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An exploration of patients' experience of nurses' use of point-of-care information technology in acute care

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Abstract

The rapid introduction of technology into acute healthcare settings, specifically the presence of point-of-care health information technology at patients' bedsides, is expected to impact patients' healthcare experience by altering nurse-patient interactions. This research was a multi-method naturalistic pilot study designed to explore patients' perception of their interactions with nurses using bedside point-of-care health information technology in acute care. Data were collected using observation, interviews and surveys. Twenty-four participants were purposefully recruited from medical and surgical wards, to capture variability in their self-reported confidence with information technology; 29% were not confident, 38% were somewhat confident and 33% were completely confident with information technology. Participants' mean age was 68.6 years (SD 11.1) and 63% were male. Qualitative observation, interview and survey data showed some nurses directly involved patients and explained or demonstrated how the point-of-care health information technology was being used to complement and enhance their care; while others used the point-of-care health information technology as an electronic documentation tool without engaging their patients. Patients' experiences of point-of-care health information technology differed with their self-reported confidence with information technology; those with complete information technology confidence were better at recognising the potential and opportunities for point-of-care health information technology to support self-directed care than those with less confidence using information technology. Some participants reported that the use of point-of-care health information technology impeded interpersonal communication with nurses. Participants recognised the benefits of point-of-care health information technology to support clinical practice but generally desired greater engagement with the nurses when they used the system.

Keywords

Patient experience, patient centered care, patient engagement, healthcare, health information technology, nurse-patient interactions

Background

Understanding the patient experience is fundamental to providing high quality acute healthcare and improving patients' overall health outcomes. The rapid introduction of technology into acute healthcare settings, specifically its presence at the point-of-care such as the patient bedside, is expected to impact patients' healthcare experience by altering nurse-patient interactions. As yet, we do not know how patients perceive the use of bedside point-of-care health information technology (POC-HIT) or how it impacts on their acute healthcare experience. Recognising patient experience as important to the quality and safety of contemporary healthcare services, this exploratory research sets out to understand the influences of nurses' use of POC-HIT on patient experience.

Patients' experiences of care are grounded in their interactions with the care environment and healthcare staff. The shift in focus of health care delivery from traditional disease-focused and clinician-centred approaches of task-orientated care to personalisation of care represents a change at both the interpersonal and organisational levels.[1,2] Person-centred care seeks to optimise patient experience by providing care that is responsive to individual patients preferences and goals, focusing on engaging patients in meeting their care needs.[3] Research examining patient experience in acute healthcare environments highlights its value as an indicator of the quality of services and its influence on patients' health outcomes.[4-10]

Extensive research seeking to operationalise person-centred care with the conviction that patients' views and experiences are integral to the provision of high quality

health care[6,11] has led to eight principles of patient-centred care being used to describe care requirements to optimise and enhance the patient experience.[6,12] For the purpose of this research these concepts have been operationalised to provide a framework to guide data analysis, and are outlined below in Table 1.

Over the last three decades, Health Information Technology (HIT) has been slowly integrated into the healthcare sector.[13,14] It is widely used to improve administrative functions such as patient flow management and tracking of healthcare costs. More recently HIT has been developed to support clinical decision making, risk management and to improve patient safety.[15] Research examining the use of HIT in acute healthcare has focused primarily on the clinicians' perspective and its functionality to optimise efficient care delivery,[16] often neglecting consumer or patient perspectives. Patient perspectives of HIT in acute health settings are expected to differ from other settings, such as primary care, due to influences such as the nature and acuity of their illness, their relationship and level of dependence on and frequency of interactions

Table 1. Picker principles of patient-centered care

Picker Principles of Patient-Centred Care [6,12]	
Respect for patients' values, preferences and expressed needs	Recognising the patient as central to their healthcare needs allowing them to direct their desired level of engagement.
Coordination and integration of care	Inclusion of patients in their care needs and enhancing workflow within and beyond the acute car environment.
Information, communication and education	Facilitating effective communication and collaboration between healthcare staff and patients. Supporting patients to make informed decisions, to optimise health outcomes and promote treatment adherence.
Physical comfort	Managing patients' physical needs and providing an appropriate physical environment to foster wellbeing
Emotional support and alleviation of fear and anxiety	Recognising the holistic ramifications of the patients clinical status and treatment regimes on their occupational, financial or social situation.
Involvement of family and friends	Providing timely information and support to families and friends.
Continuity and transition	Reducing the fragmentation between healthcare services and ensuring patients' ongoing care requirements are addressed.
Access to care	Facilitating timely access to healthcare services within and beyond the acute healthcare environment, ensuring services are available and appropriately tailored to meet the individuals cultural and healthcare needs.

with, health professionals. Implementation of HIT in acute healthcare has been associated with alterations in clinicians' perspectives of the adaptability and reliability of services, security and perceived risk, efficiency, documentation standards as well as the attitudes of the user.[17-20] Baysari, et al.[21] highlight that bedside HIT may interfere with the clinicians' ability to engage and interact with patients.

