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Information processing by community health nurses using mobile health (mHealth) tools for early identification of suicide and depression risks in Fiji Islands

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ABSTRACT

Objectives High rates of depression and suicide and a lack of trained psychiatrists have emerged as significant concerns in the low-income and middle-income countries (LMICs) such as the Pacific Island Countries (PICs). Readily available smartphones were leveraged with community health nurses (CHNs) in task-sharing for early identification of suicide and depression risks in Fiji Islands, the largest of PICs. This investigation examines how CHNs can efficiently and effectively process patient information about depression and suicide risk for making diagnostic and management decisions without compromising safety. The research is driven by the theoretical framework of text comprehension (knowledge representation and interpretation) and decision-making.

Methods Mobile health (mHealth) Application for Suicide Risk and Depression Assessment (ASRaDA) was designed to include culturally useful clinical guidelines for these disorders. A representative sample of 48 CHNs was recruited and presented with two clinical cases (depression and suicide) in a simulated setting under three conditions: No support, paper-based and mobile-based culturally valid guideline support. Data were collected as the nurses read through the scenarios, 'thinking aloud', before summarising, diagnoses and follow-up recommendations. Transcribed audiotapes were analysed using formal qualitative discourse analysis methods for diagnostic accuracy, comprehension of clinical problems and reasoning patterns.

Results Using guidelines on ASRaDA, the CHNs took less time to process patient information with more accurate diagnostic and therapeutic decisions for depression and suicide risk than with paper-based or no guideline conditions. A change in reasoning pattern for nurses' information processing was observed with decision support.

Discussion
Although these results are shown in a mental health setting in Fiji, there are reasons to believe they are generalisable beyond mental health and other lower-to-middle income countries.

Conclusions Culturally appropriate clinical guidelines on mHealth supports efficient information processing for quick and accurate decisions and a positive shift in reasoning behaviour by the nurses. However, translating complex qualitative patient information into quantitative scores could generate conceptual errors. These results are valid in simulated conditions.

Summary

What is already known?

- Smart mobile phones have supported healthcare applications by health care providers in lower to middle-income countries.
- The use of smart mobile phones can support automated calculations to reduce the total number of errors.
- Although there have been experiments in mental health settings, their impact has not been rigorously evaluated.

What does this paper add?

- The information processing involves filtering irrelevant information from the relevant, contributing to a lower cognitive load on the providers, thereby making the process efficient.
- Safety may be compromised at the expense of efficiency due to conceptual errors even though the total number of errors is reduced.
- The use of culturally appropriate guideline support on mobile phones can result in positive behavior change.
- Although these results are shown in mental health settings, there are reasons to believe they are generalised beyond mental health.

INTRODUCTION

Mental health (MH) disorders are globally recognised as a significant public health concern yet receive inadequate attention, and more than 80% of people experiencing mental illness live in low-income and middle-income countries (LMICs.[1]

Pacific Island Countries (PICs) are classified as LMIC, where in recent years, depression and suicide have been reported to have reached an alarming level.[2] With fewer than 20 qualified psychiatrists serving more than 11 million people, this situation is only likely to worsen with pandemic and post-pandemic-related conditions. The PICs alone account for 25% of the global burden of disease: Death by suicide comprises approximately 25% of the total disease burden,[3] and depressive disorders approximately 5.7%.[1]

To increase coverage and access to evidence-based mental healthcare, community health nurses (CHNs), the front-line healthcare workers, assume a significant role in the early identification of depression and suicide risk in a collaborative care approach called 'task sharing'. Despite the relative success of task-sharing initiatives globally, there is a lack of consistency in the quality of MH care, where individuals who have severe mental illness are not appropriately diagnosed and treated by community health workers.[4 5] In the community clinics in the PICs, outpatients come with different ailments, and the CHNs are challenged to identify the ones with mental health risks. This task generates a high cognitive load on these nurses, necessitating a need to leverage cheap and easily available technology, as support to offload some of the burden.

Given the widespread accessibility to smartphones in Fiji, it is appropriate to use them to support CHNs in MH care delivery by developing mobile-based screening applications to quickly screen and provide care to patients at risk. However, while mobile technology intervention have great potential to help address current problems, little is known about its added value to provide efficient, effective and safe care in the PICs.

The optimal design of mobile health (mHealth) interventions requires an understanding of the cognitive underpinnings of the use of any technological devices since the interventions are most often ad hoc and lack a sound empirical basis for investigations.[6] The use of mHealth has been successfully undertaken to support nurses in providing bedside documentation and to assist in their usual workflow.[7 8] Although, smartphones and related mobile technologies are recognised as flexible and powerful tools when used sensibly in augmenting human cognition, there is also a growing concern that continued use of these devices, may have a negative impact on users' cognition, namely, their ability to think and pay attention to specific tasks.[9]

Therefore, our studies are driven by theories and methods from cognitive science related with special focus on text comprehension (knowledge representation and interpretation) and patient management decisions within the cultural context.[10 11] The cultural context refers to the social behaviour and norms practiced in the Fiji culture, including the peoples' knowledge, beliefs, language and customs. It is the way they think, understand and communicate, which is important to consider for building any successful interventional tools.

Qualitative–cognitive studies involves collecting and analysing data from a fewer number of representative participants, with a focus on their knowledge structures and use of cognitive strategies in processing patient information.[12 13] Cognitive strategies are the specific methods that people use while solving problems. This process of eliciting underlying thoughts while reading or solving a problem requires a well-established procedure in psychological literature of collecting lengthy 'think-aloud' protocols from the nurses, as they interpret, identify and resolve the patient problem.[14]

This 'think-aloud' method is used extensively in psychological and educational research and offers unique approach to capture participant thought processes when interacting with technology and interventions.[15 16]

METHODOLOGY

Rationale

We are using smaller sample sizes of participants with in-depth analysis in our studies rather than a large-scale epidemiological study, limiting our ability to run statistical analyses on the data. We aim to develop a basic understanding of a complex phenomenon under consideration before testing generalisable inferences from this data. It should be noted that in any complex clinical situation filled with idiosyncrasies, varied situations and unique constraints, there are a remarkable number of invariants on which we can capitalise once we identify the overbidding phenomenon that is task and people invariant. Although our sample size is small, we attempt to get data saturation with qualitative methods.[17]

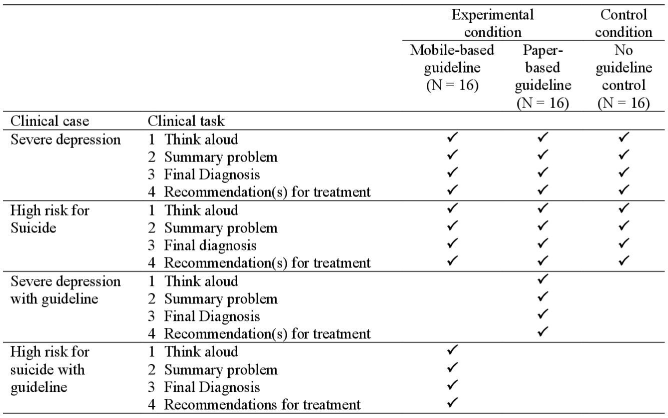
To characterise cognitive strategies underlying diagnosis for depression and suicide by CHNs under three conditions: no guidelines (current practices) as the baseline and two guidelines, paper and mHealth tools. Representation of patient information is different in the three conditions, and thus the information will be interpreted differently.[18] The patient data in the paper-based support tool is in a narrative form. The data in the mobile phone is discrete, requiring a shorter time to process information and require different nature of inferences to be drawn for making diagnostic decisions.

We expect that the nurses using mHealth will (a) process clinical information in a shorter time and (b) generate fewer errors in the calculation for more accurate diagnostic and therapeutic decisions.

Study design and procedures

Using an experimental design, CHNs were assigned to one of three conditions, nurses using to guidelines on mobile phones, on paper, and the last group were given no guideline support (control, reflecting the current status).

