then improving at the 1-month follow-up. This finding may be explained by the variation in hand placement during the initial data collection. The center of mass was changed in the DL by the participant changing their hand placement from under the axillary region before the intervention to the participant's body with arms wrapped around the chest pulling the patient into the lifter's chest (Figure 4). Although the hand position did not change significantly, the pulling of the simulated patient close to the lifter to perform the movement was deemed an improvement over the initial lifting motion. The inclusion of kinetic data would give a more definitive result to the force exerted on the lower back during this lift.

Although manual lift or movement of patients should be avoided, in instances where immediate, life-saving measures must be instituted at a moment's notice, for example, in an emergency department, it is not always possible or practical. Mechanical lifting devices require a lifting strap being placed under the patient and then attached to the hoisting device above the patient to lift the load. The positioning of the harness requires that it be put in place before the patient lies down on the bed, or if already in bed, the patient must be logrolled to allow for placement. The task of placing the strap is strenuous on the body with the patient on the floor and potentially unsafe with the patient on an emergency medical services stretcher. The positioning of the lifting device itself can also be problematic, given the space and time constraints surrounding emergency care.

The contextual Safe Handling and Applied Efficiency training intervention teaches nurses the proper body position to avoid injury when manual lifts are to be performed. It teaches them how to position themselves during the lifting process while receiving coaching and hands-on application of the skill. Through practice, muscle memory[25] is developed, such that in the emergent situation the nurse automatically assumes the appropriate position safe for the lift. Acceptability of the intervention was supported by the participants' engagement with the training and the positive verbal responses during the initial and follow-up data collection sessions.

The body positioning taught in the intervention serves to place the lifter with a solid base, feet shoulder-width apart, shoulders back in a neutral position, and the bed at a height at which the shortest member of the team is able to achieve a comfortable squat position for the transfer. The wide base allows for an equal distribution of the weight across the body, generating the force for the movement symmetrically through both legs rather than through an asymmetrical, 1-legged approach, thereby reducing the rotational forces on the lumbar spine. The neutral shoulder position is improved upon during the horizontal transfer by having the participants grip the sheet with their palms up, allowing for the natural positioning of the bony structures of the arm throughout the lift. The maximum LAD for both the PUSH and PULL portions of the horizontal transfer and for the lifting from the floor with the patient secured to the rigid spine board was found to be lower after the intervention.

Future studies will require a larger sample size, including pregnant women who do not require lifting accommodations. To determine the appropriate sample size, a power analysis for a single-factor repeated measures analysis of variance was conducted using the G*Power computer software (Heinrich Heine University).[26] The analysis indicated that 28 participants would be needed to reach 0.80 power and detect a medium effect size using α=.05. To further understand the benefits of this intervention, future studies must include the collection of kinetic data also. This kinetic data would allow for the direct calculation of forces being exerted on the ankles, knees, hips, and lower back during the movements.

Limitations

The completion of this pilot study had several limitations including the use of a manikin rather than a live subject, use of nursing students rather than practicing nurses, a lack of blinding of the research team, no preregistration of the study protocol, and the gathering of kinematic data only. The use of a manikin allowed the research team to control

for patient size, weight distribution across the manikin, and movement of the patient during the transfer process, reducing the risk during the movement. Although these controls added to the safety of the participants, the dead weight of the manikin is not representative of a human patient being moved and will need to be addressed in future studies. The use of nursing students provided a baseline for the safe patient-handling education received in 1 nursing program in Alabama. The findings of this pilot study lend support to the feasibility of using the intervention on a broader scale; however, these findings cannot be generalized to a larger population of nursing students or emergency nurses until further research has been conducted with practicing nurses. Blinding of the research team to the intervention by having a control group will add to the rigor of future studies. The use of the LiFFT[8] allowed the research team to examine a key modifiable risk factor for low back injury, but further testing of the intervention examining the kinetic variables of force and muscle activation is needed moving forward.

Implications for Emergency Nurses

The manual lifting and moving of a patient are not recommended and should be avoided whenever possible to limit the risk of injury to the health care team. The use of mechanical lifting equipment is a valuable asset in reducing injury risk to health care workers, but the number of injuries remains high. For important reasons, its use is limited within an emergency setting. To limit the risks associated with manual patient handling, the nurse must understand the premise of core stability, proper body positioning, and a reduction in the LADs.

The use of a friction reduction device is recommended for the horizontal transfer and can be beneficial in requiring the nurse to only generate a force equivalent to 25% of the patient's weight[11] to complete the movement on the basis of the friction reduction. This reduction in force[11] combined with the reduced risk of injury related to the reduction in LAD found in our intervention should decrease injury and microtrauma to the health care workers during the horizontal transfer of the patient that frequently occurs in the emergency department. This small study provides education to be used with friction reduction devices.

Conclusions

Although lifting techniques alone will never be the answer to injury prevention in nursing, the combination of proper lifting techniques and the use of appropriate lifting and transfer equipment will go a long way toward reducing the number of injuries to nurses, specifically emergency nurses. The development and phase 1 piloting of the contextual lifting intervention showed promise in reducing a key risk factor for low back injury among nursing students. Further testing of the intervention, including the kinetic variables, with practicing nurses is needed. This intervention shows promise as a viable approach to teaching nurses appropriate body positioning when performing patient movement tasks.

Acknowledgments

The research team would like to thank the Capstone College of Nursing for the use of the space to conduct the research study, the Central Appalachian Regional Education and Research Center for providing funding for this study, and Dr. Anne Franklin Lamar for editing and formatting the manuscript.

Author Disclosures

Conflicts of interest: none to report.

Funding for this study was provided through the Central Appalachian Regional Education and Research Center, a joint project of the University of Kentucky and Eastern Kentucky University. Funded by CDC/NIOSH Cooperative Agreement 2T42OH010278-04.

Appendix

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.05.018.

Participants	n	Age, y (SD)	Height, ft' in" (SD)	Weight, lb (SD)	Weightlifting, h/wk (SD)
Total	17	20.6 (0.8)	5' 6.9" (3.1")	150.8 (28.2)	2.5 (2.3)
Women	11	20.5 (0.5)	5' 5.6" (2.9")	137.8 (25.6)	1.7 (1.9)
Men	6	20.8 (1.2)	5' 9.3" (1.4")	174.5 (13.7)	4.0 (2.5)

Movement	Instruction
Core activation (used for each movement)	Stand straight with feet shoulder-width apart, shoulders back, and chest pushed forward. Contract gluteal muscles fully and take a deep breath. On exhale of the breath, contract the abdominal muscles. While maintaining tension on the abdominal muscles, relax the gluteal muscles. Core activation must be used throughout each of the movement patterns.
Direct lift of patient from floor	With patient positioned between feet, fold at hips, shifting weight to heels, squatting down behind the patient. Reach hands around the patient’s chest and take each wrist in hands, grasping the left wrist with the right hand and the right wrist with the left hand. Inhale through nose, tighten abdominal muscles and gluteal muscles, and drive through heels, extending the hips and knees until in upright position. Reverse the motion to lower patient back to the floor.
Lift of patient from the floor secured to a rigid spine board	With backboard positioned between feet, fold at hips, shifting weight to heels. Reach hands down to object, grasping the handles. Inhale through nose, tighten abdominal muscles and gluteal muscles, and drive through heels, extending the hips and knees until in upright position. Reverse the motion to lower patient back to the floor.