Nurses recognise the value of adopting HIT to support clinical care but have traditionally been frustrated by software limitations and inadequate access to computers and technical support.[8,9,22] One potential solution to inadequate access to computers in clinical environments and work-station computers situated in offices that take staff away from the bedside, is the development of HIT at the point-of-care (POC). POC-HIT is defined as HIT that enables staff and patients access to hospital information systems, patient care information, evidence-based clinical resources and patient educational materials wherever the patient is receiving treatment and care. The most common POC-HIT tools used by nurses are electronic medication charts, which have been demonstrated to aid clinical care delivery, reduce error rates and prevent adverse drug events through enhanced collaboration within the multidisciplinary team.[15,23] Similarly, HIT solutions have been adapted to support clinical handover and comfort rounding, enabling real time identification and evaluation of care gaps.[24] The introduction of sophisticated POC-HIT solutions will ultimately change the dynamics of acute healthcare specifically the nurse-patient interactions.

In Australia, there were over 10 million acute hospital admissions for the year 2014-15.[25] Every patient admitted to hospital will interact with nurses during their episode of care; nurse-patient interactions are a fundamental component of patients' experience in the acute care environment. Changes to the dynamics of these nurse-patient interactions through the adoption of POC-HIT will undoubtedly influence patients' experience of care. This study was undertaken to explore patients' experience of nurses using bedside POC-HIT in an acute healthcare environment.

Methods

The aims of this study were to:

1) Describe the patient-nurse-HIT interactions at the bedside during key care activities.
2) Explore acute care patients' experience of nurses using POC-HIT in their care delivery, in relation to: (i) interacting with nurses for key care activities of clinical handover, patient education, comfort rounding and medication administration, (ii) perceived importance, benefits and disadvantages

and (iii) expectations of how HIT can influence their care delivery.

Design
This research used a multi-method naturalistic pilot study design to explore patients' perception of their interactions with nurses using bedside POC-HIT in acute care wards. The characteristics of participants can be found in Table 2 and will be further discussed later. The research project was conducted in two stages.

Stage One
In Stage One, observation data were collected over two observation periods of approximately two hours duration. The first observation occurred in the afternoon prior to discharge and the second occurred on the morning of discharge. A semi-structured interview with each participant followed the second period of observation. A structured observation tool developed specifically for this study and qualitative field notes captured data to examine nurse patient interactions for four specific nursing care activities (clinical handover, patient education, comfort rounding and medication administration). Participant interviews focused on patients' experience of observed interactions and their perceptions of the impact of technology use on their interactions with nurses.

Stage Two
In Stage Two, a follow up telephone survey was conducted within two weeks of patients' discharge to gather perceptions about the care they received and nurses' use of the POC-HIT. The follow-up telephone survey included the Picker Patient Experience questionnaire (PPE-15)[26] and study specific supplemental questions to capture patients' perceptions of the use of the POC-HIT system (Tables 3 and 4).

Setting
Data collection took place across three acute inpatient wards at a private not-for-profit teaching hospital in metropolitan Melbourne, Australia. The POC-HIT solution introduced at the health service in 2015 was installed at the patient's bedside as a dual-purpose patient entertainment and HIT solution. The POC-HIT has a touch screen monitor for staff to access patient health records including electronic medication charts, clinical (pathology and radiology) results and documentation for comfort rounding. It also provided patient access to entertainment and educational resources.[27] Wards were selected as those with high nurse use of the POC-HIT system.

Population and sample
Patients: Eligible patient participants were English speaking; due to be discharged from hospital within the next 24 hours after a stay of longer than two days, over the age of 18 years and provided written consent.

Table 2. Characteristics of patient participants

	Stage 1 Observation participants	Stage 1 Interview participants	Stage 2 Survey participants
Age			
Mean (SD)	67.8 (11.2)	66.6 (11.2)	71.2 (10.4)
Range	48-85	48-85	55-85
Sex			
Females	6	7	7
Males	12	11	10
Perception of IT			
Not Confident	5 (27.8%)	5 (27.8%)	6 (35.3%)
Somewhat Confident	6 (33.3%)	6 (33.3%)	5 (29.4 %)
Completely Confident	7 (38.9%)	7 (38.9%)	6 (35.3%)
Length of stay (Days)			
Mean (SD)	8 (8.4)	7.1 (7.6)	7.6 (7.7)
Range	3-31	3-31	2-31
Median	4	3	5
IQR	3 – 8	3 – 7.5	3 – 8
Reason for admission			
Oncology	3 (16.7%)	3 (16.7%)	4 (23.5%)
Medical	3 (16.7%)	2 (11.1%)	2 (11.8%)
General surgery	6 (33.3 %)	6 (33.3 %)	4 (23.5%)
Orthopaedics	6 (33.3%)	7 (38.9%)	7 (41.2%)

A purposive maximum variation sampling technique[28] was used to facilitate heterogeneity in the sample to capture the diversity in patients' experience. Recruitment involved a brief explanation of the study and a single screening question to assess participants' confidence with IT using a scale of 1 to 3 (1 = not confident, 2 = somewhat confident and 3 = completely confident).[29] Consecutive patients expected to be discharged the next morning were recruited until five participants were in each of the three 'confidence' categories for each data set(observation of each activity, interview, survey), as this number was expected to provide enough data for this pilot study. Recruitment occurred on a variety of weekdays and weekends to reduce potential sampling bias. Patient participants provided written consent and contact details for the follow up survey. Data were collected over three-months in 2015.

Nurses: All primary care nurses working on the participating wards were eligible for inclusion in the observation stage of the study. On the participating wards, all permanent nurses had completed compulsory training run by the organisation regarding appropriate use and the functionalities of the POC-HIT. In addition, each ward had nominated champions that regularly provided direction and support for novice nurses and agency staff

using the system. Nurses responsible for the care of the patient participants were informed about the study, approached on the day of data collection and invited to provide verbal consent for observations to take place.