In all conditions, CHNs were presented with two clinical case scenarios, one representing severe depression and the other representing a high risk for suicide (described in materials and measures below). The CHNs



		Experimental condition		Control condition
		Mobile-based guideline (N = 16)	Paper-based guideline (N = 16)	No guideline control (N = 16)
Clinical case	Clinical task			
Severe depression	1 Think aloud	✓	✓	✓
	2 Summary problem	✓	✓	✓
	3 Final Diagnosis	✓	✓	✓
	4 Recommendation(s) for treatment	✓	✓	✓
High risk for Suicide	1 Think aloud	✓	✓	✓
	2 Summary problem	✓	✓	✓
	3 Final diagnosis	✓	✓	✓
	4 Recommendation(s) for treatment	✓	✓	✓
Severe depression with guideline	1 Think aloud		✓	
	2 Summary problem		✓	
	3 Final Diagnosis		✓	
	4 Recommendation(s) for treatment		✓	
High risk for suicide with guideline	1 Think aloud	✓		
	2 Summary problem	✓		
	3 Final Diagnosis	✓		
	4 Recommendations for treatment	✓		

Figure 1 Study design and procedures for severe depression and suicide risks.

in the control condition were tasked with four clinical problem-solving activities: (1) Think aloud while reading through each case (referred to as the 'think-aloud' task), (2) summarise each case (referred to as the 'summary problem' task), (3) provide a final diagnosis (referred to as 'final diagnosis' task) and (4) provide recommendation(s) for treatment (referred to as 'recommendation(s) for treatment' task).

After completion of all four activities, only the CHNs in the two experimental conditions were given guidelines and asked to engage in the same four activities mentioned above using the respective guideline, as illustrated in figure 1. All nurses were required to read the clinical problem scenarios without any support from the mobile or paper-based guideline to get the base line data, before they were asked to use either mobile or paper-based technology.

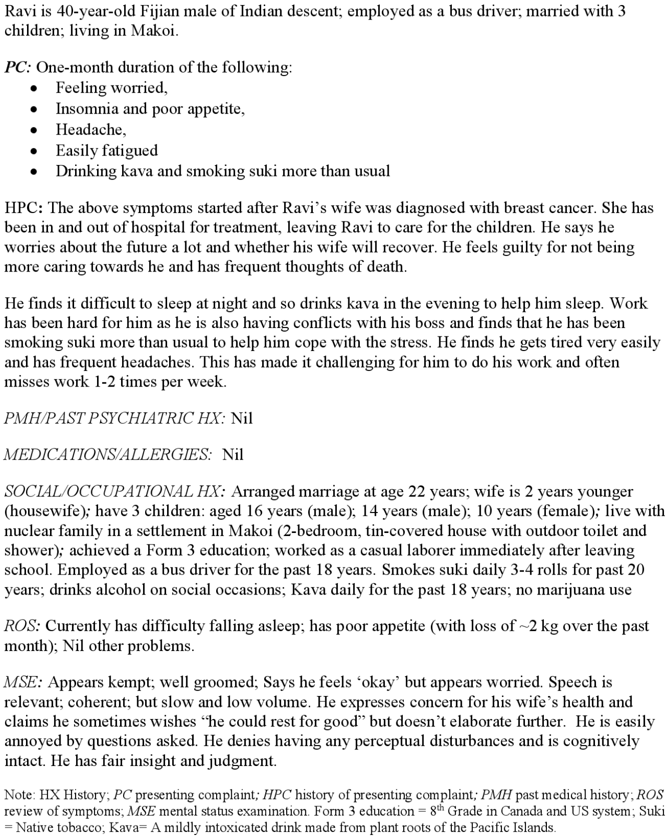
Materials and measures

Clinical cases

Two clinical scenarios used in the study reflecting severe depression and suicide risk were developed by psychiatrists and primary care physicians based on what would be expected in real community clinics in Fiji. As an illustrated example, the case of severe depression is presented in figure 2.

Clinical guidelines

Pre-existing paper-based guidelines—the 'Center for Epidemiological Studies Depression Scale' (CES-D).[19] for depression, and the 'Suicide Behaviors Questionnaire-Revised' (SBQ-R)[20] for suicide—were selected for the study. CES-D is a screening tool for depression developed by the CES and validated across various populations including Fiji.[21 22] The guidelines are given in online supplemental appendices A and B. The questions (20-item for depression and four items for suicide risk) were converted for use by nurses (from self-evaluation) evaluated for cultural sensitivity and contextual appropriateness with the support of local clinicians, and updated via an iterative design process.



Ravi is 40-year-old Fijian male of Indian descent; employed as a bus driver; married with 3 children; living in Makoi.

PC: One-month duration of the following:

- Feeling worried,
- Insomnia and poor appetite,
- Headache,
- Easily fatigued
- Drinking kava and smoking suki more than usual

HPC**:** The above symptoms started after Ravi's wife was diagnosed with breast cancer. She has been in and out of hospital for treatment, leaving Ravi to care for the children. He says he worries about the future a lot and whether his wife will recover. He feels guilty for not being more caring towards he and has frequent thoughts of death.

He finds it difficult to sleep at night and so drinks kava in the evening to help him sleep. Work has been hard for him as he is also having conflicts with his boss and finds that he has been smoking suki more than usual to help him cope with the stress. He finds he gets tired very easily and has frequent headaches. This has made it challenging for him to do his work and often misses work 1-2 times per week.

PMH/PAST PSYCHIATRIC HX: Nil

MEDICATIONS/ALLERGIES: Nil

SOCIAL/OCCUPATIONAL HX: Arranged marriage at age 22 years; wife is 2 years younger (housewife)*;* have 3 children: aged 16 years (male); 14 years (male); 10 years (female)*;* live with nuclear family in a settlement in Makoi (2-bedroom, tin-covered house with outdoor toilet and shower)*;* achieved a Form 3 education; worked as a casual laborer immediately after leaving school. Employed as a bus driver for the past 18 years. Smokes suki daily 3-4 rolls for past 20 years; drinks alcohol on social occasions; Kava daily for the past 18 years; no marijuana use

ROS: Currently has difficulty falling asleep; has poor appetite (with loss of ~2 kg over the past month); Nil other problems.

MSE: Appears kempt; well groomed; Says he feels 'okay' but appears worried. Speech is relevant; coherent; but slow and low volume. He expresses concern for his wife's health and claims he sometimes wishes "he could rest for good" but doesn't elaborate further. He is easily annoyed by questions asked. He denies having any perceptual disturbances and is cognitively intact. He has fair insight and judgment.

Note: HX History; *PC* presenting complaint*; HPC* history of presenting complaint*; PMH* past medical history; *ROS* review of symptoms; *MSE* mental status examination. Form 3 education = 8th Grade in Canada and US system; Suki = Native tobacco; Kava= A mildly intoxicated drink made from plant roots of the Pacific Islands.

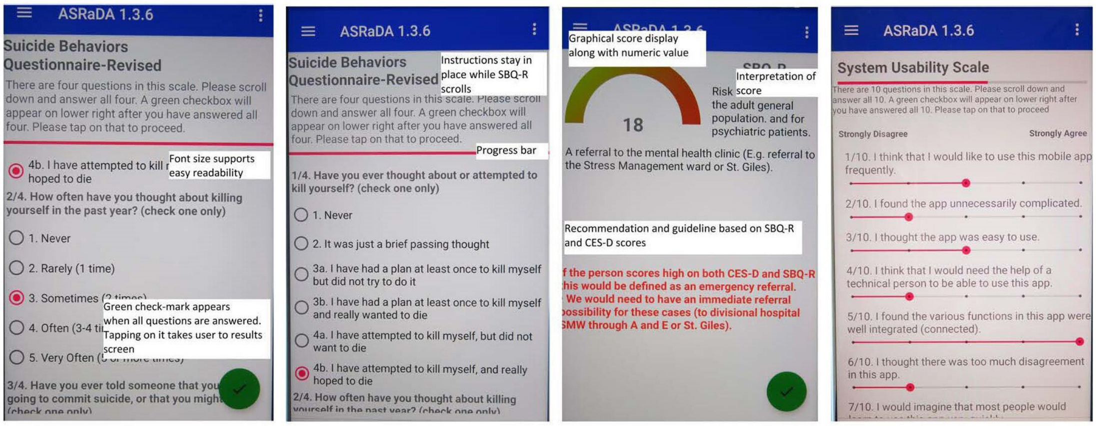
Figure 2 Clinical case of severe depression in the Pacific Islands.