Horizontal transfer of patient, push and pull positions	One member of the team will be on either side of the patient, who is on a hard slide board. The bed will be positioned such that all participants can grasp the draw sheet under the patient with knees slightly bent and spine in a neutral position. In a coordinated effort, the participant on the push side of the patient will push through their heel, extending their arms as they push the patient across the slide board. The participant receiving the patient will push through their heels, standing upright and pulling their elbows back, squeezing their scapulae together.

Movements/effects	β	SE	95% CI	t	P	BIC
Backboard lift						–130.5
Participant (random)	0.350	0.016	[0.318, 0.384]	21.83	<0.001	
Time (fixed)	–0.035	0.007	[–0.051, –0.020]	34.19	<0.001	
Direct lift						–113.6
Participant (random)	0.494	0.018	[0.457, 0.531]	26.98	<0.001	
Time (fixed)	–0.003	0.009	[–0.021, 0.014]	–0.37	0.72	
Horizontal transfer, push						–100.9
Participant (random)	0.808	0.026	[0.754, 0.862]	30.70	<0.001	
Time (fixed)	–0.086	0.012	[–0.111, –0.061]	–7.08	<0.001	
Horizontal transfer, pull						–93.0
Participant (random)	0.756	0.028	[0.680, 0.831]	26.68	<0.001	
Time (fixed)	–0.061	0.013	[–0.096, –0.026]	–4.65	0.01	

Movement	Time	M	SD	Comparison	MDiff	SEM	% CI	t	P	drm

Backboard lift	T1, Pre	.267	.033	T2−T1	−.044	.011	[−0.066, −0.021]	−4.09	<0.001	−1.12
T2, Post	.223	.043	T3−T1	−.052	.012	[−0.101, −0.002]	−4.32	<0.001	−1.21	T3, FU
.215	.049	T3−T2	−.008	.015	[−0.055, 0.039]	−0.53	0.60	−0.17	Direct lift	T1, Pre
.390	.044	T2−T1	.015	.015	[−0.060, 0.089]	1.02	0.32	0.20	T2, Post	.405
.081	T3−T1	−.001	.014	[−0.100, 0.099]	−0.06	0.95	−0.02	T3, FU	.389	.053
T3−T2	−.016	.018	[−0.127, 0.096]	−0.86	0.40	−0.22	Horizontal transfer, push	T1, Pre	.598	.063
T2−T1	−.167	.024	[−0.366, 0.031]	−6.84	<0.001	−2.54	T2, Post	.430	.069	T3−T1
−.170	.020	[−0.372, 0.031]	−8.54	<0.001	−2.84	T3, FU	.427	.057	T3−T2	−.003
.018	[−0.170, 0.164]	−0.17	0.87	−0.05	Horizontal transfer, pull	T1, Pre	.530	.058	T2−T1	−.151
.023	[−0.403, 0.101]	−6.67	<0.001	−2.18	T2, Post	.379	.078	T3−T1	−.134	.016

[–0.349, 0.080]	–8.20	<0.001	–2.59	T3, FU	.396	.044	T3−T2	.017	.020	[–0.229, 0.263]

Movements/effects	β	SE	95% CI	t	P	BIC
Backboard lift						–153.91
Participant (random)	0.287	0.014	[0.259, 0.316]	20.51	<0.001	
Time (fixed)	–0.026	0.006	[–0.039, –0.013]	–3.99	<0.001	
Direct lift						–121.43
Participant (random)	0.396	0.018	[0.360, 0.431]	22.43	<0.001	
Time (fixed)	0.000	0.008	[–0.017, 0.016]	–0.03	0.98	
Horizontal transfer, push						–99.40
Participant (random)	0.655	0.027	[0.599, 0.712]	23.84	<0.001	
Time (fixed)	–0.085	0.013	[–0.111, –0.059]	–6.69	<0.001	
Horizontal transfer, pull						–99.66
Participant (random)	0.569	0.029	[0.492, 0.646]	19.81	<0.001	
Time (fixed)	–0.067	0.013	[–0.103, –0.032]	–5.05	0.01	

DETAILS

Subject:	Lifting; Patients; Emergency medical care; Intervention; Motion capture; Students; Pelvis; Feasibility; Random variables; Rotation; Training; Weightlifting; Data collection; Nurses; Emergency services; Nursing; Technology; Injuries; Back injuries; Health services; Statistical analysis
Business indexing term:	Subject: Training
Identifier / keyword:	Back injury; Patient lifting and moving; Human engineering; Nursing research

Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
Pages:	101-112.e1
Publication year:	2021
Publication date:	Jan 2021
Section:	Research
Publisher:	Elsevier Limited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Journal Article
DOI:	https://doi.org/10.1016/j.jen.2020.05.018
ProQuest document ID:	2487205579
Document URL:	https://www.proquest.com/scholarly-journals/development-feasibility-testing-contextual/docview/2487205579/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2021-02-14
Database:	Public Health Database

2021…Time to Elevate: JEN

ProQuest document link

ABSTRACT (ENGLISH)

In 2020, Emergency Nurses Association President Mike Hastings focused on the theme of the power of one. Elevate your professional association: help take the Emergency Nurses Association, our profession, and the specialty of emergency nursing to the next level. Before you sit down to read the next issue of the Journal of Emergency Nursing, set a goal and accomplish something in your personal life, your professional life or profession, and your community to improve that space around you.

FULL TEXT

As I sit down to write my first president's message, our world is still in the middle of fighting a pandemic caused by coronavirus disease 2019; we are strife with societal and political issues around the world; many are fighting for equality; and in the United States, the atmosphere is politically charged. All of these issues have had a major impact on our lives in some aspect.

It is the nature of nurses to help, and these recent times have left us asking, "What do I do? Where do I fit in?" Or maybe you are feeling weak and tired in the face of societal or personal struggle from the stress of it all. What is the answer?

In 2020, Emergency Nurses Association President Mike Hastings focused on the theme of the power of one. How can one person make a difference? This message is so important and continues for all of us as we begin 2021.