Data collection tools
A structured observation tool was developed specifically for the purpose of this study. The tool captured expected nurse actions for the four specific patient care activities; clinical handover, patient education, comfort rounding and medication administration. These activities were selected as they represented peak opportunities for nurse-patient interactions that included the POC-HIT, and were expected to capture use of the educational resources on the POC-HIT; however the use of POC-HIT resources for general patient education about their condition was only observed on one occasion so this activity was excluded from grouped analysis. The tool content was derived from practice recommendations and local policy documents, it was reviewed by an expert panel for face validity then pilot tested by the single data collector before being used to collect study data.

The standardised ISOBAR clinical handover communication tool; Identification, Situation, Observations, Background, Assessment and

Recommendation, has been adopted by the hospital to guide clinical handover as it provides a succinct and comprehensive understanding of the patient.[30] Local hospital policy dictates that episodes of comfort rounding address patients' pain, position, personal needs, attending to treatment (Rx), ensuring items are in reach, responding to concerns, and reassuring the patient.[31] Appropriate administration of medications to patients in the acute context involves adhering to the seven rights of medication administration; right patient, right medication, right dose, right route, right time, right documentation, right clinical context.[32] These tools were therefore employed to structure the observation data collection. Interviews were guided by observations and used to clarify patients' perspectives on observed events. Participant interview questions focused on patients' experience of the POC-HIT and their perceptions of its impact on their interactions with nurses. The PPE-15 survey 26 was selected for use in this study to elicit feedback regarding patients' experience of inpatient care relevant to the Picker dimensions that were used as a framework for the qualitative analyses. Supplemental HIT related items (See Table 4) based on the PPE-15 were added to the original questionnaire to capture patient perceptions specific to HIT.

Data analysis and rigor
Observation data were analysed using quantitative content analysis methods. Data were coded using explicit categories consistent with the patient care activities that used the POC-HIT. Descriptive statistics were used to identify the proportion of time nurses spent on each of the specific care activities.

Qualitative content and thematic analysis of observation and interview field notes used the framework analysis method[33] and followed these steps; reading and familiarisation with the data; coding the data and identifying themes and sub-themes. In this first phase the dimensions of patient experience identified by the Picker Patient Experience framework were used to guide and structure the analysis6, (see Table 1). The second phase of analysis involved identifying emergent codes and sub-themes for each dimension specific to the patients' experiences of the POC-HIT. Initial configurations were tested with the other investigators, alternate explanations considered and those ascertained to have the best 'fit' between data and analysis were retained. By using these steps, data were searched for patterns, linkages, and plausible explanations.[34]

Analysis of the survey data collected after discharge involved coding the PPE-15 items dichotomously, as to the presence or absence of a problem, in accordance with a previously validated scoring scheme.[26] For example, a problem was defined when the patient response indicated that an item or aspect of care could be improved upon.

Descriptive statistics were analysed using Microsoft Office Excel. Qualitative responses to open ended questions were coded and analysed using the same framework and methods used for observation and patient interview data.

Consistent with a multi-method research design, and in order to ensure rigor of the study, attention was given to credibility, fittingness, confirmability and triangulation.[34] Participant triangulation was achieved by recruiting participants with different confidence using IT from multiple ward types and examining the consistency of the data. Data source triangulation involved comparing data collected using multiple methods (observation, interview and survey) and analyst triangulation was achieved by multiple investigators analysing data and comparing their findings. This approach provided both rigor and in-depth understanding of patients' perceptions to enhance the credibility of the research findings. Consistency in the findings across participants, locations and data sources suggests possible transferability of data.

Low risk ethics approval was sought and gained from the health service (reference LR239-15) and Deakin University Human Research Ethics Committee (reference 2015-220).

Results

Data were collected over a three-month period in 2015 across three acute inpatient wards; 24 participants were recruited. Recruitment and attrition across the two stages of the research can be explained as follows: 12 participants completed all data collection over both stage 1 and 2 of the research. In addition, seven participants in stage 1 were lost to stage 2 follow up: one participant completed only one inpatient interview and declined further participation; one participant completed only observations and could not be interviewed as they deteriorated; and five participants completed all stage 1 observations and interviews but were not contactable for survey follow up. Of these, medication administration on the POC-HIT was not observed for three participants. To ensure the target sample size of five observations for each activity using the POC-HIT in each of the three IT confidence groups was obtained, four additional consecutive participants who matched the desired characteristics were recruited to Stage 1. Five additional participants were also recruited only for stage 2 to address attrition in collection of survey data. Data from 18 inpatient observations, 18 inpatient interviews and 17 post discharge surveys were analysed (see figure 1).

Nurses' use of POC-HIT for clinical activities
Over the 36 two-hour observation periods conducted at peak activity times (change of shift), 68 nurses were observed using the POC-HIT for patient care; they included graduate nurses (n=11, 16 %), division one (n=38, 56%) and two (n=9, 13%) registered nurses, agency