These guidelines were programmed into a mobile-phone application, *Application for Suicide Risk and Depression Assessment* (ASRaDA), and updated using a number of iterations with usability evaluation provided by CHNs. The left hand side of figure 3 shows the suicide guideline screen in the mobile phone, together with a nurse's response.

The nurses read the questionnaire items aloud to a member of the research team who acted as the patient, and who provided a standard scripted response (typical of responses in Fiji) to the nurses. For example, the patient would respond to an item #5, 'How often have you had trouble keeping your mind on what you were doing?' with, 'It has been really difficult to do my work or my usual chores'. This narrative response had to be translated into a quantitative number on a symptom frequency scale, from zero (rarely or none of the time; less than 1 day) to three (most or all of the time; 5–7 days). Total scores were added manually in the paper-based condition, but they were automatically calculated in the mobile condition.

Determining the criticality of guideline information

Two experts scored information in each of the two clinical cases as critical, important or additional supporting information for making the diagnoses. These items were then checked against the guideline items for alignment with the clinical aspects of the patient problem to capture



ASRaDA 1.3.6

Suicide Behaviors Questionnaire-Revised

There are four questions in this scale. Please scroll down and answer all four. A green checkbox will appear on lower right after you have answered all four. Please tap on that to proceed.

● 4b. I have attempted to kill r hoped to die

Font size supports easy readability

2/4. How often have you thought about killing yourself in the past year? (check one only)

○ 1. Never

○ 2. Rarely (1 time)

● 3. Sometimes

○ 4. Often (3-4 ti

○ 5. Very Often (

Green check-mark appears when all questions are answered. Tapping on it takes user to results screen

3/4. Have you ever told someone that you going to commit suicide, or that you migh

ASRaDA 1.3.6

Suicide Behaviors Questionnaire-Revised

Instructions stay in place while SBQ-R scrolls

There are four questions in this scale. Please scroll down and answer all four. A green checkbox will appear on lower right after you have answered all four. Please tap on that to proceed.

Progress bar

1/4. Have you ever thought about or attempted to kill yourself? (check one only)

○ 1. Never

○ 2. It was just a brief passing thought

○ 3a. I have had a plan at least once to kill myself but did not try to do it

○ 3b. I have had a plan at least once to kill myself and really wanted to die

○ 4a. I have attempted to kill myself, but did not want to die

● 4b. I have attempted to kill myself, and really hoped to die

2/4. How often have you thought about killing

Graphical score display along with numeric value

18

Interpretation of Risk score

the adult general population. and for psychiatric patients.

A referral to the mental health clinic (E.g. referral to the Stress Management ward or St. Giles).

Recommendation and guideline based on SBQ-R and CES-D scores

f the person scores high on both CES-D and SBQ-R his would be defined as an emergency referral. We would need to have an immediate referral possibility for these cases (to divisional hospital SMW through A and E or St. Giles).

ASRaDA 1.3.6

System Usability Scale

There are 10 questions in this scale. Please scroll down and answer all 10. A green checkbox will appear on lower right after you have answered all 10. Please tap on that to proceed

Strongly Disagree

Strongly Agree

1/10. I think that I would like to use this mobile app frequently.

2/10. I found the app unnecessarily complicated.

3/10. I thought the app was easy to use.

4/10. I think that I would need the help of a technical person to be able to use this app.

5/10. I found the various functions in this app were well integrated (connected).

6/10. I thought there was too much disagreement in this app.

7/10. I would imagine that most people would

Figure 3 SBQ-R Screen in ASRaDA showing guideline questionnaire and nurse's response, and System Usability Scale.

the appropriate constructs, as intended. The criticality of guideline information is given in figure 4.

Mobile technology and development

The application development system, invented initially at NASA Johnson Space Center that enabled the development of media-rich training and clinical practice guideline applications without programming,[22 23] was used to design and test a mobile phone based clinical guidance in rural health providers in India and in Colombia.[18 24 25] In our current study, we leveraged concepts and experiences from this tested system to develop the suicide risk and depression assessment mHealth tool (ASRaDA) on an Android smartphone application, and loaded on Samsung J3 smartphones. Several versions of ASRaDA were tested in a controlled setting with a small cohort of CHNs, and refined iteratively into a final version, including responding to the 10-item System Usability Survey (SUS).[26 27]

CHNs logged with the patient's name into the application, displaying guideline selection (see online supplemental appendix C, for an example of the mobile ASRaDA application guideline). Each participant was given an identification number for privacy, where the mapping to the actual name was encrypted for security.

	Symptom	Question Numbers	Type
Severe depression risk	Sadness (Dysphoria)	2, 4, 6	Critical
	Loss of Interest Anhedonia)	8, 10	Critical
	Suicidal Ideation	14, 15	Critical
	Loss of Appetite	1, 18	Important
	Insomnia	5, 11, 19	Important
	Thinking/Concentration	3, 20	Important
	Guilt (Worthlessness)	9, 17	Important
	Tired (Fatigue)	7, 16	Additional
	Movement (Agitation)	12, 13	Additional
Suicide risk	Thought or attempt of committing suicide	1	Critical
	Past thought of committing suicide	2	Critical
	Confiding thought of committing suicide	3	Important
	Likelihood of committing suicide	4	Important

Figure 4 Expert classification of level of criticality of information in clinical text and corresponding guideline(s) for depression and suicide risks.

Participants

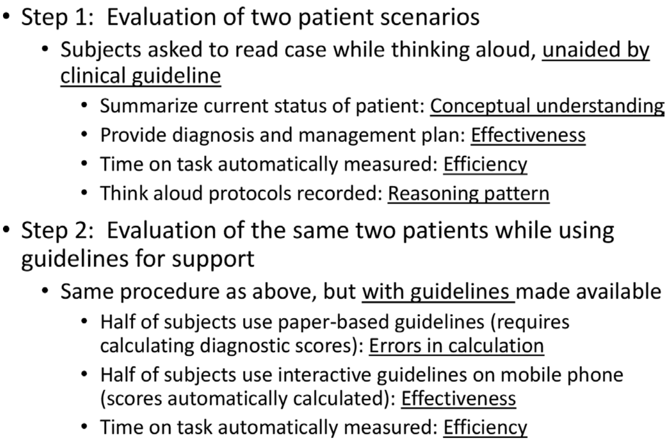
Forty-eight CHNs were recruited from an available pool of 5000 participants with the assistance of the Fiji Ministry of Health (MoH), according to the inclusion and exclusion criteria (race representation, relative fluency in English language, ages and years of experience). Since more women traditionally train as nurses, the possible recruitments were all women. The detailed eligibility criteria included: practicing or medically trained CHNs, who has satisfied requirements of Fiji's MoH, fluent in English (national language of Fiji), capable of using smartphone applications, between 25 and 55 years-old, and at least 5 years of nursing-related experience. Approximately 60% of the CHNs were local Fijians and 40% were Fijians of Indian origin, representing the per cent distribution of nurses in the community clinics. These percentages also align with statistics from prior research studies.[28 29]

Only women traditionally train as nurses in the Pacific Islands. Representing the Fiji demographics, the recruits were approximately 65% i-Taukei (natives of Fiji) and 35% of Indo–Fijian origin. These percentages align with statistics from prior research studies.[28 29] The community nurses had varied training and included nurses with general nursing (54%), mental health (23%) with WHO mhGAP[30] and other specialised training (79%) such as maternity or dermatology.