In 2021, I challenge each of us to focus on the word ELEVATE. Elevate ourselves: take the time to make ourselves better in some aspect. This step of elevating ourselves will have an impact not only on us but on the world around us, as doing something good and positive for ourselves reflects on those around us. Elevate your career in whatever role you fulfill in our profession. Does that mean honing a certain skill, educating yourself on a disease, or taking a leadership class, for example? Push yourself higher through the act of getting lost in the service of others. Mahatma Gandhi said, "The best way to find yourself is to lose yourself in the service of others." Elevate your professional association: help take the Emergency Nurses Association, our profession, and the specialty of emergency nursing to the next level. Get involved, volunteer to help propel us all forward as a united force. This united force will be very powerful.

To accomplish great things, we will need to lean on one another, but it all begins with us individually. On a personal note, I love to listen to music of all kinds. I use music to relax, to get hyped up for something, and also for inspiration. The idea of improving ourselves before we can improve others always reminds me to reflect on the message in the song "The Man in the Mirror" by Michael Jackson. Its main message is that, if you want to make a change, you have to start with the person you see in the mirror.[1] Another song I find to be inspirational in this aspect is by Matthew West, titled "Do Something." He tells us that if we are tired of the negative things around us then we need to do something; he challenges us to start with ourselves to make change happen. Lyrics from the song include: "If not us, then who, If not me and you…If not now, then when?"[2]

I applaud you for sitting down to read this message and this issue of the *Journal of Emergency Nursing*. You are already taking a step right now to better yourself, which translates to elevating the emergency nursing profession, your career, and ultimately the care of the patients we serve.

Now comes the homework for the next 2 months: Before you sit down to read the next issue of the *Journal of Emergency Nursing*, set a goal and accomplish something in your personal life, your professional life or profession, and your community to improve that space around you.

Stay positive, stay focused, and be the good!

ELEVATE

DETAILS

Subject:	Emergency medical care; Nursing; Nurses; COVID-19; Professional development; Emergency services
Business indexing term:	Subject: Professional development
Publication title:	Journal of Emergency Nursing:; JEN; Philadelphia
Volume:	47
Issue:	1
First page:	1
Publication year:	2021
Publication date:	Jan 2021
Section:	President's Message
Publisher:	Elsevier Lim ited
Place of publication:	Philadelphia
Country of publication:	United Kingdom, Philadelphia
Publication subject:	Medical Sciences--Nurses And Nursing
ISSN:	00991767
e-ISSN:	15272966
Source type:	Scholarly Journal
Language of publication:	English
Document type:	Commentary
DOI:	https://doi.org/10.1016/j.jen.2020.10.006
ProQuest document ID:	2487205576
Document URL:	https://www.proquest.com/scholarly-journals/2021-time-elevate/docview/2487205576/se-2?accountid=211160
Copyright:	©2020. Emergency Nurses Association
Last updated:	2021-04-09
Database:	Public Health Database

Bibliography

Citation style: APA 6th - Annotated with Abstracts - American Psychological Association, 6th Edition

Transcutaneous pacing: An emergency Nurse's guide: JEN. (2021). Journal of Emergency Nursing, 47(2), 326-330. doi:https://doi.org/10.1016/j.jen.2020.11.003

Transcutaneous pacing is commonly performed in emergency departments to treat patients with cardiac dysrhythmias. Although emergency nurses are required to complete a standardized course that reviews components of transcutaneous pacing, such as Advanced Cardiac Life Support, performing transcutaneous pacing on patients may be done infrequently in some facilities and can lead to anxiety and fear for bedside emergency nurses, especially novice emergency nurses and nurses who infrequently care for patients requiring external pacing. This manuscript provides a practical guide for emergency nurses to care for patients who require transcutaneous pacing. Key information found in this manuscript includes indications for transcutaneous pacing, the nurse's role when performing transcutaneous pacing, and transcutaneous pacing troubleshooting information.

Implementing point-of-care troponin testing in the emergency department: Impact on time to result: JEN. (2021). Journal of Emergency Nursing, 47(2), 299-304. doi:https://doi.org/10.1016/j.jen.2020.06.014

IntroductionIn the emergency department, troponin assays are commonly used and essential in the evaluation of chest pain and diagnosis of acute coronary syndrome. This study was designed to assess the potential impact of implementing point-of-care troponin testing by comparing the time to point-of-care laboratory result and time to conventional laboratory result.MethodsThe study enrolled 60 ED patients deemed to need a troponin test in the evaluation of low-risk chest pain (HEART score <4 based on history, electrocardiogram, age, risk factors). Point-of-care troponin testing was performed with the same blood sample obtained for a conventional troponin assay. If the provider determined that the patient required 2 troponin tests, the second laboratory draw was used in the data collection. This was to correlate the time of laboratory result to time of disposition.ResultsOf the 60 subjects enrolled, 2 subjects were excluded because of user errors with the point-of-care testing equipment and 2 others for not meeting inclusion criteria on later review. The median times for the point-of-care troponin and conventional troponin assays were 11:00 minutes (interquartile range 10:00-15:30) and 40:00 minutes (interquartile range 31:30-52:30), respectively; $P < 0.001$. There were 3 extreme outliers from the conventional troponin assay that significantly skewed the distribution of the mean, making the median the more accurate assessment of the central tendency.DiscussionPoint-of-care troponin testing provided results in a median time 29 minutes quicker than the conventional troponin assay. This result is statistically significant and has the potential to greatly improve time to disposition in all patients with chest pain requiring a troponin assay.

Table of contents: JEN. (2021). Journal of Emergency Nursing, 47(2), A1-A3. doi:https://doi.org/10.1016/S0099-1767(21)00018-0

Cardiopulmonary resuscitation feedback: A comparison of device-measured and self-assessed chest compression quality: JEN. (2021). Journal of Emergency Nursing, 47(2), 333-341.e1. doi:https://doi.org/10.1016/j.jen.2020.10.003

BackgroundHigh-quality cardiopulmonary resuscitation is the foundation of cardiac arrest care. Guidelines specify chest compression depth, recoil, and rate, but providers often fail to achieve these targets. Furthermore, providers are largely unable assess the quality of their own or other peoples' chest compressions. Chest compression feedback devices can improve chest compression quality; their use is endorsed internationally, but they remain largely absent in clinical care.This article analyzes preclinical data collected during a quality improvement project. It describes provider demographics and perceptions about their chest compression quality and correlates them to measured chest compression quality, compares clinician perception of chest compressions to objective measures, and describes the effect of feedback on compression quality.MethodsClinicians were recruited from 2 metropolitan emergency departments. A questionnaire was used to assess participants' levels of training and experience. A before-and-after assessment of chest compression quality was performed using a Laerdal CPRmeter 2 and a CPR mannequin. Pretest measures of chest compression quality were made by covering the device screen thereby blinding providers to feedback; repeat measures were then collected from the same participants but unblinded to