Figure 1. Flow diagram of participants
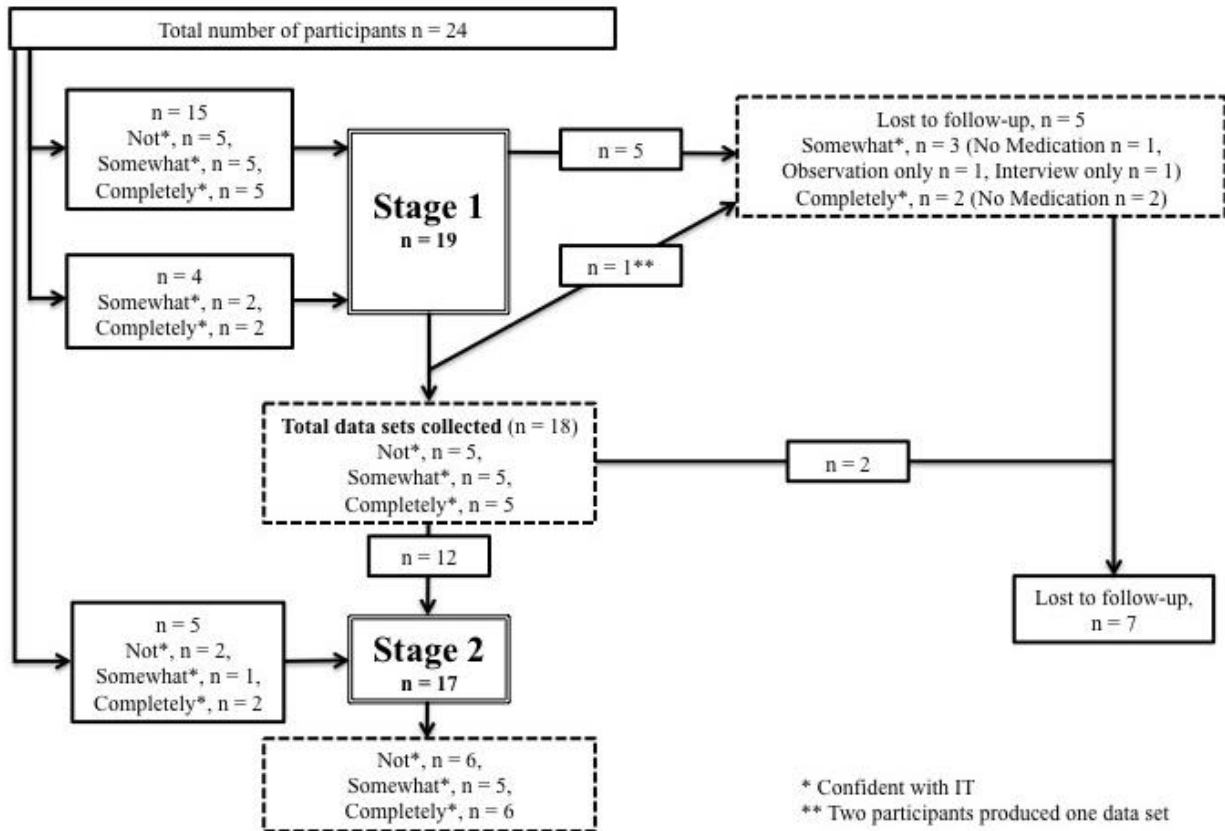
nurses (n=2, 3%), clinical nurse specialists (n=6, 9%) and associate nurse unit managers (n=2, 3%). Of these, 93% were female. Under the team-nursing model of care delivery adopted across all wards, the median number of nurses providing care to each patient was 2 (range 1 to 3); 13 nursing students were excluded from analysis. During the observations, the POC-HIT was used for 111 patient care events; clinical handover (n=36, 32 %), medication administration (n= 22, 20%) and patient comfort rounding (n=53, 48%). Figure 2 displays the frequency that each of these care activities were undertaken by nurses and the proportion of events in which the POC-HIT was used by nurses. During the observation periods, nurses were also observed to use the POC-HIT to access patient results including patient pathology (n=4, 4%) and imaging results (n=2, 2%).

Clinical handover
During the 36 clinical handovers observed, the average number of nurses present at the bedside was 3 (SD 0.9) and clinical handovers typically lasted 3.0 minutes (SD 1.2 minutes). During clinical handovers, nurses were observed to use the POC-HIT to provide recommendation regarding the patients' future care, review medication

charts, patient pathology or imaging results. Patient interactions during clinical handovers varied across the 36 events observed. Nurses were observed on seven occasions to conduct handover outside of the patients' rooms; this occurred if the patient was asleep at the time or if the nurse in charge of the shift had been the primary nurse. During six observed handovers, patients were active participants in the handover; in two of these observations, the nurse engaged the patient in an informal conversation, allowing them to contribute insights to the oncoming nurse. Examples of this from the researcher's field note include:

> *Participant was asked at the conclusion of handover how their pain management was and if they required additional pain relief.*
> *Participant described how they had progressed since the oncoming nurses had previously looked after them. (Researcher field notes)*

Medication management
Over the 22 episodes of medication administration observed, nurses used the POC-HIT to facilitate administration of an average 5 (SD 2.3) medications for each episode; of these at least 86% used all the seven

medication rights. Observed interactions between nurses, patients and the POC-HIT during medication administration included: nurses confirming the clinical appropriateness of medications (n=5, 23%), nurses providing verbal patient education about their medication using the electronic medication chart (n=6, 27%), nurses encouraged patients to actively participate in medication administration (n=6, 27%), nurses did not engage with patients (n=6, 27%), and patient questioned nurses about medications (n=3, 14%).