Methods of analysis

The data were collected and analysed using mixed methods approach that closely aligned with the tasks and the corresponding cognitive measures, as given in figure 5.

Audio recordings on the mobile phones were transcribed using 'Express Scribe Transcription Software' V.6.10 from NCH[31] automated software and checked for accuracy by the local experts. Using thematic qualitative approaches with inductive and deductive coding, as well as specific theme development,[32 33] the generated 'think-aloud' protocols were analysed. Initial emerging



- Step 1: Evaluation of two patient scenarios
  - Subjects asked to read case while thinking aloud, unaided by clinical guideline
    - Summarize current status of patient: Conceptual understanding
    - Provide diagnosis and management plan: Effectiveness
    - Time on task automatically measured: Efficiency
    - Think aloud protocols recorded: Reasoning pattern
- Step 2: Evaluation of the same two patients while using guidelines for support
  - Same procedure as above, but with guidelines made available
    - Half of subjects use paper-based guidelines (requires calculating diagnostic scores): Errors in calculation
    - Half of subjects use interactive guidelines on mobile phone (scores automatically calculated): Effectiveness
    - Time on task automatically measured: Efficiency

Figure 5 Mixed methods: tasks and measures.

themes were used to code the rest of the transcripts to create descriptions of all emerging themes that accurately reflected the data. Nurses' reasoning patterns were identified using method in previous research on guideline-assisted reasoning.[12 13] The response protocol segmentation processes identified both the concepts used by the nurses and the relations among these concepts in their reasoning. Semantic networks were then constructed, where concepts and their relations are organised into graphical structures that represent the steps in their reasoning. These semantic networks convey two types of information: conceptual information (ie, the concepts used to solve a problem) and structural information (ie, how the concepts are related to each other) about how the subjects constructed their diagnoses and recommendations

The diagnostic accuracy coding was adapted from Patel and Groen[34] and comprised three categories: Correct (ie, completely accurate), partially correct (ie, some accurate diagnostic components) or incorrect (ie, not accurate). These categories were evaluated as a function of the levels of nurses' MH training.

The summarisation protocols were analysed using formal methods of natural language representation, more specifically, concept and semantic analysis.[34] Next, the expert template for information criticality was used to code CHNs summary protocols. An illustrated example of the coding of these three summary narratives is given on figure 6.

An example of the first step in clinical text segmentation and coding of CHNs protocols for generated inferences using the depression scenario is given in online supplemental appendix D.

The times for task completion were automatically calculated on the smart phone recorders.

RESULTS

Time on task: task efficiency

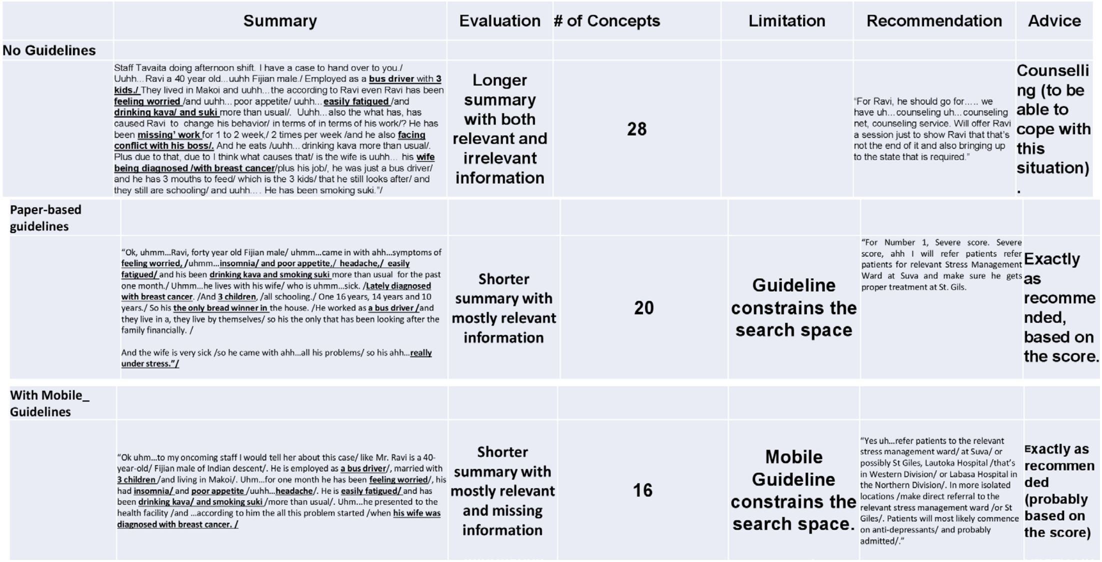
Task efficiency is the time required to complete the task. The benchmark was the time on task with no guideline support (mobile or paper).

Figure 7 depicts time for task completion with paper and mobile-based guidelines for depression and suicide risks scenarios.

The average times for completion of the depression and suicide risk problems were the shortest when using the mobile technology, followed by the paper-based and the no guideline support condition. The use of mHealth-based guidelines was most efficient in supporting quick identification of suicide and depression risk patients.

Time on task: process efficiency

Process efficiency is the processing of patient information for depression and suicide risks as identified by concept density and accuracy of patients description in the problem summaries provided by the nurses.



	Summary	Evaluation	# of Concepts	Limitation	Recommendation	Advice
No Guidelines						
	Staff Tavaita doing afternoon shift. I have a case to hand over to you./ Uuhh…Ravi a 40 year old…uuhh Fijian male./ Employed as a **bus driver** with **3 kids./** They lived in Makoi and uuhh…the according to Ravi even Ravi has been **feeling worried** /and uuhh… poor appetite/ uuhh… **easily fatigued** /and **drinking kava/ and suki** more than usual/. Uuhh…also the what has, has caused Ravi to change his behavior/ in terms of in terms of his work/? He has been **missing' work** for 1 to 2 week,/ 2 times per week /and he also **facing conflict with his boss/.** And he eats /uuhh… drinking kava more than usual/. Plus due to that, due to I think what causes that/ is the wife is uuhh… his **wife being diagnosed /with breast cancer**/plus his job/, he was just a bus driver/ and he has 3 mouths to feed/ which is the 3 kids/ that he still looks after/ and they still are schooling/ and uuhh…. He has been smoking suki."/	Longer summary with both relevant and irrelevant information	28		"For Ravi, he should go for….. we have uh…counseling uh…counseling net, counseling service. Will offer Ravi a session just to show Ravi that that's not the end of it and also bringing up to the state that is required."	Counselling (to be able to cope with this situation).
Paper-based guidelines						
	"Ok, uhmm…Ravi, forty year old Fijian male/ uhmm…came in with ahh…symptoms of **feeling worried, /**uhmm…**insomnia/ and poor appetite,/ headache,/ easily fatigued/** and his been **drinking kava and smoking suki** more than usual for the past one month./ Uhmm…he lives with his wife/ who is uhmm…sick. /**Lately diagnosed with breast cancer**. /And **3 children**, /all schooling./ One 16 years, 14 years and 10 years./ So his **the only bread winner in** the house. /He worked as **a bus driver /**and they live in a, they live by themselves/ so his the only that has been looking after the family financially. / And the wife is very sick /so he came with ahh…all his problems/ so his ahh…**really under stress."/**	Shorter summary with mostly relevant information	20	Guideline constrains the search space	"For Number 1, Severe score. Severe score, ahh I will refer patients refer patients for relevant Stress Management Ward at Suva and make sure he gets proper treatment at St. Gils.	Exactly as recommended, based on the score.
With Mobile_ Guidelines						
	"Ok uhm…to my oncoming staff I would tell her about this case/ like Mr. Ravi is a 40-year-old/ Fijian male of Indian descent/. He is employed as **a bus driver**/, married with **3 children** /and living in Makoi/. Uhm…for one month he has been **feeling worried**/, his had **insomnia/** and **poor appetite** /uuhh…**headache**/. He is **easily fatigued/** and has been **drinking kava/ and smoking suki** /more than usual/. Uhm…he presented to the health facility /and …according to him the all this problem started /when **his wife was diagnosed with breast cancer. /**	Shorter summary with mostly relevant and missing information	16	Mobile Guideline constrains the search space.	"Yes uh…refer patients to the relevant stress management ward/ at Suva/ or possibly St Giles, Lautoka Hospital /that's in Western Division/ or Labasa Hospital in the Northern Division/. In more isolated locations /make direct referral to the relevant stress management ward /or St Giles/. Patients will most likely commence on anti-depressants/ and probably admitted/."	Exactly as recommended (probably based on the score)

Figure 6 An example of analysis of summaries and recommendations as a function of guideline use by a community health nurses.