feedback. Provider charecteristic were collected by survey. Correlations between blinded chest compression quality and provider charecteristics; the reliability of providers estimated compared to measured quality; and the effects of feedback on chest compression quality were assessed using Pearsons correlations, Cohens κ, and paired t testing.Results84 participants were assessed. The mean years of certification were 11.74. Ninty-five percent of the providers self-assessed as more experienced than novice and 81% reported performing cardiopulmonary resuscitation at least occasionally. The frequency of performing chest compressions was correlated with self-assessed skill ($r = 0.58$, $P < .001$). However, self-assessed skill was only weakly correlated with chest compression quality ($r = 0.29$, $P = .01$) and not at all with the frequency of performing chest compressions or years of certification. There was no agreement between self-assessed and device-measured chest compression depth ($\kappa = -0.10$, $P = 0.11$), recoil ($\kappa = -0.14$, $P = .03$), or rate ($\kappa = 0.06$, $P = .30$). The overall quality of compressions improved by 16.9%; the percentage of chest compressions achieving target depth by 3.58%; recoil by 22.82%; and rate by 23.66% with feedback. A total of 97.6% of the staff rated chest compression feedback helpful.ConclusionsOur findings suggest that participants' demographics were not correlated with chest compression quality and that providers cannot reliably assess chest compression quality. The data also demonstrate that with minimal training, feedback can significantly improve chest compression quality.

Thank you to reviewers: JEN. (2021). Journal of Emergency Nursing, 47(2), A10-A12. doi:https://doi.org/10.1016/S0099-1767(21)00022-2

Hope—We are seeing a light at the end of the tunnel: JEN. (2021). Journal of Emergency Nursing, 47(2), 207. doi:https://doi.org/10.1016/j.jen.2020.12.010

I am writing my second message as the president of the Emergency Nurses Association. At the time of my writing, we are at the close of 2020. A year that seemed like a lifetime—2020. A year that cast many shadows on our lives and left many of us with feelings of uncertainty and fear. Fortunately, we are experiencing some hope now that the first coronavirus disease vaccine has been administered to frontline health care workers around the world. At the time of your reading this message, I am hopeful that we are getting close to or actually vaccinating the general public. As nurses, we are instrumental in educating the public in the science and evidence of the vaccine. We have to step up and dispel rumors and misinformation. Nursing has been considered the most trusted profession for the last 19 years,1 and we need to use that trust to help get the public vaccinated and put an end to this pandemic for all of us.

Information for readers: JEN. (2021). Journal of Emergency Nursing, 47(2) doi:https://doi.org/10.1016/S0099-1767(21)00021-0

Importance ranking of electrocardiogram rhythms: A primer for curriculum development: JEN. (2021). Journal of Emergency Nursing, 47(2), 313-320. doi:https://doi.org/10.1016/j.jen.2020.11.005

IntroductionElectrocardiogram interpretation is an essential skill for emergency and critical care nurses and physicians. There remains a gap in standardized curricula and evaluation strategies used to achieve and assess competence in electrocardiogram interpretation. The purpose of this study was to develop an importance ranking of the 120 American Heart Association electrocardiogram diagnostic labels with interdisciplinary perspectives to inform curriculum development.MethodsData for this mixed methods study were collected through focus groups and individual semi-structured interviews. A card sort was used to assign relative importance scores to all 120 American Heart Association electrocardiogram diagnostic labels. Thematic analysis was used for qualitative data on participants' rationale for the rankings.ResultsThe 18 participants included 6 emergency and critical care registered nurses, 5 cardiologists, and 7 emergency medicine physicians. The 5 diagnoses chosen as the most important by all disciplines were ventricular tachycardia, ventricular fibrillation, atrial fibrillation, complete heart block, and normal electrocardiogram. The "top 20" diagnoses by each discipline were also reported. Qualitative thematic content analysis revealed that participants from all 3 disciplines identified skill in electrocardiogram interpretation as clinically imperative and acknowledged the importance of recognizing normal, life threatening, and time-sensitive electrocardiogram rhythms. Additional qualitative themes, identified by individual disciplines, were

reported.DiscussionThis mixed-methods approach provided valuable interdisciplinary perspectives concerning electrocardiogram curriculum case selection and prioritization. Study findings can provide a foundation for emergency and critical care educators to create local ECG educational programs. Further work is recommended to validate the list amongst a larger population of emergency and critical care frontline nurses and physicians.

Asynchronous testing of 2 specimen-diversion devices to reduce blood culture contamination: A single-site product supply quality improvement project: JEN. (2021). Journal of Emergency Nursing, 47(2), 256-264.e6. doi:https://doi.org/10.1016/j.jen.2020.11.008

ObjectiveBlood culture contamination above the national threshold has been a consistent clinical issue in the ED setting. Two commercially available devices were examined that divert an initial small volume of the specimen before the collection of blood culture to reduce skin contamination.MethodsProspectively, 2 different blood culture–diversion devices were made available in the unit supplies to ED clinicians at a single site during 2 different periods of time as a follow-up strategy to an ongoing quality improvement project. Blood samples were collected in the emergency department over a period of 16 months. A retrospective record review study was conducted comparing the use of the 2 specimen-diversion devices with no device (control group) for blood culture contamination rates. The main outcome of monthly blood culture contamination per device was tested using a Bayesian Poisson multilevel regression model.ResultsA total of 4030 blood samples were collected and analyzed from November 2017 to February 2019. The model estimated that the mean incidence of contaminated blood draws in the device A group was 0.29 (0.14-0.55) times the incidence of contaminated draws in the control group. The mean incidence of contaminated blood draws in the device B group was 0.23 (0.13-0.37) times the incidence of contaminated draws in the control group, suggesting that initial-diversion methods reduced blood culture contamination.ConclusionInitial specimen–diversion devices supplement present standard phlebotomy protocols to bring down the blood culture contamination rate.

Leading and accelerating change: JEN. (2021). Journal of Emergency Nursing, 47(2), 218-220. doi:https://doi.org/10.1016/j.jen.2021.01.006

In the final manuscript in our ENA 50th Anniversary celebration, Milbrath and Snyder3 provide a historical analysis of the top 3 policy issues addressed in the ENA's history: (1) provision of care for vulnerable populations, (2) trauma and injury prevention, and (3) patient quality and safety. In the hopes that March of 2021 will mark the date when we can begin to emerge from our isolation to celebrate together once again, I envision that the pandemic can serve as the inflection point marking when ENA progresses from leading change to also accelerating the needed improvements in our health care system.In This Issue of the Journal of Emergency Nursing In addition to our 50th Anniversary celebration article, this issue of Journal of Emergency Nursing (JEN) includes a collection of articles focused on novel technology, coronavirus disease 2019 leadership, and cardiovascular care. Ivanov et al's research begins to bring emergency triage into the advanced digital age by testing the accuracy of a machine learning algorithm for assigning Emergency Severity Index acuity.6 The results tantalize the imagination with a future where patient care is more accurate and precise with human decision-making augmented and supported by real-time supercomputing tools. By relaying how the facility leaders flexibly adapted structures and processes at their site in the face of uncertainty and little previous evidence, the authors provide an important contribution to the literature on considerations for emergency care leadership in future, major infectious disease disasters.