Comfort rounding

Overall, 53 episodes of comfort rounding were observed with an average of 2.9 (SD 0.6) events per patient, consistent with the frequency expected over the 2 hour observation periods. The nurses were observed to adopt

one of three strategies to using the POC-HIT for this activity: 1) the nurse would come in to the patient room and complete the necessary documentation on the POC-HIT without interacting with the patient (n=25, 47%); 2) the nurse held a conversation with the patient, independent of their use of the POC-HIT and subsequently filled out the POC-HIT, or vice-versa (n=20, 38%); 3) the patient was included in the conversation while using the POC-HIT (n=8, 15%). On occasion, episodes of comfort rounding were used as a prompt to initiate other care activities such as assistance with activities of daily living, position changing or performing a procedure (n=18, 34%).

Patients' experience of the use of POC-HIT during their acute care admission

Patients' experience was examined using interview and survey data. The characteristics of the patient participants

Figure 2 – Frequency that the POC-HIT system was used to support clinical activities
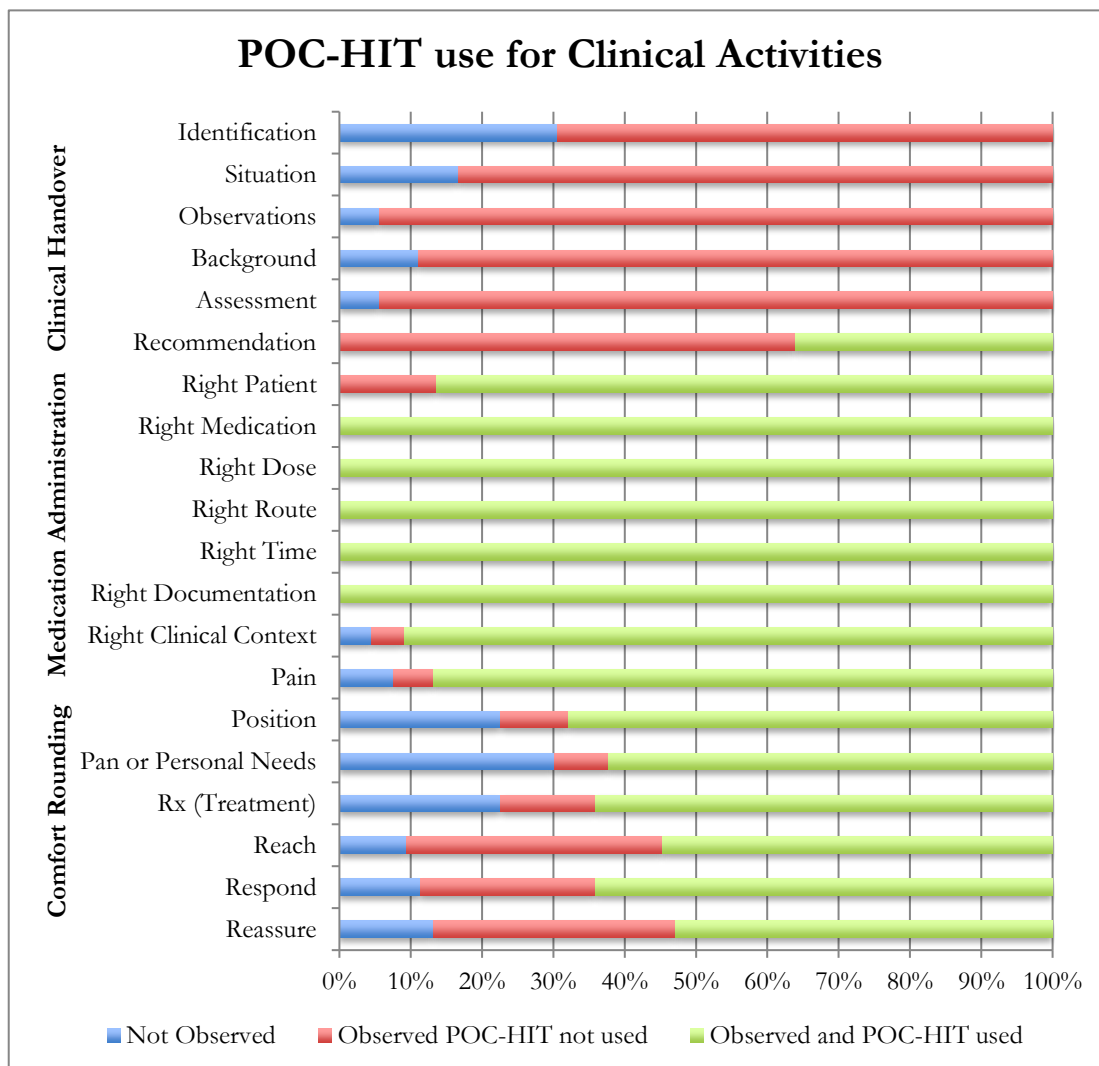
(Table 2) in each of the stages were similar. Using the qualitative framework analysis method[33], only three of the eight Picker dimensions of patient centred care were deductively identified in analysis of patient transcript data.