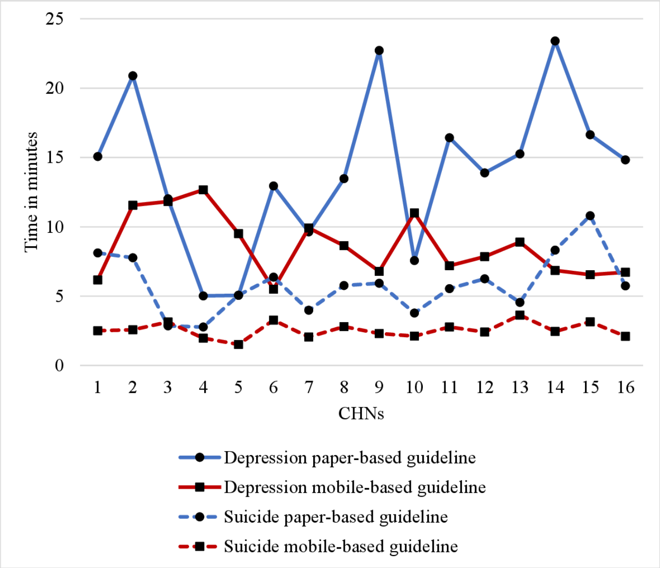


Figure 7 Time for task completion with paper and mobile based guidelines for depression and suicide risk. CHNs, community health nurses.

Summarisation tasks were analysed for knowledge organisation among the control and the experimental groups. There were fewer concepts identified in the summaries provided by CHNs in the guideline experimental conditions for depression (paper, M=6.44 (6.34); mobile, M=11.11 (3.52)) and suicide (paper, M=3.69 (7.04); mobile, M=3.10 (1.90)) problems than in the summaries under control condition (depression: M=15.94 (7.85) and suicide: M=12.69 (5.79)) for both depression and suicide risk cases (see figure 8). Most of the information in summaries with guideline support were important and critical only, whereas in the control condition, irrelevant information was also included.

Reasoning about the patient problems

Knowledge organisation drives the development of reasoning strategies for diagnoses. Thus, it is expected that the CHNs will show different reasoning patterns in the control and in both the experimental conditions. As reported earlier, the transcripts were analysed using a formal method of natural language analysis, the semantic networks.[13]

Figure 9A presents an illustrated example of a community nurse's think-aloud protocol (nurse #1 with MH training) in the control group, working with the depression case. The figure shows asemantic network structure, where nodes are patient information given in the clinical text. The links are the directionality of inferences generated during the think-aloud process.[18] She identified the key concepts associated with the scenario but attributed the financial crisis to the patient's 'bad' behaviour, which lead to depression, and she recommended that the problem may go away if the patient stopped spending money on drinking kava and smoking suki.

Figure 9B presents an illustrated example of a think-aloud protocol of another community nurse (nurse #2 with MH training) with an equal level of training in MH when primed by the depression guideline. The nurse first considered severe depression, a significant factor as a possible diagnosis, and looked for confirming evidence in the patient scenario. Drinking more kava and smoking suki was considered a result of depression rather than the cause. She recommended that Ravi seek professional help.

With the use of paper-based guidelines, a similar pattern was found. This shift in reasoning was identified in 35% and 30% of the nurses working with depression scenarios in mobile and paper-based support, respectively, showing a specific positive trend in behaviour change. These patients were recommended for illness management according to the guidelines, which otherwise would have been missed. The rest of the nurses either did not generate rich enough data to conduct the analysis of natural language (NLP), as with the rest of the data, or did not show any change in their reasoning patterns. The suicide risk scenario guideline was too short, resulting in sparse think-aloud data, and was not amenable to formal analysis for reasoning patterns.

Errors of calculation

Errors were found in manually adding the total number of scores with the paper-based guideline for depression (correct score: 36.55, CHNs: 30.00±2.6), and suicide risk (correct score:11.15, CHNs 12.15±1.3). In this particular situation, the errors did not affect the recommended treatment modalities since a wide range of the scores for each treatment modality resulted in the same treatment recommendations. However, in some other situations, where the score range relates for treatment recommendation is much smaller, these errors will be of concern. There were no calculation errors when using mobile-based guidelines since the system automatically made the calculations and suggested the appropriate recommendations based on the total scores.

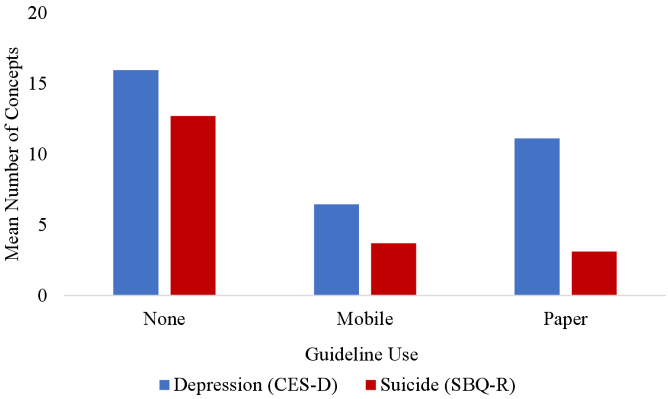


Figure 8 Mean number of concepts in summarization task using paper, mobile, and no guideline conditions. CES-D, Center for Epidemiological Studies Depression Scale; SBQ-R, Suicide Behaviors Questionnaire-Revised.

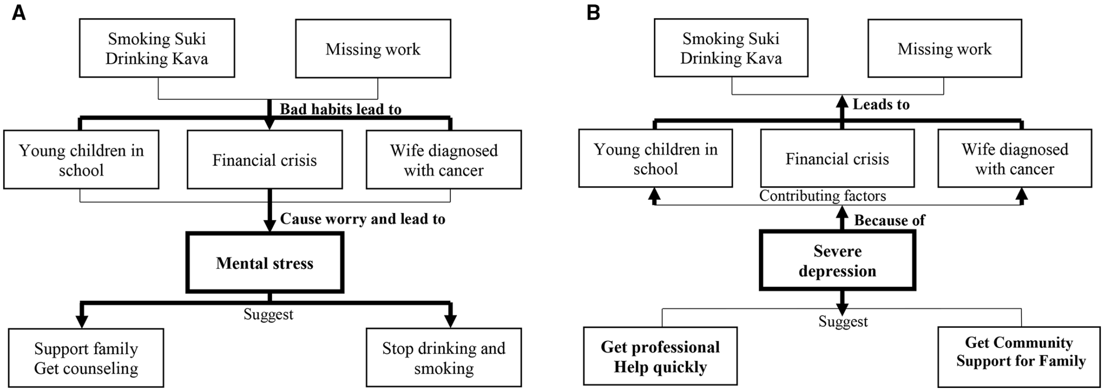


Figure 9 (A) Patient problem explanation prior to reading the mHealth guideline for depression. Key: rectangles represent concepts identified and the links represent connections between the concepts as inferred by the community health nurses. The arrows represent the directionality of reasoning. (B): patient problem explanation AFTER reading the mHealth depression guideline.

Diagnostic accuracy

Table 1 presents CHNs final diagnostic decision patterns after going through the patient problems.