Prone positioning of patients with coronavirus disease 2019 who are nonintubated in hypoxic respiratory distress: Single-site retrospective health records review: JEN. (2021). Journal of Emergency Nursing, 47(2), 279-287.e1. doi:https://doi.org/10.1016/j.jen.2020.12.006

IntroductionIn March and April 2020 of the coronavirus disease 2019 pandemic, site clinical practice guidelines were implemented for prone positioning of patients with suspected coronavirus disease 2019 in hypoxic respiratory distress who are awake, alert, and spontaneously breathing. The purpose of this pandemic disaster practice improvement project was to measure changes in pulse oximetry associated with prone positioning of patients with coronavirus disease 2019 infection in adult acute respiratory distress or adult respiratory distress syndrome, who are

awake, alert, spontaneously breathing, and nonintubated.MethodsA retrospective chart review of patients who were coronavirus disease 2019 positive in the emergency department from March 30, 2020 to April 30, 2020 was conducted for patients with a room air pulse oximetry <90% and a preprone position pulse oximetry ≤94% who tolerated prone positioning for at least 30 minutes. The primary outcome was the change in pulse oximetry associated with prone positioning, measured on room air, with supplemental oxygen, and approximately 30 minutes after initiating prone positioning. Median and mean differences were compared with the Wilcoxon signed-rank test and paired t-test.ResultsOf the 440 patients with coronavirus disease 2019, 31 met inclusion criteria. Median pulse oximetry increased as 83% (interquartile range, 75%-86%) on room air, 90% (interquartile range, 89%-93%) with supplemental oxygen, and 96% (interquartile range, 94%-98%) with prone positioning ($z = -4.48$, $P < .001$). A total of 45% (n = 14) were intubated during their hospital stay, and 26% (n = 8) of the included patients died.DiscussionIn patients with coronavirus disease 2019 who are awake, alert, and spontaneously breathing, an initially low pulse oximetry reading improved with prone positioning. Future studies are needed to determine the association of prone positioning with subsequent endotracheal intubation and mortality.

Editorial board: JEN. (2021). Journal of Emergency Nursing, 47(2) doi:https://doi.org/10.1016/S0099-1767(21)00019-2

Impact of ED triage symptom- and travel-screening strategy: JEN. (2021). Journal of Emergency Nursing, 47(2), 221. doi:https://doi.org/10.1016/j.jen.2020.12.001

Emergency nursing review questions: March 2021: JEN. (2021). Journal of Emergency Nursing, 47(2), 331-332. doi:https://doi.org/10.1016/j.jen.2021.01.002

Interventions are directed at removing the cause as well as providing supportive care to address dehydration, cardiovascular instability, prevention of renal failure, and restoration of normothermia.1 Correct answer: C When caring for patients with dementia, such as a patient with Alzheimer disease, explain each step in a process or activity such as applying a blood pressure cuff. A classic symptom is extreme pain or tenderness that is out of proportion to the injury’s appearance, but this symptom may be blunted in a patient with neuropathy.3 Correct answer: B In the patient with hemorrhagic shock, coagulopathy can be worsened by hypothermia and is detrimental to coagulation, even in the absence of acidosis, which also reduces the ability to form effective clots. Patients may become hypocalcemic after massive transfusions of blood products owing to binding of calcium by citrate used in anticoagulation of blood products.4 Correct answer: A This patient is exhibiting signs and symptoms of bacterial meningitis, which include high fever, severe headache, photophobia, nuchal rigidity, and mental status changes.

Commentary on “Prone positioning of patients with coronavirus disease 2019 who are nonintubated in hypoxic respiratory distress”: JEN. (2021). Journal of Emergency Nursing, 47(2), 214-217. doi:https://doi.org/10.1016/j.jen.2021.01.003

Douglas et al turned 6 patients in acute respiratory failure from supine to prone and reported a mean increase in Pao2 of 69 mm Hg without changing any mechanical ventilation parameters such as tidal volume, oxygen concentration, or pressures.3 There was increasing interest in the maneuver as well as research in the decades to follow, but the studies failed to demonstrate important patient-focused outcomes such as improved survival4 until the 2013 Proning of Severe ARDS Patients (PROSEVA) controlled trial.5 In this randomized trial, Guerin et al5 employed long durations of prone ventilation (16 hours or more) in patients with moderate to severe ARDS to reduce the 28-day mortality from 32.8% in patients in the supine group to 16.0% in those in the prone group, resulting in a 16% absolute risk reduction in mortality (number needed to treat: 6 to save 1 life).Flipped Physiology Prone positioning has multiple beneficial effects for both ventilation and oxygenation. Adopting a prone position results in more homogeneous ventilation, decreases shunting, and improves ventilation and perfusion matching by offloading abdominal and cardiac weight from the lung tissues and by switching the dependent area of infiltrates away from the posterior lung tissues.6 More homogeneous ventilation is thought to also decrease lung injury by distributing mechanical force from the ventilator across the lung during inhalation more evenly.6 Evidence from small observational and retrospective studies suggests that prone positioning in nonintubated patients is feasible and

associated with improved oxygenation.7-14 To date, there are no published randomized controlled trials that definitively demonstrate a mortality benefit of prone over supine positioning for awake and spontaneously breathing patients with COVID-19. The work by Wendt et al1 crosses boundaries between being a retrospective observational study and a report of a quality improvement (QI) project. Because of these blurred boundaries, the authors may have been well served to have used established reporting guidelines such as Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)19 or Standards for QUality Improvement Reporting Excellence (SQUIRE).20 These reporting guidelines would have ensured that the authors reported in a consistent manner and would have facilitated future comparisons among similar studies. Some studies describe a 1-hour period, repeated 5 times daily,14 whereas others used “as long as tolerated” durations, which resulted in a median duration of 75 minutes (range 30 minutes-480 minutes).13 Contraindications to proning from the literature include clinical or hemodynamic instability and recent thoracic or abdominal surgery.6 Patients with Do Not Resuscitate orders or advanced directives have been excluded from previous research studies on proning, and clinicians should apply proning as individualized comfort or palliative measures indicate for these patients.6 Be aware that cardiac arrests do occur in the prone position, they may be more difficult to detect,23 and they

The emergency nurses association: 50 years of advocacy and advancement: JEN. (2021). Journal of Emergency Nursing, 47(2), 224-238.e1. doi:https://doi.org/10.1016/j.jen.2020.11.007

To commemorate the 50th anniversary of the Emergency Nurses Association, this article describes the 3 most enduring and impactful policy initiatives in the organization’s history. These initiatives were identified through a comprehensive review of the articles published in the Journal of Emergency Nursing as well as in other publications of the Emergency Nurses Association, including position statements and press releases. The top 3 policy issues throughout the Emergency Nurses Association’s history were identified as provision of care for vulnerable populations, trauma and injury prevention, and patient quality and safety. The Emergency Nurses Association also worked hard to professionalize emergency nursing within the realms of nursing and emergency services during the first half of its history, and since then the Emergency Nurses Association has promoted issues related to the emergency nursing workforce and to ensuring a safe and sustainable environment in which nurses practice. This article includes critical constructs such as the professionalization of emergency nursing; advocating for vulnerable populations such as children, older adults, and people experiencing sexual violence or human trafficking; improvements in trauma care and injury prevention; promoting quality and safety through nursing certifications, efficient and accurate nurse triage, and disseminating best practices in evidence-based care; and supporting the nursing workforce by championing issues such as workplace violence, ED crowding, and healthy work environments.

