

EXPERIENCES OF PROFESSIONAL NURSES USING COMPUTER TECHNOLOGY IN THE INTENSIVE CARE UNIT SETTING IN SWAZILAND

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ABSTRACT

The use of computer technology by nurses in the intensive care unit (ICU) setting is relatively new in Swaziland. In 2010, the second ICU opened in the country and very few nurses had been trained in critical care nursing. Understanding the nurses' experiences with computer technology use in the ICUs in Swaziland may reveal effective strategies for the adoption and optimisation of the new technology for patient care activities.

The purpose of this qualitative study was to explore the experiences of professional nurses using computer technology in the ICU setting in the Swazi context. Purposive sampling of ICU nurses ($N = 13$) was done at two hospitals in Swaziland to engage in individual face-to-face interviews. Colaizzi's method guided the thematic analysis of the narrative data.

Two themes emerged from the data analysis: practice value benefits and computer utilisation challenges. The narrative data revealed that the nurses valued the technology, but experienced challenges when using computers to perform their daily nursing activities. Nurses perceived that computers made work easier and contributed to quality improvement and resource utilisation. However, the challenges included a lack of institutional support and resource supplies, insufficient orientation and training and unreliable computer systems and Internet connectivity.

As the use of computers by ICU nurses becomes the standard in Swaziland, these findings suggest that a well-designed orientation and ongoing institutional support may serve

to optimise the use of the technology. Further research may explore the impact of computer technology on work-related quality of life for nurses and its effectiveness in improving patient care and clinical outcomes.

Keywords: computer technology; intensive care units; professional nurses; qualitative

INTRODUCTION AND BACKGROUND INFORMATION

The use of computer technology (CT) in the daily activities of patient nursing care in Swaziland is relatively new. If nurses have not been exposed to computer training in their educational preparation, they may lack the fundamental computer skills needed in the workplace. Further, nurses who do not own a personal computer may not have the opportunity to adequately reinforce the skills needed to use CT in the hospital setting.

Contemporary healthcare continues to transform and the introduction and use of CT in nursing have changed traditional nursing practices (Kipturgo, Kivuti-Bitok, Karani and Muiva 2014, 1). Nurses are potentially the largest group of technology users in healthcare organisations (Kipturgo et al. 2014, 2). To maximise the benefits of CT, the users (i.e. nurses) must be willing to fully embrace the technology (Nkosi, Asah and Pillay 2011, 881). Workplace computers may reduce the risk of human error (Ajayi 2013, 158), decrease the time to complete tasks and improve recordkeeping (Nkosi et al. 2011, 876); using CT also enhances the flow of information, improves the quality of clinical data (Ajayi 2013, 158) and reduces paperwork (Bhaskar and Somu 2009, 4).

Nursing documentation is a key element for the continuity and coordination of patient care. The quality of care delivery is directly related to the quality of information available to healthcare professionals (Ajayi 2013, 158; Shank, Willborn, PytlikZillig and Noel 2012, 249). Increasingly, paper records are not meeting contemporary requirements to assure quality care (Oroviogicoechea, Elliott and Watson 2008, 568). CT enables more complete and real-time data documentation, storage, organisation and retrieval than a paper-based system (Asah 2013, 500).

In a survey of Australian nurses ($N = 4\ 330$), Eley, Fallon, Sour, Buikstra and Hegney (2009, 1152) identified barriers to successful adoption of CT; computers were perceived as incompatible with traditional nursing values of human interaction and physical touch. They also noted that a lack of training, limited access to computers and unavailable technical support reduced effective utilisation. Nurses with positive attitudes towards CT are likely to enhance the quality of recorded information (Shank et al. 2012, 252).

In contrast, negative nurse attitudes may reduce effective utilisation of CT (Nkosi et al. 2011, 877). Nkosi et al. report that some nurses experience anxiety, apprehension and uneasiness with using CT in their daily practice. With a lack of orientation and training, nurses may feel overwhelmed by new technologies, stunting adoption and utilisation (Galani, Yu, Paas and Chandler 2014, 32). Nurses may fear losing their nursing skills

and expertise if they adopt CT into their clinical practice (Dahm and Wadensten 2008, 2139).

STATEMENT OF THE RESEARCH PROBLEM

The existing literature suggests that the inappropriate implementation of CT into nursing practice settings may contribute to unsuccessful adoption, inefficient use of resources and increased stress in the workplace (Ajayi 2013, 161; Asah 2013, 504-5; Galani et al. 2014, 32-3; Bhaskar and Somu 2009, 6; Nkosi et al. 2011, 877). Hospitals in Swaziland have recently introduced CT in the intensive care setting. In Swaziland, the intensive care nurses' perceptions of the impact of CT on their daily practice is unknown.