In the case of severe depression, the majority of CHNs provided a partially correct final diagnosis. The four nurses, who provided the correct diagnosis, had recently received or were currently undergoing training in MH (WHO-based mhGAP programme.[30] However, two of these four nurses provided only partially correct recommendations for treatment. Five CHNs who provided incorrect diagnoses had not received MH training. Training in mental health programme appears to play an important role in diagnostic accuracy for identification of depression and suicide risk.

Errors of translation: From qualitative to quantitative information.

During our analysis, we discovered other form of errors when coding nurses' responses to the guideline questions (qualitative) into quantitative scales. These errors were generated during cognitive processing of patient information for translating them (interpreting) into paper and mobile-based quantitative scales to determine the treatment recommendations.

Not all the nurses provided detailed 'think-aloud' data when computing this translation. Six nurses (total: 9), using paper-based guidelines and five (total: 7) using mobile-based depression guidelines, generated three to four errors in translation. An illustrated example of two such errors is given in table 2.

Suicide risk guideline was too short to capture such errors. Limitations in data collection restricted our ability to provide a more comprehensive information on these errors, except that such errors are pervasive due to the complexity of patient responses, which do not fit neatly into a set of quantities.

Table 1 Final diagnosis provided by the community health nurses

		Clinical problems	
	Mental health (MH) Training level	**Severe depression N (%)**	**High risk for suicide N (%)**
Correct	MH training	4 (100)	0 (0)
	No MH training	0 (0)	0 (0)
	Total	**4 (8)**	**0 (0)**
Partially correct	MH training	8 (26)	12 (40)
	No MH training	22 (73)	18 (60)
	Total	**30 (63)**	**30 (63)**
Incorrect	MH training	3 (60)	0 (0)
	No MH training	2 (40)	7 (100)
	Total	**5 (13)**	**7 (15)**
Missing		9 (24)	11 (23)
Total		**48**	**48**

Usability

Sixteen nurses who used the ASRaDA application, 7 participants for CES-D and 14 for SBQ-R completed the questionnaire. From a maximum score of 100 on SUS usability scale, ASRaDA was scored at 85.36. The details of the usability study and its limitations are reported elsewhere.[29 35] The left hand side of figure 3 shows the suicide guideline screen on the mobile phone, together with a nurses' response to the usability test.

DISCUSSION

Clinical guideline acts as a primer to help focus on fewer and more critical/important information, filtering out most irrelevant information[34 36] It constrains a broad memory search, making it easier and quicker to get to the target, due to reduced memory load. The ability to separate relevant information from irrelevant information is recognised as a hallmark of developing expertise, where the guidelines provide such support.

The conceptual shift in reasoning assists the nurses to narrow the relevant information search space and, quickly arrive at the diagnosis.[37] This change in the directionality of reasoning suggests a critical behaviour change from blaming the patient to attributing the problem to the nature of the illness. This pattern of behaviour has also been reported in other studies.[5]

Table 2 Errors in translating narrative responses to the questions into quantity

Example 1: Nurse #07	Example: Nurse #08
MHb07: “Do you enjoy life?” **Patient (Ravi): “Not at all.”** **MHb07:** “Most of the time. **Three**.” **Interviewer: “So are you saying that most of the time he enjoys life, based on Ravi’s answer?”** **MHb07:** “Ok let me ask you the question again.” **“Do you enjoy life?”** **Interviewer: “Ravi says not at all.”** **MHb07: “**That means never so that’s **zero**.”	**MHb08: “Do you feel you are just as good as other people?”** **Patient (Ravi): “I have been feeling as unworthy as a criminal most of the time.”** **MHb08: “Ohh…for that it will be score 3.”** **Interviewer: “Score 3?”** **MHb08: “Score 3.”** **Interviewer:** “So you are saying that Ravi feels just as good as other people most of the time based on his answer?” **MHb08:** “Oh no, no, he does not feel good at all so it will be score nil. **Zero**.”

The nature of patient information processing is different for nurses with and without mHealth-supported guidelines. The narrative nature of paper-based guidelines takes longer to process, but requires fewer inferences to be generated with fewer chances of any significant errors. The discrete nature of mobile-based guidelines helps focus on critical information faster. However, the user is required to generate more inferences in order to relate the discrete symptoms, to generating some form of patient narrative, resulting in a greater chance of generating errors of interpretation.[38]

These results are shown to be true in our small sample of participants. With detailed analysis of fewer subjects, the results predict with some measure of confidence that community nurses with vastly different backgrounds, working in different settings, will generally experience similar problems when dealing with cognitive and technical performance pressures of varied characteristics. This detailed study enhances the reliability and rigour in generalising the study findings. The next step is to test them in the broader sample of nurses and implement and evaluate the tool in the clinical setting. The results are generalisable to other PICs (which share a relatively similar culture) and to other LMICs, as long as the tool is ecologically validated and tested for cultural sensitivity in the new context.

Impact of this research: Currently, treatment of those in PICs with mental health problems occurs when the disease is at an acute stage, for example, an unsuccessful suicide attempt, that necessitates hospitalisation. There are very few means or methods in the PICs to identify and treat at-risk persons at an early stage of the disease when treatment can be most effective. A significant benefit of our research is (a) increased task-sharing and empowerment of CHNs as the front-line care providers in mental health care and (b) likelihood of better mobile tool acceptability and sustainability in the clinical environment. The primary strength of the research is a novel application of cognitive, decision-making and safety aspects in mHealth design and user-centred testing process.

The targeted clinical problem, assessment of the risk of suicide in patients with depression, is an active public health issue everywhere in the world, with relevance to a variety of populations (for instance, war veterans and active military in the USA) and in virtually every context (outpatient or inpatient settings, primary care or rural environments).

CONCLUSIONS

The evidence from our exploratory study supports the hypothesis that culturally appropriate smartphone technology assists in the process of task-sharing with community health nurses, thereby reducing the burden on a limited number of available mental health professionals. The mHealth supports efficient and effective screening of patients with severe depression and suicide risk, with minor safety concerns. Furthermore, the results from the cognitive analysis show that culturally appropriate clinical guidelines for mental health risks trigger a positive trend in behaviour change.

LIMITATIONS AND CHALLENGES

There are always challenges when intervening in any complex and culturally diverse environment. This situation is exacerbated in resource-limited conditions such as in LMICs. One such challenge is about implementation in the clinical practices. When implementing ASRaDA into the community clinics in the PICs, these challenges will be salient, and will need to be carefully monitored for any unintended consequences.

One of our experimental tasks required the nurses to ‘think-aloud’ while reading the clinical cases. As in several other cultures, people do not often read aloud in a classroom in the PICs. This resulted in the nurses processing more information at the level of text syntax rather than the semantics, making it difficult to gauge more accurately, their understanding of the clinical problem. Training the nurses to think aloud while doing their tasks was not trivial, leading to some sparse and missing information during data collection, limiting our ability to collect the complete data set.

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Contributors VLP conceptualised, set the direction of the investigation and drafted the final manuscript. MH and VN assisted in data analysis, creating figures and drafting of the primary manuscript. OC and WM provided the clinical support in monitoring the entire study at the clinical site. SI developed the mobile application and conducted the usability studies. VLP, the guarantor accepts full responsibility for the finished work and the conduct of the study, as well as the control the decision to publish.

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Increasing enrolment in a national VA transitions of care programme: a pre–post evaluation of a data dashboard and nudge-based intervention

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ABSTRACT

Background The rural transitions nurse programme (TNP) is a care coordination intervention for high-risk veterans. An interactive dashboard was used to provide real-time performance metrics to sites as an audit and feedback tool. One-year post implementation, enrolment goals were not met. Nudge emails were introduced to increase TNP veteran enrolment. This study evaluated whether veteran enrolment increased when feedback occurred through a dashboard plus weekly nudge email versus dashboard alone.

Setting/population This observational study included veterans who were hospitalised and discharged from four Veterans Health Administration hospitals participating in TNP.

