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Perioperative Nurses' Perceptions Pre-Implementation of an Electronic Medical Record System

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Abstract. The use of electronic medical record (EMR) systems is transforming health care delivery in hospitals. Perioperative nurses work in a unique high-risk health setting, hence require specific considerations for EMR implementation. This research explored perioperative nurses' perceptions of facilitators and barriers to the implementation of an EMR in their workplace to make context-specific recommendations about strategies to optimise EMR adoption. Using a qualitative exploratory descriptive design, focus group data were collected from 27 perioperative nurses across three hospital sites. Thematic analyses revealed three themes: 1) *The world is going to change*; 2) *What does it mean for me?* and 3) *We can do it, but we have some reservations*. Mapping coded data to the Theoretical Domains Framework identified prominent facilitators and barriers, and informed recommended implementation strategies for EMR adoption by perioperative nurses.

Keywords. Perioperative nurses, electronic medical record, Theoretical Domains Framework

1. Introduction

Nurses are the largest workforce in hospitals, hence their adoption of new technologies such as electronic medical records (EMRs) is crucial for successful and sustained implementation. Understanding user perceptions before introducing an EMR is a crucial step to plan the most effective strategies to support implementation. Perioperative nurses work across the pre, intra and post-operative areas, in a unique environment that is isolated, fast-paced with rapid patient turnover, stressful, incorporates multiple professions and teams, and uses highly technical equipment to care for very vulnerable

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patients [1; 2]. Introducing an EMR system into the perioperative setting can have severe negative consequences for staff and patients if not well informed and planned. Understanding nurses' perceptions of the facilitators and barriers specific to this setting can be used to inform tailored interventions to enable adoption and sustainability of the EMR.

The Theoretical Domains Framework (TDF) [3], developed for implementation research, provides a comprehensive theory about barriers and facilitators to implementation of change, and influences on behaviours in complex situations. The TDF is useful to assist understanding of what influences behaviour in a particular context and can inform evidence-based strategies to address implementation problems. It has been widely used in both research and practice with health professionals involving implementation of evidence-based recommendations, including technology [3].

The aim of this study was to explore perioperative nurses' perceptions of facilitators and barriers to the implementation of an EMR in their workplace. The objectives were to: 1) identify what perioperative nurses perceived to be facilitators and barriers to introducing an EMR into their setting; and 2) map the data to the TDF in order to inform context-specific recommendations about strategies most likely to be effective in optimising EMR adoption by nurses in this setting.

2. Methods

The qualitative exploratory descriptive design involved five focus groups to collect data from a convenience sample of 27 perioperative nurses (96% female) across three hospital sites within a single large healthcare organisation in Melbourne, Australia, in mid-2019. Low-risk ethics approval was obtained prior to commencement.

Recruitment involved e-mails to staff from nurse managers with information about the study followed up with face-to-face ward visits by the researchers. Coffee cards were offered to thank participants for their participation. All participants provided written and verbal informed consent prior to data collection.

The pragmatic approach to data collection encouraged participation by making it easy for perioperative nurses to attend a focus group. Staff rooms or unused spaces within the operating theatre and educators' offices were used so that staff could enter or leave the focus group at their convenience. Strategies to enhance the quality of data included: having mixed groups of participants with different levels of clinical experience and positions to ensure diverse views, using an experienced facilitator to lead the focus groups and ensure active participation by all attendees, and having detailed field notes collected by an observer. A semi-structured interview guide, informed by appreciative enquiry [4] used open-ended questions to gather data on nurse perceptions of an EMR implementation. Example questions included 'Why do you think the EMR is important?' and 'How prepared do you feel?' The focus groups were audio-recorded and transcribed verbatim for analyses.

Data analysis were conducted in two stages. First, a six-step inductive thematic analysis method [5] was used to inductively identify, analyse and report emergent themes within the data. Second, coded data were deductively mapped to the 14 domains of the TDF to identify the most common facilitators and barriers and inform selection of context-specific recommendations to support EMR implementation.

3. Results

Inductive thematic analysis revealed three themes with eight sub-themes.

1. *The world is going to change* captured perioperative nurses' anticipation and expectations of working with the EMR. It included three sub-themes:
   i. The work environment will change captured perioperative nurses' sense of inevitability that change will occur in their work setting and clinical practices.

"....it sort of joins everything together, if you are doing documentation, it has certain consistency…[that] is more precise and more accurate."

   ii. Clinical practices will change captured excitement, anticipation and worry about how the EMR would take the nurses into the future.

"... because we are quite fast paced in what we do in theatre, we don't want that slowing it down."

   iii. Technology going forward captured perioperative nurses' perspectives of a future world using the EMR.

"I think that's just bringing us into the future."

"...that's how technology is going and how the world is operating so the information that we need, and we want we need to have access straight away"

2. *What does it mean for me?* captured perioperative nurses' perspectives about how the EMR will impact them as individuals, in particular, how they perceived their own readiness, skills, competence and feelings about the EMR in their work setting. Three sub-themes emerged:
   i. How am I going to do it? captured what would make perioperative nurses comfortable in adopting the EMR.