Syncope in the emergency department: A guide for clinicians: JEN. (2021). Journal of Emergency Nursing, 47(2), 342-351. doi:https://doi.org/10.1016/j.jen.2020.11.002

Syncope is a common presenting symptom to emergency departments, but its evaluation and initial management can be challenging for ED practitioners and particularly urgent in the presence of high-risk features that increase the likelihood of cardiac etiology. Even after thorough clinical evaluation, syncope may remain unexplained. In such instances, practitioners’ clinical judgment and risk assessments are critical to guide further management. In this article, evidence-informed strategies are outlined to approach the diagnosis of syncope and provide an overview of syncope clinical decision rules and shared decision-making. By incorporating risk stratification and shared decision-making into syncope care, practitioners can more confidently engage patients and families in disposition decisions to organize appropriate outpatient and follow-up care, observation, or admission.

Board of directors: JEN. (2021). Journal of Emergency Nursing, 47(2) doi:https://doi.org/10.1016/S0099-1767(21)00020-9

Improving ED emergency severity index acuity assignment using machine learning and clinical natural language processing: JEN. (2021). Journal of Emergency Nursing, 47(2), 265-278.e7. doi:https://doi.org/10.1016/j.jen.2020.11.001

IntroductionTriage is critical to mitigating the effect of increased volume by determining patient acuity, need for resources, and establishing acuity-based patient prioritization. The purpose of this retrospective study was to determine whether historical EHR data can be used with clinical natural language processing and machine learning algorithms (KATE) to produce accurate ESI predictive models.MethodsThe KATE triage model was developed using 166,175 patient encounters from two participating hospitals. The model was tested against a random sample of encounters that were correctly assigned an acuity by study clinicians using the Emergency Severity Index (ESI) standard as a guide.ResultsAt the study sites, KATE predicted accurate ESI acuity assignments 75.7% of the time compared with nurses (59.8%) and the average of individual study clinicians (75.3%). KATE's accuracy was 26.9% higher than the average nurse accuracy (P <.001). On the boundary between ESI 2 and ESI 3 acuity assignments, which relates to the risk of decompensation, KATE's accuracy was 93.2% higher, with 80% accuracy compared with triage nurses 41.4% accuracy (P <.001).DiscussionKATE provides a triage acuity assignment more accurate than the triage nurses in this study sample. KATE operates independently of contextual factors, unaffected by the external pressures that can cause under triage and may mitigate biases that can negatively affect triage accuracy. Future research should focus on the impact of KATE providing feedback to triage nurses in real time, on mortality and morbidity, ED throughput, resource optimization, and nursing outcomes.

Time-to-treatment and its association with complications and mortality rate in patients with acute myocardial infarction: A prospective cohort study: JEN. (2021). Journal of Emergency Nursing, 47(2), 288-298.e4. doi:https://doi.org/10.1016/j.jen.2020.05.013

IntroductionTime-to-treatment is one of the most important factors affecting the complications and mortality rate in patients with acute myocardial infarction. The purpose of this study was to determine time-to-treatment and its association with complications and mortality rates in patients with acute myocardial infarction in selected hospitals in Zanjan, Iran.MethodsThis prospective cohort study was performed with 200 patients suffering from acute myocardial infarction in selected educational hospitals of Zanjan from June 2016 to March 2017. Parameters including the interval between pain onset and treatment, myocardial infarction complications, in-hospital mortality, and 30-day mortality after the occurrence of myocardial infarction were collected through a special questionnaire and phone calls. The data were analyzed using descriptive statistics and logistic regression models.ResultsThe longest time-to-treatment delay is related to prehospital time (mean, 330.68 SD=411.55] minutes). Based on the results, the increase in the interval time between onset of pain and treatment (odds ratio: 1.001; 95% confidence interval, 1.000–1.002; P = 0.01), hypertension (odds ratio: 2.96; 95% confidence interval, 1.14–7.68; P = 0.02), and left coronary artery complete occlusion (odds ratio: 2.78; 95% confidence interval, 1.57–4.94; P < 0.001) were mortality predictor factors. Furthermore, the increase in the interval time between onset of pain and treatment (odds ratio: 1.001; 95% confidence interval, 1.000–1.002; P = 0.03), current smoking (odds ratio: 5.53; 95% confidence interval, 1.75–17.43; P = 0.004), and right coronary artery complete occlusion (odds ratio: 5.87; 95% confidence interval, 1.34–25.82; P = 0.02) were highly associated with the occurrence of heart failure.DiscussionHypertension, smoking history, and delay in treatment time were highly associated with the occurrence of heart failure and mortality. Therefore, in Iranian society, education on primary and secondary prevention of myocardial infarction is recommended to reduce patient mortality.

Proning pains: Recognizing the red flags of body mechanics for health care workers involved in prone positioning techniques: JEN. (2021). Journal of Emergency Nursing, 47(2), 211-213. doi:https://doi.org/10.1016/j.jen.2021.01.001

The practice of placing a patient with COVID-19–associated ARDS in the prone position has become part of the routine treatment because this position allows for greater expansion of the posterior portion of the lungs, resulting in more efficient removal of pulmonary secretions and, ultimately, improved oxygenation of the patient.1,2 From a health care clinician's standpoint, however, this positioning technique can be quite labor-intensive because several health care clinicians and direct care aides are required to safely transition the patient from a supine position to a prone position, all the while maintaining hemodynamic and oxygenation stability.3 Even more concerning is the recognition that placing a patient in the prone position greatly increases the health care worker's risk for musculoskeletal low back injury4 (Figure), resulting in negative consequences for the injured worker, the staffing

needs of the organization, and the overall health care pandemic response. With the bed or gurney raised to working hip height (recognized as a consensus among health care workers of approximately the same height)6 to midthigh as discussed later in the article, at least 2 team members are needed to reach across the patient to the opposite side; this movement places the nurse in a position of extension for the lumbar spine,5,7,8 which is the first red flag for musculoskeletal injury. Typically, health care workers generate this force from the muscles of the lower back or from the arms and shoulders.10 Although the force exerted for smaller-statured patients may not pose a significant risk for injury among multiple health care workers, an increased force is required if the number of staff members is reduced or the patient is larger in mass.4 From here, the patient's body weight is held and supported by the team members, while another team member places a draw sheet or lifting straps.