Methods Veteran enrolment counts between the dashboard phase and dashboard plus weekly nudge email phase were compared. Nudge emails included run charts of enrolment data. The difference of means for weekly enrolment between the two phases were calculated. After 3 months of nudge emails, a survey assessing TNP transitions nurse and physician champion perceptions of the nudge emails was distributed.

Results The average enrolment for the four TNP sites during the ~20-month dashboard only phase was 4.23 veterans/week. The average during the 3-month dashboard plus nudge email phase was 4.21 veterans/week. The difference in means was −0.03 (p=0.73). Adjusting for time trends had no further effect. Four nurses responded to the survey. Two nurses reported neutral and two reported positive perceptions of the nudge emails.

Conclusion Drawing attention to metrics, through nudge emails, maintained, but did not increase TNP veteran discharges compared to dashboard feedback alone.

BACKGROUND

Older patients using the Veterans Health Administration (VA) for healthcare face a risky transition from urban hospitals back to their rural homes.[1] This has been attributed to inadequate communication around follow-up expectations, self-care needs, poor understanding of home care strategies and difficulties adjusting to new medications.[2] The rural transitions nurse programme (TNP) is a national care coordination, quality improvement intervention led by one transitions nurse and one physician champion at select VA hospitals. TNP was designed to address the challenges faced by rural veterans through implementation of an evidence-based care coordination intervention.[2 3] Based on pilot work,[3] each site was expected to enrol 25–30 veterans each month.

Audit and feedback method is a common strategy to support programme implementation.[4] TNP measures were audited and fed back to sites through an interactive data dashboard. Sites entered veteran demographic, intervention and enrolment data into the dashboard. The data were analysed and available to sites to support discussion of programme goals and opportunities for improvement. During the first year of TNP implementation, most sites recruited fewer than 25–30 veterans each month. Interviews with TNP nurses and champions suggested that low awareness of monthly enrolment counts was a factor. To enhance awareness and increase the number of veterans enrolled in TNP, we added a nudge-based intervention to the data dashboard feedback method. Nudge interventions introduce subtle changes to an environment, 'nudging' a person toward a certain behaviour, and require careful design and delivery.[5] This project studied the design and implementation of the nudge intervention compared with the data dashboard audit and feedback approach alone.

METHODS

The TNP nudge intervention was studied as an observational pre–post subproject within a type II hybrid effectiveness-implementation quality improvement study.[2] Four VA hospitals

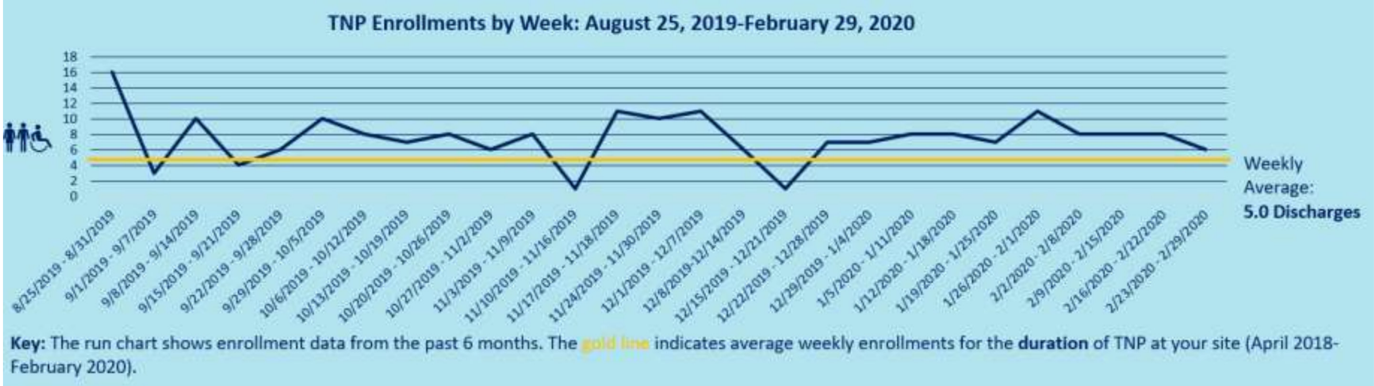

Figure 1 Sample site-specific run chart. This figure was created by the first and senior authors of this paper. Both gave their permission for its publication.

that were enrolling veterans in TNP for 22 months participated. The data dashboard plus nudge intervention trial period were scheduled for 3 months.

Data dashboard intervention

The data dashboard was hosted in Microsoft SQL Server Reporting Services on a VA-hosted, interactive interface designed specifically for TNP. Transitions nurses were encouraged to enter enrolment information daily. The data were descriptively (eg, means and counts) analysed using Excel formulas and put into data tables and charts. Site level data were available for review and retrieval within secure folders on demand.

Nudge-based intervention

The TNP nudge intervention was informed by two evidence-based design approaches: salience and default/positioning effect.[5] Salience effect refers to the tendency to focus on noteworthy or novel items, while ignoring those that do not grab attention. We included a run chart in the email, using bright, colourful graphics to draw attention to the enrolment data (figure 1). These run charts were site specific and presented 6 months of weekly enrolment counts and a trend line depicting the average enrolment for the duration of the programme.

Default/positioning effect refers to the ease with which someone makes a choice, in our case, routinely viewing TNP enrolment data. The nudge intervention and run chart were pushed directly to sites' email inboxes weekly, an alternative to the dashboard, which required sites to pull their own data from a secure folder. The difference of means for weekly enrolment numbers between the two phases was calculated using Poisson distribution. To assess perceptions of the data dashboard and nudge intervention, a VA REDCap survey was distributed to the four transitions nurses and four site champions at the end of the trial period.

RESULTS

Over the 3-month trial period, 10 nudge-based emails were sent to each site. The average enrolment for all sites during the 22-month dashboard only phase was 4.23 veterans a week, or 15.9 veterans a month. The average enrolment for all sites during the 3-month dashboard and nudge email phase was 4.21 veterans/week and 18.75 veterans/month. The difference in means was −0.03 (p=0.73). Adjustment for time trends had no further effect. All four TNP nurses and zero site champions completed the post-trial survey. Half of the nurses (n=2) indicated that the run charts increased their awareness of enrolment expectations, but all four reported the nudge emails did not impact collaboration with site champions around enrolments goals.

DISCUSSION

We aimed to increase awareness of weekly enrolment counts and overall veteran enrolments in TNP by introducing a nudge intervention to augment a data dashboard audit and feedback method. We found some increase in awareness, but no change in enrolments during the nudge intervention. Enrolments continued lower than programme expectations. Our findings suggest that improving performance through audit and feedback is nuanced and requires engagement by sites to problem solving along with flexibility and frequent review by implementation teams.

Due to the lack of impact, we ended the nudge intervention and started reporting enrolment data on monthly transitions nurse learning collaborative phone calls with time allotted for discussion. We anticipate this approach will facilitate group problem solving regarding veteran enrolments and lead to programme adaptations and realistic goals to support sustainment of TNP at current sites. Additional methods to test in future work include audit and feedback through weekly text messages through the phone or a dedicated web-based app. While this may combat email fatigue and be a novel approach to engage participants, the efficacy of these nudge-based methods has been mixed across settings.[6 7]

Our study has several limitations and should be viewed in the context in which it was delivered. Given our small sample size, this study was subject to selection bias. The interventions were implemented as part of a pragmatic quality improvement project and were not designed to address causal or correlational questions.

CONCLUSION

A nudge intervention plus data dashboard audit and feedback method increased awareness of TNP goals but did not increase veteran enrolments. Given the challenges of influencing behaviour, we recommend frequent, rapid testing of evidence-based audit and feedback methods within programmes. Inclusion of qualitative approaches should be considered to better understand the underlying mechanisms that may be driving performance.

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Contributors BC, CL and HG jointly designed the study. DG designed and created the data dashboard. TW conducted quantitative analyses. BC, CL, DG, TW and HG revised the manuscript.