"I'm pretty good with typing, [I] am a two finger typer…but I know I'm not physically computer literate…."

"I'm going to be embarrassed. I'm not gonna know what I'm doing."

   ii. Training captured the unmet expectations of EMR training for perioperative nurses.

"I am not happy with the training, the way it's been done, they have just plucked people out of the air…to train,…they are not trained in education…staff come away very anxious."

"I have had two days. I am meant to be a super user…I actually still haven't got the handle on it properly."

   i. Super users captured perioperative nurses' mixed feelings about super users.

"...Super users are great idea, but they are not always available; they might not be here; things go wrong when there's no one around."

3. *We can do it, but we have some reservations* reflected a persistent message that overall, perioperative nurses were positive about the change in their workplace with the EMR implementation. They expressed confidence, despite the uncertainties and hurdles, that they can use the EMR in their setting. Two-subthemes were:
   i. We're prepared to click, click, click captured the positivity of perioperative nurses about making the EMR work in their setting.

"I understand the technology moving forward…And I think in some respects, the EMR will be fantastic, especially once we get the hang of it and we can click, click, click."

ii. What if… captured the perioperative nurses' fear and anxiety of how they will respond if something should go wrong.

"…hospitals that have been using it, there has been so many ups and downs… if one bugs down, the rest of it breaks as well…what are we going to do?"

In the second stage of analyses, 713 coded quotes were mapped to 11 of the 14 TDF domains as illustrated in Table 1. The most frequently cited domains relevant to perioperative nurses' adoption of the EMR related to the environmental context and resources (54.3%), followed by beliefs about consequences (10.4%). The TDF domain of reinforcement was represented by only 0.9% of the coded data. The three TDF domains not mapped in this data included: social influences, intentions and memory, attention and decision processes.

Mapping the coded data to the TDF domains allowed for identification of context-specific recommendations to support an EMR implementation for perioperative nurses.

Table 1. TDF domains, percentages of domain represented by coded quotes and suggested strategies.

TDF Domains	% of coded quotes of facilitators and barriers	Recommended strategies
Environmental context and resources	54.3%	Restriction, environmental restructuring and enablement
Beliefs about consequences	10.4%	Education
Beliefs about capabilities	7.9%	Persuasion
Social professional role and identity	5.6%	Incentivization
Skills	4.9%	Education
Knowledge	4.6%	Training
Optimism	4.1%	Coercion
Goals	3.8%	Environmental restructuring
Behavioral regulation	1.8%	Enablement
Emotions	1.5%	Modelling
Reinforcement	0.9%	Enablement

4. Discussion

Overall, perioperative nurse participants were positive and confident about adopting the EMR in their workplace. They reported they were receptive to using the EMR because they felt they were quick learners, had good support and teamwork, as well as comradeship and resilience due to working in a high stress environment. Perioperative nurse participants indicated their prior experience with multiple technologies in their workplace increased their confidence. They felt that they were frequently inundated with new changes in their workplace, and were confident they could manage the EMR implementation. This finding supports the results of a previous study where nurses with more computer experience had more positive attitudes towards healthcare technology than their less experienced counterparts [6].

Despite their positive attitudes, participants also expressed anxiety, worries, fears and concerns about the implementation of an EMR in their setting. These findings correspond with previous literature reporting technology poses multiple challenges for perioperative nurses [2]. Perioperative nurse participants' concerns were most often focused on the hardware (e.g. having sufficient devices, ergonomics, and type of devices) and workflow changes with the EMR implementation (e.g. potential for slowed

workflows, shift work implications and training). Surprisingly, social influences did not emerge in the data.

As a consequence of these analyses and mapping of the data, recommendations to support EMR implementation with perioperative nurses include nurse involvement in the design and implementation of the EMR, and training customised for specific nursing groups or roles to prevent cognitive overload.

A strength of the research method used for this study was that the depth of the data allowed for thick and rich descriptions. The pragmatic methods used for recruitment and data collection encouraged participation from a wide range of information-rich perioperative nurses across three hospital sites [7; 8]. Another strength relates to theoretical and analytical triangulation [9] involving use of the TDF as a conceptual framework and employing inductive and deductive approaches to analysing the qualitative data. Data saturation that suggests the findings may be transferrable to other similar settings.

Future research is required to examine the effectiveness of strategies to support EMR implementation in perioperative settings, and how this impacts perioperative nurses' perceptions of EMR adoption, as well as their workflows and practices.

5. Conclusions

This study highlights the importance and potential benefits of developing a deep understanding of end-user perceptions before introducing an EMR into a specific health setting. Specific strategies and interventions derived from the study data can be used to alleviate perioperative nurses' anxiety and fear and has implications for the success of the system as well as patient safety and worker well-being.

Perioperative nurses were confident in their ability to adopt an EMR system within their workplace due to their experiences working in a high-stress environment with multiple technologies and feeling supported with good comradery and teamwork. This research provides insights into facilitators and barriers to EMR adoption as perceived by nurses from a specific specialty group in an Australian healthcare context.

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