PURPOSE OF THE STUDY, OBJECTIVES, ASSUMPTIONS, RESEARCH QUESTIONS

The purpose of this study was to explore the experiences of intensive care nurses with regard to the utilisation of CT and its impact on their nursing practice. The objective was to collect qualitative data from a sample of nurses recruited from the two hospitals in Swaziland that had an intensive care unit (ICU). The research was based on an assumption that the introduction of CT in daily nursing practice was a technological innovation that may have resulted in benefits and challenges for clinical nurses in Swaziland. The qualitative design was selected on a second assumption that the open-ended questions in the participant interviews would allow for the nurses' perceptions and insights to be contextualised to the environment and appropriate to the culture. The research question posed for this study was: "What are the experiences of professional nurses in intensive care units in Swaziland using computer technology in patient care activities?"

RESEARCH METHODOLOGY

In this article a qualitative, descriptive study is described that was guided by a phenomenological approach. Only two hospitals in Swaziland had an ICU; eligible participants were professional nurses providing direct patient care in the ICU setting in either of the two hospitals. A purposive sample of ICU nurses who had experience with the use of CT in the workplace was used for in-depth interviews. The participant interviews were conducted in English by the first author. Preliminary analyses of the data were conducted following each interview. This approach allowed for participant recruitment to continue until theoretical saturation was achieved, when no new information emerged in subsequent participant interviews.

Prior to the initiation of each interview, the participants signed an informed consent document and completed a demographic sheet. The following data were collected to

characterise the sample: age, sex, educational level, prior training in CT, experience with CT in the workplace, years of experience as a nurse and years of experience in the ICU setting. Face-to-face, semi-structured participant interviews ranged from 45–60 minutes. Participants agreed to the audiotaping of the interviews; the digital recordings were transcribed verbatim for analysis. The initial interview question was: “What is your experience as an intensive care professional nurse who works with computer technology in nursing practice?” Standard probes were used to clarify narratives and to encourage in-depth, rich data. Researcher field notes were made to inform the subsequent data analyses.

Qualitative Data Analysis

The qualitative data were analysed using Colaizzi’s method (Polit and Beck 2012, 566). Data collection and analysis were concurrent. Initially, transcripts were read for accuracy and completeness. Then, the analysis began with open coding to highlight words and phrases relevant to the research question and create basic categories. Axial coding was used to formulate meanings, establish relationships between categories and identify emerging themes. The preliminary findings were validated through member checking. The analysis resulted in a rich and exhaustive description of the experiences of ICU nurses utilising CT in their nursing practice.

Ethics

The study was approved by the Medical Research Ethics Committee of the University of Limpopo (South Africa), Medunsa Campus (MREC/H/98/2010: PG). Permission to conduct the study and recruit the sample was obtained from the appropriate hospital administrators and unit managers. Informed consent to engage in audiotaped interviews was obtained from all participants. Interviews were conducted in private offices to protect participant privacy and reduce the threat of interruptions.

RESULTS

Sample Characteristics

Professional nurses ($N = 13$) working in the ICUs in Swaziland were recruited for this study. The sample comprised female ($n = 9$) and male ($n = 4$) nurses who ranged in age from 24 to 48 years old. The participants’ years of experience as an ICU nurse ranged from 1 to 24 years. The majority of the participants ($n = 9$) had received no formal ICU training and approximately half ($n = 7$) had received no basic CT training.

Qualitative Results

The analysis of the narrative data led to the emergence of two themes. The first theme, practice value benefits, relates to the nurses' benefits of utilising CT in their nursing practice. The second theme, computer utilisation challenges, describes the challenges faced by the participants when utilising computers in the ICU setting.

THEME 1: PRACTICE VALUE BENEFITS

The nurse participants spoke of the benefits of having CT available in the ICU to support patient care. Their perspectives describe how CT makes work easier and enhances quality improvement.