Response to chmielewski letter: JEN. (2021). Journal of Emergency Nursing, 47(2), 222-223. doi:https://doi.org/10.1016/j.jen.2020.12.002

The greeter nurse also handles incoming phone calls from clinics or private offices wanting to move individuals who need a higher level of care to the emergency department, thereby reducing the burden on the charge nurse in the emergency department and enabling them to focus on ambulance traffic and overall clinical care. Having a registered nurse in the role of a greeter nurse act as the first contact of any patient presenting to the emergency department improves patient safety and serves as a structured risk mitigation strategy for the registration staff. ...]the coronavirus disease pandemic further reinforces the critical importance of rapidly identifying and isolating patients with potential highly hazardous communicable diseases to mitigate hospital-based exposure events.—Michelle M. Schwedhelm, MSN, RN, Executive Director, Emergency Management & Clinical Operations, Co-Executive Director, Global Center for Health Security, Nebraska Medicine, Omaha, NE; Jocelyn J. Herstein, PhD, MPH, Research Assistant Professor, Global Center for Health Security, Department of Environmental, Agricultural, and Occupational Health, College of Public Health, University of Nebraska Medical Center, Omaha, NE, E-mail: jocelyn.herstein@unmc.edu; Suzanne M. Watson, RN, Nurse Manager, Emergency Services, Nebraska Medicine, Omaha, NE; Amy L. Mead, RN, Associate Nurse Manager, Emergency Services, Nebraska Medicine, Omaha, NE; Leo Maddalena, MS, Applications Sr Analyst, Enterprise Clinic, Nebraska Medicine, Omaha, NE; Devon D. Liston, MPH, Applications Sr Analyst, Enterprise Clinic, Nebraska Medicine, Omaha, NE; and Angela L. Hewlett, MD, Associate Professor, Internal Medicine Infectious Diseases, University of Nebraska Medical Center, and Medical Director, Nebraska Biocontainment Unit, Nebraska Medicine, Omaha, NE.

CE earn up to 10.5 contact hours: JEN. (2021). Journal of Emergency Nursing, 47(2), 359. doi:https://doi.org/10.1016/S0099-1767(21)00037-4

Emergency care EMTALA alterations during the COVID-19 pandemic in the united states: JEN. (2021). Journal of Emergency Nursing, 47(2), 321-325. doi:https://doi.org/10.1016/j.jen.2020.11.009

The coronavirus 2019 pandemic has affected almost every aspect of health care delivery in the United States, and the emergency medicine system has been hit particularly hard while dealing with this public health crisis. In an unprecedented time in our history, medical systems and clinicians have been asked to be creative, flexible, and innovative, all while continuing to uphold the important standards in the US health care system. To continue providing quality services to patients during this extraordinary time, care providers, organizations, administrators, and insurers have needed to alter longstanding models and procedures to respond to the dynamics of a pandemic. The Emergency Medicine Treatment and Active Labor Act of 1986, or EMTALA, is 1 example of where these alterations have allowed health care facilities and clinicians to continue their work of caring for patients while protecting both the patients and the clinicians themselves from infectious exposures at the same time.

Factors affecting attitudes toward defibrillator use among clinical nurses in south korea: A cross-sectional study: JEN. (2021). Journal of Emergency Nursing, 47(2), 305-312. doi:https://doi.org/10.1016/j.jen.2020.07.001

IntroductionNurses are often first responders to in-hospital cardiac arrests. However, many nurses do not perform defibrillation even when required. Nurses' attitudes toward defibrillator use are influenced by social and psychological context. This descriptive, cross-sectional study explored factors affecting attitudes toward defibrillator

use among nurses in South Korea.MethodsA total of 280 nurses with a minimum of 6 months' clinical experience were included. The data were acquired through a self-administered questionnaire. Regression analysis was used to determine factors significantly associated with attitudes toward defibrillator use.ResultsOnly 13.6% of the participating nurses had experience with defibrillator use in a cardiopulmonary resuscitation situation, whereas 94.6% of the nurses had received training on defibrillator use. Attitudes toward defibrillator use accounted for 37% of variance in measures of self-confidence, image, and job fit.DiscussionTo improve clinical nurses' attitudes toward defibrillator use, improving their self-confidence, image, and job fit through ongoing assessment and retraining on defibrillation is required. In addition, relevant institutional support and systematic guidelines should be provided.

Providing a safe haven: Staff response to a simulated infant relinquishment in the emergency department: JEN. (2021). Journal of Emergency Nursing, 47(2), 352-358.e2. doi:https://doi.org/10.1016/j.jen.2020.12.005

Every state in the United States has established laws that allow an unharmed newborn to be relinquished to personnel in a safe haven, such as hospital emergency departments, without legal penalty to the parents. These Safe Haven, Baby Moses, or Safe Surrender laws are in place so that mothers in crisis can safely and legally relinquish their babies at a designated location where they can be protected and given medical care until a permanent home can be found. It is important for health care professionals to know about and understand their state's law and how to respond should an infant be surrendered at their facility. No articles were found in the peer-reviewed literature that describe a method to evaluate nurse competency during infant relinquishment at a Safe Haven location. This article will describe commonalities and differences among these Safe Haven Laws, responsibilities of the hospital and staff receiving a relinquished infant, and 1 hospital's experience when running an infant relinquishment drill in their emergency department.

Commentary on "Syncope in the emergency department: A guide for clinicians": JEN. (2021). Journal of Emergency Nursing, 47(2), 208-210. doi:https://doi.org/10.1016/j.jen.2020.12.012

Many of the clinical decision rules do not incorporate the historical features of the event itself; rather, they reveal the underlying clinical conditions of the patients, such as heart failure.2 The adult and pediatric literature diverge in this regard, highlighting that the malignant causes of syncope differ across age ranges.3 The authors correctly identify the difficulty generalizing 1 approach to syncope. Probst et al performed a robust prospective, multicenter trial evaluating older adults presenting to the emergency department with syncope looking at 30-day all-cause mortality or serious cardiac outcomes.15 They derived the FAINT score including the following: history of heart failure, history of cardiac arrythmias, initial abnormal ECG, elevated pro–B-type natriuretic peptide, and elevated high-sensitivity troponin. Many ED observation pathways focus on the patient with syncope; however, even if admitted to the hospital, another event would be unlikely in the next 24 to 72 hours.17 Admission to the hospital, which is sometimes used as the final protective action for the emergency provider in the case of syncope, not only fails to prevent sudden death but is expensive and a waste of resources.18 Is the answer shared decision-making instead of clinical decision rules?