Emergent sub-themes were related to three structural codes 1) patients' values preferences and expressed needs, 2) information, communication and education and 3) access to care. Accordingly, illustrative quotes for each

Table 3. Patients' experience of nurses using POC-HIT in their care delivery

Theme and Subtheme	Not confident using IT	Somewhat confident using IT	Completely confident using IT
Respect for patients values, preferences and expressed needs			
Preference for engagement	I wasn't involved so much…I don't want to know what they (nurses) are doing, as long as they know. *(Participant 17)*		I had to ask what they (nurses) were constantly doing on the screen… I was really frustrated because I didn't know. *(Participant 18)*
Perceived usefulness and usability	Does it serve its purpose, wouldn't it be better for staff to have their own device, separate to the screen I use. *(Participant 7)*	This system, especially for the medications seems more efficient use of their (nurses') time…rather then paper folders. *(Participant 10)*	All in one system, I could easily do what I wanted and the nurses could quickly come in and do their bit. *(Participant 5)*
	I found it difficult to get onto the channel I wanted, I had to get the staff to show me…multiple times. *(Participant 8)*		It (POC-HIT) was very clear and pretty straight forward to use. *(Participant 6)*
Maintaining privacy and confidentiality	I rather paper, you can't lose paper, this can disappear up in the system and be lost and then there is no record of what needs to be found later. *(Participant 17)*	Security is a big concern for me … if there is a security breach and your health information finds its way out to unauthorised individuals. *(Participant 14)*	I don't have any concerns with the use of computers for healthcare … hospitals like this would have to have similar security systems to banks you'd think. *(Participant 13)*
Information communication and education			
Provision of educational information	I think patients with better understanding of these devices could benefit … I suppose other patients could get information about their care on this screen and that could help both the staff and the patients. *(Participant 19)*	I briefly looked through the resources available, but found nothing specific to my care needs… I was receiving 1:1 education from a nursing specialist therefore not requiring to use technology. *(Participant 2)*	I did have a flick through some of the exercise/education information but my physio was regularly around helping me with those and of course the nurses. *(Participant 13)*
Communication	I just let the staff tell me what I am required to do and clarify it with them if I have concerns. *(Participant 19)*	I don't really see how it would impact my care … it just seems to replace the older forms of documentation. *(Participant 2.8)*	It was quite a fragmented process … the girls (nurses) would talk to me then return back to looking at the screen, it really impeded the flow of conversation. *(Participant 5)*
Access to care			
Impact on accessing care	I noticed a considerable amount of double documentation, I thought it (POC-HIT) would streamline the documentation process... but it seemed like a very repetitive process. *(Participant 16)*	The nurses could access everything they needed to right here next to the bed, very efficient. *(Participant 10)*	The potential for remote access… doctors could look at results, tests and observations they'd ordered without coming here …I don't think that would depersonalise it, they are busy and need to be practical with their time. *(Participant 9)*
	I suppose this information will get transferred when I go to rehabilitation, that's good about this electronic business … the transferability of it all. (Participant 8)	Care beyond this episode, its already happening, my results already go to my GP so with a click of a button he has access to my test results … its all accessible electronically. *(Participant 1)*	If it were all integrated in one system with all doctors using an integrated system there would be much simpler way to communicate with various specialists. *(Participant 12)*
Patient access	If they (nurses) have to use it I suppose they know best, but for me I am not so savvy on these things. *(Participant 17)*	Using the additional features on it (POC-HIT) depends on how comfortable you are with these devices, I would need more explanation than I got during this admission. *(Participant 2.8)*	I'd really like to be more involved in the care, if some of my record was visible to me …for instance a daily plan and recovery process it would help you feel like you're accomplishing the right things. *(Participant 18)*
Impact on nurse-patient interactions	They would come in and use it, I was never quite sure what they were doing, I suppose it was their documentation. *(Participant 16)*	How they (nurses) engaged with me during their use of the (POC-HIT) system varied and it impacted me… if they were nervous then that really reduced my confidence in their competence using it. *(Participant 14)*	It provided a physical barrier in the contact I had with staff, they wouldn't engage with me. *(Participant 6)*

sub-theme are summarised in Table 3. Data were triangulated with responses to the Stage Two telephone survey (see Table 4) with 17 participants (see Table 2 for participant characteristics); surveys took average of 8.5 (SD 2.6) minutes (range 6 to 17 minutes).

1. Respect for patients values, preferences and expressed needs
Participants recognised that the POC-HIT system was widely used to facilitate care activities. They highlighted that nurses' approach to using the system influenced their experience of care; 47% (n=8) suggested its use had a negative impact 'I do sometimes feel that the care is more focused on the technology then on me' (Participant 5). Three emergent subthemes were identified as described below.

Preference for engagement
Observational data collected demonstrated few interactions between patients and nurses using of the POC-HIT system, with nurses using the system primarily as a separate stand-alone activity. Participants varied in their desire for the nurses to engage with them when using the system. Those participants who self-rated as not confident with IT expressed a desire not to be involved in that aspect of their care. In contrast, participants who reported complete confidence with IT expressed their desire for a greater interaction with the nurses when they were using the POC-HIT system.

Perceived usefulness and usability
All participants identified the POC-HIT system as a useful source of entertainment during their acute hospital stay as it provided free access to television, radio and computer games. Participants' perceptions of the usefulness of the system to enhance care delivery differed according to their confidence using IT systems. Individuals not confident with IT saw less value in the POC-HIT and found it more difficult to use than participants who reported being somewhat and completely confident with IT. Participants with higher IT confidence recognised the value of the POC-HIT in facilitating staff to access their records directly at their bedside.