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Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval In accordance with VA institutional review board, this study is a designated programme evaluation; thus no institutional review board approval was needed.

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BMJ HCI launches partnership programme for patients and carers as authors and peer reviewers

Dana Lewis [1], Philip Scott [2]

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ABSTRACT

BMJ Health & Care Informatics (BMJHCI) is launching a partnership programme, where patients write articles and serve as peer reviewers on both patient-written and researcher-written articles. This article outlines the programme and describes the importance of public involvement in research and implementation in digital health. We think patients and carers should be funded to participate at this stage of research as well as other stages of research. The quality of peer review can be greatly improved by recruiting patients to peer review and improve readability and understanding of scientific literature and to ensure that research and other articles appropriately include what matters most to patients. Just as real-time communication is two-way communication, both healthcare providers and patients should have a voice in the literature, and involving patients in journals is an important step toward amplifying and supporting the balance of perspectives. Patients are the whole purpose of research and practice in health and care, so this rightly includes their role in the publication and review of health informatics literature as well as the publication of their own perspectives regarding access and delivery of healthcare. Patients and carers can provide valuable insights into research articles, and they can also serve as effective peer reviewers. The BMJHCI is excited to kick off the new partnership programme and encourages all interested patients and carers to apply to participate as authors and/or reviewers.

INTRODUCTION

BMJ Health & Care Informatics (BMJHCI) is launching a partnership programme[1], where patients and carers write articles and serve as peer reviewers on both patient-written and researcher-written articles. This article outlines the programme and describes the importance of public involvement in research and implementation in digital health.

WHAT THE BMJHCI PARTNERSHIP PROGRAMME IS

First, let us clarify the terminology and scope of the BMJHCI partnership programme. In physiological medical care, the word 'patient' is fairly obvious and typically denotes the 'subject' of clinical diagnosis or treatment. However, we are also including people who participate in mental health services or social care. Using the term 'patient' in such contexts is viewed as inappropriate in many jurisdictions, and alternative expressions such as 'service user' or 'client' tend to be adopted. We also want to include the general public, whether or not they are currently receiving health or care services, as they ultimately fund these services either through taxation or insurance. The 'public' have legitimate interests not just as funders, but as citizens who want society to be healthy and thriving. Therefore, the scope includes not just care of illness, but promotion of public health and well-being. All of these areas have aspects of digital technology, so our partnership programme is equally broad, and when we say 'patient' or 'public' in this article, we mean it in this globally inclusive sense. That being said, it is often the recipients of care services (and their family, or other informal carers) who can offer the most direct human insights into what works and does not work. We want all of these voices to be heard.

Therefore, to enable more voices to be heard and to enhance the inclusivity and accessibility of our readership, we will invite participants to both peer review submitted papers and sometimes to write an article on a topic selected by the oversight panel and agreed by the editor in this new partnership programme.

HOW THE BMJHCI PARTNERSHIP PROGRAMME WILL WORK, AND HOW TO APPLY

Participating in the peer review process for medical literature has its challenges. It is a time-consuming process. It may be a challenge to find the time to read and critically assess submitted manuscripts. Patients may have competing priorities in their lives, including full- time jobs and time-demanding and energy-demanding treatments or treatments for their family members. There is a learning

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curve for anyone who is new to the peer review process and the conventions of academic publishing, although BMJHCI provides guides[2] and support for new reviewers. Whereas researchers are writing and publishing as part of their jobs, we recognise this is extracurricular workload for programme participants. This has been recognised by major research funders like the National Institute for Health Research (NIHR)[3] in the UK and the Patient-Centered Outcomes Research Institute (PCORI)[4] in the USA, who offer a level of reimbursement to patient and public representatives who participate in their research. We support this principle and are extending it to journal contributions.

People who are interested in participating can apply by filling out a short online form (available at https://bit.ly/BMJHCI-PPI-application) sharing their background and relevant experiences. They will indicate whether they would like to serve as an author (writing articles), or as a reviewer (reviewing articles), or both. Once submitted, members of the BMJHCI oversight panel will review the applications and select a diverse mix of participants for the BMJHCI partnership programme. For individuals in countries that are unable to access the form, contact *info.bmjhci@bmj.com* to express interest in participating in the partnership programme.

WHAT PEOPLE WILL DO: WRITING

Patient-written articles are one form of patient involvement in research. A patient-written article is a research article that is written by patients or caregivers about their own experiences with a disease or condition, or of others in their community, from the perspective of how information, communication and digital technology have made things better or worse. For example, a patient who receives lab results via their online health portal regarding a new diagnosis may discuss the benefits and challenges of receiving this information digitally and how that impacts their care or perception of care. The articles will also be peer-reviewed by patients or caregivers.

Patient-written articles have several benefits. They allow patients to share their specific, personal experiences with the disease or condition and the process of accessing or receiving healthcare. Patient-written articles are also likely to be of high quality, as patients who write the articles are intimately familiar with the disease or condition and the challenges it presents, and are likely to cover topics and perspectives that are not currently found in existing medical literature. Some of the patient perspectives regarding informatics, particularly around accessing or receiving information, are often not well known to clinicians and others working to design such systems in healthcare. As such, patient-written articles provide an opportunity to improve the understanding of the lived experience of the disease or condition—including interactions and communications with the healthcare system itself. Patient-written articles can also contribute to a shared language and understanding of health and care topics that is more accessible to a wider audience.

WHAT PEOPLE WILL DO: REVIEWING

In addition to patients and carers contributing to research in other ways, they may also choose to serve as patient (peer) reviewers. This is a role that has traditionally been performed only by academic researchers.

There are many benefits to having patient reviewers, such as providing clarity to the authors by asking more detailed questions about design, methods and analyses. Patient reviewers can provide insight into the language of a manuscript that can be unintentionally written in a jargon-filled way that may not be understandable to patients or other researchers. This again reflects the common requirement of research funders for a ‘plain language’ (if that is the vernacular) or ‘lay’ summary in a grant application. Readability assessment methods such as the Gunning Fog Index[5] can get you so far, but actual patient or carer review can often take you a lot further in simplifying your writing. Moreover, patient reviewers can aid researchers and other authors to have a better understanding of patient perspectives and shape future research involving patients. Patient reviewers can provide valuable feedback about the article itself as well as the direction of future research more thoroughly and appropriately involving patient perspectives.

WHY THIS MATTERS

Journals such as the *BMJ* have previously had patient and carer panels, who have contributed patient-written articles, but not all journals have the resources or ability to pay patients and carers to be involved at this level of authorship and peer review for medical literature. We think patients and carers should be funded to participate at this stage of research as well as other stages of research. Peer review is often viewed as the gold standard for assessing the quality of research. The quality of peer review can be greatly improved by recruiting patients to peer review and improve readability and understanding of medical literature and to ensure that research and other articles appropriately include what matters most to patients.

Other journals should consider adopting a similar approach in order to involve patients in research, and to create a more collaborative relationship between the research community and patients. It may be particularly useful for journals that publish articles about diseases and conditions which are not yet well understood by the general population, and so the voice of the patient is perhaps more important than what we may currently see represented in the existing medical literature. Healthcare and medical literature may historically be perceived as one sided, as journals are typically written by and for individuals delivering care. But increasingly, patients are accessing and using medical literature themselves as well, due to lack of credible information elsewhere online. Just as real-time communication is two-way communication, both healthcare providers and patients should have a voice in medical literature, and involving patients in journals is an important step toward amplifying and supporting the balance of perspectives.

CONCLUSION

Patients are the whole purpose of research and practice in health and care, so this rightly includes their role in the publication and review of health informatics literature as well as the publication of their own perspectives regarding access and delivery of healthcare. Patients and carers can provide valuable insights into research articles, and they can also serve as effective peer reviewers. The BMJHCI is excited to kick off the new partnership programme and encourages all interested patients and carers to apply to participate as authors and/or reviewers.

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