Makes work easier

All of the participants ($N = 13$) explained how CT made their work easier. For example, CT had helped some busy ICU nurses by reducing stress and increasing motivation:

"we always work under pressure. I feel it's the best for nurses to work with computer technology than doing it manually because it makes it easier for me to do my nursing care" (P5)

"[CT] makes our nursing care a lot easier, I feel the computer has brought with it job satisfaction" (P8)

"it [CT] can take away the burnout which is sometimes caused by too much writing because there is too much paperwork in the nursing profession" (P13)

The participants noted that computerised documentation provided evidence of nursing care delivery. Further, CT made it easier for the nurses to review and edit their patients' health records. A participant reported:

"I can be able to amend/change any form or work on my own ... and ... if there is a mistake you can rectify it and correct it yourself ... it's very easy to edit your work" (P8)

The CT also made nursing care more efficient, particularly when there were few staff on duty. Participants shared the following:

"the central monitor helps us to monitor what is happening to patients when you are in the duty room, especially when you alone in the unit as a nurse monitoring the patients" (P3)

"we don't take vital signs manually, but we just check the readings from the monitor screens and record them" (P10)

Nurses extolled the advantages of CT:

"Using the computer... makes it easy for us to retrieve patients' information if there is a need... the patient's information is just a click away" (P10)

“It also compensates the shortage of nurses in the unit ... now we are able to access or retrieve the tests results from the laboratory than actually going there to fetch them” (P10)

The benefit of “saving time” meant more time to engage in direct patient care activities:

“you don’t spend a lot of time taking vital signs... that time which you could be using for doing something else for the patients” (P1)

Benefits of CT indirectly related to patient care included using computers for communication, scheduling and formulating reports:

“they are also used for communication purposes between the unit staff members and also between the staff and the doctors, especially if it’s work related or it concerns the patients” (P12)

These regular tasks were easier with the introduction of computers. One participant imagined the opportunities of extending the use of CT beyond the day-to-day tasks:

“I think that using computers will bring great benefits in the nursing profession which we have not yet seen... ensuring massive communication and networking among other hospitals, colleagues and countries” (P11)

Additionally, CT facilitated the development of new ICU forms and policies. The participants also mentioned that CT uses less energy and paper and saves space by reducing the need for filing cabinets.

Enhances quality improvement

Participants described how CT improves the overall quality of care:

“the computer... has improved the way we document our daily care rendered to the patients” (P13)

“having the computer is a good step towards ... achieving and providing quality healthcare to the society of Swaziland ... and has improved documentation generally” (P8)

“we are able to store information safely as compared to the pen and paper system ... documents get lost easily” (P5)

“computers are safe ... passwords restrict the access to patients’ information to staff members only” (P9)

The majority of the participants extolled the benefits of the Internet to supplement their knowledge with up-to-date clinical information:

“The Internet keeps us knowledgeable and competent with current information and skills... nursing is dynamic, so you need to stay informed on current nursing management and care” (P13)

“we usually use the computers to research for knowledge about the conditions ... the Internet has the very current information ... as compared to the books that we have, some of them are old and outdated” (P9)

THEME 2: COMPUTER TECHNOLOGY UTILISATION CHALLENGES

The participants varied in their reported knowledge, skill and experience with the use of computers. They identified numerous factors that affected the adoption (and optimisation) of CT in their nursing practice. The second theme described four challenges to utilising CT in the ICU setting: 1) lack of training, 2) inadequate support, 3) insufficient equipment and 4) the unreliability of the technology.

Lack of training

The overwhelming majority of the participants ($n = 12$) acknowledged lacking the skills to use CT efficiently. Their nursing programmes did not cover the fundamentals of computer usage. Nurses who were working in the ICU before the introduction of computers had not received formal training when the CT was introduced. Others did not receive formal computer training during their orientation to the ICU setting:

“I can say there is no training ... I did not receive any formal training, I trained myself at home, I started by buying the computer, played games, and typed some few words and my kids also helped me” (P3)

“there is no training provided, so we learn at home and on the job from others or you have to do it on your own using your spare time. All of us, we are interested in attending a formal training” (P8)

“what makes it worse is that ... it’s not even in their plans to do that [provide training] so the only option is to attend the training on your own during your spare time and using your money” (P9)

For many of these participants, the lack of formal training resulted in feelings of incompetence or worse:

“I’m not competent, when I did my Diploma in nursing, the computer course was not there” (P9)

“I’m not very comfortable ... I don’t really have a good background with computers” (P5)

“When the computer is having a problem, you don’t know whether it’s because we are not competent enough ... sometimes I do blame myself, thinking maybe I did not click the right things” (P6)

“sometimes, the computers are down because someone was fiddling with them not knowing what he/she is doing, so it’s a trial and error” (P10)

Participants learnt CT skills from one another or waited for assistance:

“some of my colleagues use the computers to polish up their skills ... it’s not everybody who went for computer training. Some are being trained on-the-job by colleagues who have the expertise” (P10)

“not everybody in the unit is able to use the computer comfortable so some they end up waiting for someone to help them do work in the computer or get information” (P8)