Maintaining privacy and confidentiality
Two participants who were not confident using IT expressed concerns about the confidentiality of their

Table 4. Percentage of problem scores coded as "problem scores" in telephone survey
Combined PPE-15 and Technology questions

	%
Respect for patient values, preferences and expressed needs	
Staff gave conflicting information	23.5
Doctors sometimes talked as if I wasn't there	11.8
Not always treated with respect and dignity	5.9
Not sufficiently involved in decisions about treatment and care	11.8
Doctors and nurses used the POC-HIT in front of you as if you weren't there	70.6
The POC-HIT negatively impacted how you felt you were treated	100
Information, communication and education	
Nurses' answers to questions not clear	11.8
Doctors' answers questions not clear	17.7
Nurses didn't discuss anxiety or fears	5.9
Doctors didn't discuss anxiety or fears	29.4
Staff did not direct me to the educational resources on the POC-HIT	94.1
Did not access the educational facilities on the POC-HIT	94.1
The POC-HIT negatively impacted how you communicated with staff	100
Access to care	
Not easy to find someone to talk to about concerns	47.3
Staff did not do enough to control pain	24.9
Family didn't have the opportunity to talk to doctor	29.4
Family not given information needed to help recovery	11.8
Purpose of medications not explained	23.6
Not told of medication side effects to monitor on discharge	23.6
Not told about danger signals to look for at home	23.6
The POC-HIT was not helpful in conversations with your healthcare team	41.2

personal information when the health record was stored digitally on the POC-HIT system. In contrast, another participant with complete IT confidence reported no concerns.

2. Information, communication and education
The presence of the POC-HIT at the patients' bedside was recognised by participants as changing the way they received information and interacted with nurses. The two sub-themes are described below.

Provision of educational information
While the POC-HIT provided a variety of health information services and education opportunities for patients, participants consistently reported not being directed to these educational resources by the nursing staff. This was consistent with the observational data where nurses used the POC-HIT to provide patients with information about their prescribed medications but did not direct patients to the additional patient information resources available on the system. The three participants who had independently reviewed the educational resources on the POC-HIT system all reported they did not find anything relevant, as staff had already provided them with verbal education or printed pamphlets. Participants not confident with IT reported they preferred to receive face-to-face education from the staff. Despite the low use of education resources in the POC-HIT, 77% (n=13) of participants reported they received adequate information to monitor their condition and manage their health following their discharge.

Communication
Independent of their reported confidence using IT, the majority (71%, n=12) of participants identified that the POC-HIT impacted on how they communicated with the staff. Participants reported being able to discuss their concerns as desired with their clinician but suggested that the POC-HIT disrupted nurses' ability to engage and communicate, describing feelings of frustration towards nurses use of the POC-HIT. One exception was a participant, who reported being somewhat confident with IT and regarded the POC-HIT as the modern form of documentation, not associating it with any disruption of care processes (Table 2).

3. Access to care
The POC-HIT was recognised by participants in both the interviews and telephone surveys, as influencing how they, as patients, were receiving care. Access to care was reflected by three sub-themes as discussed below.

Impact on accessing care
Three participants (two completely confident and one somewhat confident with IT) highlighted the POC-HIT as expediting care processes as it allowed care tasks to be completed at the bedside. The functionality of the POC-

HIT to facilitate nurses' work was recognised by all participants although there was some concern about its reliability. The recognised advantages included; increased accessibility to imagining and pathology results, facilitating remote access for doctors to obtain patient information and streamlining processes for medication administration and documentation. Furthermore, the ability of the POC-HIT to facilitate care transitions beyond the single episode of acute care, such as between healthcare organisations, was similarly recognised across the confidence categories. However, the potential of the POC-HIT system to hinder care provision, particularly if documentation was not effectively assimilated, was also recognised.

Patient access
Participant's desire to access and utilise the POC-HIT for clinical purposes varied. Those not confident using IT preferred to be passive and have nurses or other clinicians direct their care. Alternatively, higher confidence IT users recognised the potential of the POC-HIT to support self-directed care, expressing a desire to direct their own care in accordance with a care plan detailed from the POC-HIT.

Impact on the nurse-patient interactions
Participants from all IT confidence categories held mixed views on how the POC-HIT influenced the care they received. It appeared that clinicians' approaches to patient interactions when using the POC-HIT directly influenced participants' experience. Some participants saw some staff as effectively integrating the POC-HIT into the care processes, while others reported using the POC-HIT at the bedside disrupted care delivery and communication. Separation of clinicians' use of the POC-HIT from any interactions with their patients left participants to assume or make their own conclusions about what they were doing. One participant, who reported complete confidence using IT saw the POC-HIT as a physical barrier to the way they could interact with nurses. Alternatively, some participants recognised the benefits of POC-HIT in facilitating care, even if it changed the dynamics of their interactions with staff members '…it made it easier, everything was right there for them' (Participant 13). One participant suggested that the approach staff adopted in using the POC-HIT directly influenced their own anxiety about its use (Table 2).

Discussion

The study results confirm that patients' experience of healthcare are grounded in their perceptions of interactions with care processes and engagement with staff.[7] Participants reported that as patients they were rarely engaged or included in the nurses' care practices using the POC-HIT.

Survey and interview responses similarly identified participants' felt they were treated respectfully and adequately involved in their care decisions. However, participants also indicated that nurses' approach to using POC-HIT could interfere with their ability to interact and engage with them. Discussions with participants highlighted that they perceived nurses use of the POC-HIT to be fragmented, at times eliciting feelings of frustration. Observation and survey results similarly reflect participants' views of variable nurse-patient engagement during POC-HIT use. Patient perceptions of nurses' use of POC-HIT contrasts with Dagnone, et al.[35] findings, where participants felt the HIT aided clinical care without repercussions on clinician-patient interactions. These differences may reflect the predominant focus of the current project on patients' experience of nurse's use of POC-HIT when providing direct patient care, in contrast with Dagnone and colleagues[35] research that focused on doctors' consultations.