Use of the donabedian model as a framework for COVID-19 response at a hospital in suburban westchester county, new york: A facility-level case report: JEN. (2021). Journal of Emergency Nursing, 47(2), 239-255. doi:https://doi.org/10.1016/j.jen.2020.10.008

The purpose of this facility-level case report was to describe our facility's leadership process of applying the Donabedian model to structure an early response to the coronavirus disease pandemic relative to emergency care. Using the Donabedian model as a guide, both structure and process changes were implemented to maintain high-quality clinical outcomes as well as ED staff safety and engagement. Rapid changes to the model of care, both architecturally and through the expansion of universal precautions through personal protective equipment, created the foundation for what was to follow. Clinical, service quality, and staff safety outcomes were evaluated to demonstrate that the collaborative changes that follow a known process improvement model can be used to address the coronavirus disease pandemic. Further study is needed to compare the outcomes of this facility-level case study with those of others to evaluate the success of the measures outlined.

Information for readers: JEN. (2021). Journal of Emergency Nursing, 47(1) doi:https://doi.org/10.1016/S0099-1767(20)30392-5

Job stress among emergency nurses: JEN. (2021). Journal of Emergency Nursing, 47(1), 19-20. doi:https://doi.org/10.1016/j.jen.2020.07.014

Understanding ED buprenorphine initiation for opioid use disorder: A guide for emergency nurses: JEN. (2021). Journal of Emergency Nursing, 47(1), 139-154. doi:https://doi.org/10.1016/j.jen.2020.10.001

Opioid use disorder is a critical public health problem that continues to broaden in scope, adversely affecting millions of people worldwide. Significant efforts have been made to expand access to medication therapy for opioid use disorder, in particular buprenorphine. As the emergency department is a critical point of access for many patients with opioid use disorder, the initiation of buprenorphine therapy in the emergency department is increasing, and emergency nurses should be familiar with the care of these vulnerable patients. The purpose of this article is to provide a clinical review of opioid use disorder and opioid withdrawal syndrome, medication treatments for opioid use disorder, best clinical practices for ED-initiated buprenorphine therapy, assessment of withdrawal symptoms, discharge considerations, and concerns for special populations. With expanded understanding of opioid use disorder, withdrawal, and available treatments, emergency nurses will be better prepared to deliver and support life-saving treatments for patients and families suffering from this disease. In addition, emergency nurses are well positioned to play an important role in public health advocacy around opioid use disorder, providing critical support for destigmatization and expanded access to safe and efficacious treatments.

Emergency nursing review questions: January 2021: JEN. (2021). Journal of Emergency Nursing, 47(1), 155-156. doi:https://doi.org/10.1016/j.jen.2020.08.008

A.History of recent viral infection B.Eating green beans canned at home C.Recently visiting a zoo D.Camping in a tick-infested area 3. A patient with chronic heart failure presents to the emergency department with acute dehydration and hypokalemia after an increase in their dose of furosemide. Recent viral infection (A), visiting a zoo (C), and exposure to ticks (D) are not associated with the symmetrical descending paralysis seen in botulism.3 3.

Assessment of interrater reliability of the emergency severity index after implementation in emergency departments in jamaica using a learning collaborative approach: JEN. (2021). Journal of Emergency Nursing, 47(1), 58-65. doi:https://doi.org/10.1016/j.jen.2020.07.003

IntroductionIn 2016, the Ministry of Health in Jamaica selected the Emergency Severity Index as the triage tool to be used nationally. This study evaluated the effectiveness of this approach by assessing the interrater reliability among new users trained with minimal resources by 2 experienced trainers, 1 local and 1 international.MethodsA retrospective case series review was conducted within an online learning collaborative framework. After completion of the training, the participants from each of the 19 clinical sites were asked to submit 2 triage cases per month for blinded review by the expert trainers. The triage categories assigned by each reviewer were compared with those assigned by the newly trained Emergency Severity Index providers. A weighted kappa value was calculated to assess the degree of agreement between the sites and the expert trainers.ResultsA total of 166 cases were received over the study period. Participation in the learning collaborative was consistently below 50%. The interrater reliability between the expert trainers ($\kappa = 0.48$) as well as between each scorer and each accident and emergency department site ($\kappa SF = 0.33$, $\kappa PT = 0.26$) was low, although there was improvement over the study period. Incomplete triage documentation limited raters' ability to assign triage categories and assess interrater reliability.DiscussionDespite a rigorous implementation process, the interrater reliability of the Emergency Severity Index skills of Jamaican emergency nurses and doctors when compared with that of the 2 experts was poor. Several areas were identified for strengthening. Considerations for the implementation of the Emergency Severity Index in countries outside of the US were also discussed.

Initial testing of a web-based intervention to reduce adolescent driver inattention: A randomized controlled trial: JEN. (2021). Journal of Emergency Nursing, 47(1), 88-100.e3. doi:https://doi.org/10.1016/j.jen.2020.07.012

IntroductionMotor vehicle crashes are the leading cause of adolescent death. Inattention to the roadway contributes to crash risk. The objective of this study was to deploy an initial study of a web-based intervention (Let's Choose Ourselves) designed to improve adolescent driver attention to the roadway.MethodsWe used a randomized controlled trial design in a sample of adolescent drivers to test if a web-based intervention decreased cell phone engagement in driving simulation at 3 months as compared with controls. As secondary hypotheses, we tested if the intervention increased the use of peer passengers to manage distractions and decreased eyes off the forward roadway in driving simulation and decreased self-reported risky driving behaviors. Adolescents, aged 16-17 years, licensed for ≤90 days were randomized to Let's Choose Ourselves with distractions in the simulator protocol at baseline, Let's Choose Ourselves with no distractions, an attention control intervention on healthy eating with distractions, or attention control with no distractions. We used Poisson regression modeling to test the primary and secondary hypotheses.ResultsThe trial included 60 adolescents (66.7% female, 78.3% non-Hispanic white subjects, mean age 16.8 years, licensed 50.8 days). In Poisson regression, controlling for sex, we found no significant effects of Let's Choose Ourselves on primary or secondary outcomes. However, there was a significant effect of visit on self-report outcomes, with self-reported distracted driving behaviors increasing over time.DiscussionAlthough there were no significant effects of Let's Choose Ourselves, self-reported risky driving behaviors increased over time. Further investigation of the relationship between driving experience and increasing inattention to the road in adolescents is warranted.

CE earn up to 10.5 contact hours: JEN. (2021). Journal of Emergency Nursing, 47(1), 206. doi:https://doi.org/10.1016/S0099-1767(20)30413-X

Cost savings of frequent, concise skills competency training in the emergency department: JEN. (2021). Journal of Emergency Nursing, 47(1), 181-185. doi:https://doi.org/10.1016/j.jen.2020.07.013

Database copyright © 2023 ProQuest LLC. All rights reserved.

Terms and Conditions Contact ProQuest