Inadequate support

The participants expressed the need for administrators to appreciate the importance of CT, the need for support mechanisms and the shared responsibility for effective usage:

“it is important for the management to consult the nurse when they want to introduce computer technology because they are the ones who know their unit needs and they will be using the computers” (P8)

“there is no support especially with our management here because they are less interested, maybe it’s because they are computer illiterate themselves or it’s due to financial problems ... they are concerned with patients’ care, not what the nurses need to improve the nursing care” (P3)

The participants believed that administrators were unaware of the CT problems they faced, resulting in feelings of demotivation. There was a lack of technical support necessary to maintain the computers, retain valuable data files, or prevent the computers from crashing:

“there is nobody responsible for repairing the computers here” (P2)

“I would like to have a technician who will be stationed in the hospital to help fix any problem with the computer as soon as possible but, at the moment, we don’t have one around” (P4)

Though preferring to have CT replace the pen-and-paper system, the participants were concerned that occasional computer problems resulted in important files being irretrievable or damaged.

Another consequence of insufficient administrative support was the lack of policies regulating the use of the computers by the nurses. The ICU unit had limited computers. Hence, the nurses experienced annoyance with colleagues who used the computers for their own personal use during working hours:

“My colleagues like playing games most of the time. So, when you want to use the computer for work-related things like documentation ... it’s like you are bothering or irritating them.” (P7)

“Colleagues spend more time using the computer, surfing the Internet and doing things that are not work-related. So you find that it’s impossible to do your work. So I feel everybody must respect the fact that the computers are for doing work-related stuff, not personal stuff, because

we end up forgetting or not documenting ... there is no restriction on using the computer, so rules must be laid down for everybody to follow” (P9)

The unrestricted access allowed the downloading of malware that could destabilise the system:

“Strong rules on how to use the computers are needed because some bring things which are full of viruses to infect the computer which causes the computer to freeze or crash and we lose all the data we had” (P7)

Time and resources were wasted when faulty computers forced the nurses to return to the pen-and-paper system to document patient care.

Insufficient equipment

All of the participants bemoaned not having enough computers in the ICU. The first hospital had one for documentation and one central monitor; the second hospital had two computers for documentation and one central monitor. This resulted in nurses having to delay documentation until a computer was available:

“We have one computer ... if we could have two computers maybe that could help ... if one is faulty, we can use the other one so that there is no disturbance on our documentation of our nursing care” (P3)

“Having one computer is a big challenge for us in the unit because we have to take turns in using it and when it’s taken for fixing we are left with nothing to use” (P6)

“Sometimes, they are both faulty. So we are left stranded without something to use” (P12)

The participants were not aware of any plans to provide additional computers at either of the hospitals. They felt that the lack of equipment decreased their satisfaction with CT overall.

Unreliability of CT

Although CT was a benefit to the participants, it was not dependable. As a consequence of the instability of the system, they were concerned when patient data and information were lost in a computer mishap. Their uncertainty undermined their confidence in the computers:

“We have lost some information in the past, although I can’t say exactly what was the cause... maybe it’s viruses” (P4)

“Data is lost and it becomes very difficult sometimes for us to restore the lost information... sometimes data is deleted by us as nurses by mistake” (P11)

“I don't think we can completely run away from the pen and paper system because computers are sometimes faulty; they can crash so you can't trust them completely with the patients' information” (P1)

Participants noted that software was not regularly updated and outdated antivirus programs were insufficient to protect the ICU computer systems.

In summary, the study participants were able to identify both benefits and disadvantages of using CT in the ICU setting. There were no significant differences in the perceptions of the nurses from one hospital to the other; there were similar issues in both institutions.

DISCUSSION OF THE FINDINGS

The participants in this study identified benefits to using CT in the ICU setting. Nurses felt that CT saved time and made their daily nursing care work easier. A major advantage of computers is that nurses can access patients' clinical records in a matter of minutes; it is no longer necessary to search through stacks of papers (Boone 2012). This study confirmed previous research findings that nurses preferred to use computers to schedule nursing shifts (Greenwood 2016) and store patient information (Williams 2016).

These participants supported previous findings that computers improve the nurses' ability to make decisions in a timely manner (Abdrbo, Hudak, Anthony and Douglas 2011, 286). Further, they felt that retrieving clinical information from the Internet enhanced understanding of diseases and conditions. Computers allow access to library databases that update working nurses (Boone 2012). The participants in this study felt that searching the Internet also helped them to implement interventions according to standard guidelines.