Similar to previous research, participants in this study desired varying levels of engagement with their care;[4,7] this was linked specifically to their level of confidence with IT and engagement with the POC-HIT. Similar to findings of Liu, et al.[36] patients' personal and socio-economic characteristics also emerged as a possible influence on their desire for engagement with HIT. Congruent to participants' self-rated IT confidence, participants not confident preferred to be passive recipients of care and not involved in nurse's use of the POC-HIT system. In contrast, participants with complete IT confidence expressed a desire for greater involvement with both the POC-HIT and with staff using it. Consistent with previous research[37], those participants describing themselves as not confident with IT also expressed concern about potential risks associated with HIT. Current findings confirm work by Hofstede, et al.[38] that suggested patients with increased exposure to and use of HIT in their everyday lives are more positive and accepting of its viability in healthcare.

Inpatient care in an acute environment provides a unique opportunity to improve patients' understanding and management of their acute health and chronic illnesses. This study highlights a consistent participant concern, across each of the IT confidence categories, that nurses rarely directed patients on how to use the POC-HIT. For example, participants from all stages of data collection described not using or even realising that the POC-HIT had educational resources available to them. The observational and survey data similarly support patient descriptions of lack of explanation by nurses of how the POC-HIT was used and how the patient could use the resources themselves.

Participants identified that the POC-HIT system interfered with their ability to engage and communicate with nurses and other clinicians. Interestingly, responses to the PPE-

15 suggest that participants believed that the hospital staff did effectively communicate with them, however the POC-HIT was identified as a barrier to this communication. The functionality and adaptability of HIT to meet the demands of its local environment without detracting from clinical care, remains one of the barriers to the acceptability of IT in acute healthcare.[39] Research by Migdal, et al.[40] found physician-patient communication to be significantly improved following the implementation of a tablet HIT. The poor communication identified in the current study, may relate to staff member's simultaneous use of the POC-HIT system while communicating with patients that resulting in a perception of task-orientated care delivery.

Nurses clinical practice associated with using the POC-HIT system influenced patients' healthcare experience. The observation data suggest that patients were only occasionally involved during nurses' interactions with the POC-HIT. Responses to the interviews and surveys supported these researcher observations; with patients describing nurses proficiently using the POC-HIT but not including them into their care practices. This finding confirms previous research that identified HIT resulted in less nurse-patient engagement as clinicians focused on the documentation.[21,41]

Participants, from all IT confidence categories, identified the potential for POC-HIT to facilitate the continuation of health records, encompassing all acute exacerbations and details of chronic illness.[35] Most participants associated the POC-HIT with streamlining care processes, however, two participants highlighted the inflexibility and repetitive nature of the POC-HIT system as preventing efficient nursing care. The adaptability of HIT to meet the requirements of the clinical setting has previously been identified as a barrier to widespread adoption in healthcare settings.[42-44]

Patients are increasingly expressing their desire for greater autonomy over managing their health and access to their health records.[35,40] Enabling independent patient access to care resources was highlighted in the study data as a potential advantage of POC-HIT. Patients with complete confidence using IT recognised that the POC-HIT could support their involvement and promote recovery, through the use of interactive care plans. Jones[45] similarly recognised individuals' readiness to engage with HIT was dependent on the accessibility of HIT, personal skills and motivation for active participation in their healthcare needs.

Limitations

This pilot study was conducted when the POC-HIT system had only recently been introduced into the chosen health service and it is possible that the study findings

might change over time once the POC-HIT system was fully imbedded into practice and nurses themselves became more familiar with the system. This study only included a small number of participants limiting the transferability of the study findings. Similarly, as some participants recruited to the study were in the process of an ongoing care regime with expectations that future care will be provided from the healthcare organisation, they might have been reluctant to be perceived as critical of the care they were receiving. Furthermore, the focus of this research was patients' experience of their interactions with nurses using the POC-HIT. As a consequence, nurses were not invited to share their perspectives, which may have provided different and possibly complementary data to better understand nurse-patient interactions; this should be considered in future research. Finally, the presence of the researcher prompted one participant to review the resources available to them on the POC-HIT, and it may also have changed nurses' behaviour when using the POC-HIT system.

Implications for practice

Patient experience is an important indicator for the quality of healthcare services. As HIT becomes increasingly embedded into acute care settings it is fundamental to understand its impact on their experiences of care.[41] Acknowledging the impact of POC-HIT on the dynamics of nurse-patient interactions in acute care, clinicians should be aware of and appropriately trained to adopt strategies to mitigate the isolating impact HIT may potentially have on patients' experience.

Direction for future research

Understanding the impact of POC-HIT on patients' experience is necessary to ensure the delivery of person-centred care. This pilot study has demonstrated the feasibility of using the tools, methods and data management in the acute healthcare context. As the periods of observation yielded consistent findings, shorter duration observations should be considered in future research. Examination of nurse perspectives should be included if the method was to be used for future interventional research to optimise the integration of POC-HIT into nurses' workflow and enhance therapeutic interactions between patients and nurses. Understanding the implications of POC-HIT on patients' experiences is key to optimising its integration into the acute healthcare environment.

Conclusion

The results from the current study identified that patients were generally receptive to the use of POC-HIT to support clinical care but nurses' actions and their own confidence with IT appeared influential on their overall experience. Participants acknowledged the ability for HIT to support continuity of care and those participants with greater IT confidence recognised its potential to be used to facilitate patient participation in care.

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