These findings support the assertion that CT improves the quality of data recording; electronic records are more complete, accurate and up-to-date and may reduce redundancy (Oroviogicochea et al. 2008, 570). These findings provide evidence that computerised documentation has the benefit of minimising errors and omissions in the patient's record. This study, similar to findings by Urquhart, Currell, Grant and Hardiker (2010), showed that CT decreased the time required for data entry and reduced the number of paper files.

The participants in this study described how inadequate equipment and lack of technical support contributed to demotivation. Nurses perceived that CT did not alleviate their workload when they experienced challenges that impeded their motivation to use CT (Asah 2013, 505; Eley et al. 2009, 1154; Koivunen, Valimaki, Koskinen, Staggers and Katajisto 2009, 1142; Mitchell, Ryan, Carson and McCann 2007, 2292). There were very few computers in these ICUs; research has found that having too few computers results in nurses having to stand in a queue to get their work done (Eley et al. 2009, 1155). Similarly, Mitchell et al. (2007, 2293) reported that nurses complained about the

time taken to queue for computers, gain access to the Internet and download clinical materials.

The nurses surveyed in this study described how unreliable computer systems disrupt nurses' work flow. Eley et al. (2009, 1154) mention reliability of equipment as a serious barrier to using CT effectively. These nurses were uncertain whether patient records were safe or whether CT could be adopted wholeheartedly due to the potential loss of data. Similarly, researchers (Asah 2013, 501; Hardwick, Pudilo and Adelson 2007, 253; Sarfo and Asiedu 2013, 218; Shank et al. 2012, 252) have identified slow response, software problems, data security, or the loss of patient data as the result of CT failure or downtime.

The participants in this study needed training to maximise the benefits of CT in the ICU setting. Previous research (Eley et al. 2009, 1152) has identified barriers to nurses adopting CT as including the lack of training, lack of confidence with computer skills and the incompatibility of computers with traditional nursing values. When the selection of computer hardware and software applications does not meet the needs of the nurses, their motivation to embrace CT may be undermined (Cross and MacDonald 2013, 117). Similarly, Koivunen et al. (2009, 1145) describe how a lack of CT training leads to nurses experiencing a lack of interest and a fear of losing patient information. Similar to our findings, these authors note that barriers to using CT include a lack of technical support, lack of CT training in nursing schools, not having a computer at home and a lack of time to use computers at work.

RECOMMENDATIONS

It is recommended that institutional leaders and nursing administrators in Swazi hospitals be committed to the integration of CT into the ICU setting. The findings of this study support the conclusion that the successful introduction, adoption and utilisation will require that nurses take an active role in the selection, implementation and evaluation of CT (Kipturgo et al. 2014, 2). It is recommended that the hospital administrators conduct a comprehensive assessment of the nurses' computer literacy and technology skills so that appropriate training programmes can be developed to target their specific needs.

Nursing leaders need to appreciate the benefits and challenges that their nurses face when using new technologies. It is recommended that administrators consult the nurses (as end-users) as an ongoing assessment of the issues that arise with the use of CT in the ICU setting and find solutions appropriate to the context. It is also recommended that the implementation of CT be supported by a clear plan for maintaining the hardware and upgrading the software to ensure system stability.

Administrators should consider that sustaining an effective computer system requires an initial start-up financial investment (equipment and software) as well as ongoing expenses for personnel (information technology specialists). To maximise the benefits of CT in the ICU, and reduce the threats to the system, clear and comprehensive

policies should be written to address the appropriate use of the computers by all health care workers with access to the equipment.

It is recommended that the curricula of nursing programmes be expanded to integrate the necessary computer-related content and practical training to ensure that new graduates possess the skills to utilise computers effectively in the patient care environment.

Research is needed to describe how nursing administrators can best support the effective computerisation of their facilities. Further research may evaluate the impact of CT on nursing competencies, team effectiveness, or patient outcomes.

LIMITATIONS OF THE STUDY

This study recruited nearly half of all the ICU nurses in Swaziland at the time of data collection. The findings specific to the experiences of the Swazi nurses may not be generalised outside of the country. However, many aspects of their experience with adopting – and adapting to – the use of CT may be transferable to other settings.

CONCLUSIONS

In conclusion, the nurses in the ICUs appreciated working with CT and believed that computers improved the quality of their nursing care, enhanced the work flow and contributed to their job satisfaction. However, nurses were found to be unprepared by their basic nursing educational programmes for the use of CT in the workplace. Furthermore, there was a lack of formal orientation to the hardware and software by their employing institutions and no ongoing refresher courses to improve their skills. Finally, the importance of having administrative support for the use and maintenance of CT cannot be underestimated.

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