

An exploration of the education and training experiences of ICU nurses in using computerised equipment

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KEY WORDS

ICU, computerised equipment, nursing education

ABSTRACT

Objective

To explore the education and training experiences of intensive care unit (ICU) registered nurses in using computerised technologies and to assess the relationship it has with role performance and level of clinical experience.

Design

A qualitative study using semi-structured in-depth interviews.

Setting

Two general ICUs, one of which was fully computerised with a Clinical Information System (CIS) and the other partially computerised with a Central Monitoring System (CMS).

Subjects

In each setting a clinical nurse consultant (CNC), a clinical nurse specialist (CNS) and a registered nurse (RN) with less than twelve months experience in ICU were interviewed; six nursing staff in total.

Main Outcome measure

Identification of the main themes underpinning ICU nurses' perceptions and experiences of education and training in using computerised equipment with regard to their perceived roles and clinical experience.

Results

Participants identified a range of formal and informal education and training sources available to them within their ICU setting and articulated both positive and negative experiences associated with using computerised technologies. Their level of confidence in using computerised technologies was clearly related to their years of experience and differentiated clinical nursing roles and reflected whether they worked in a fully or partially computerised unit.

Conclusion

Further research needs to be undertaken to investigate the training needs of ICU nurses to use computerised equipment.

INTRODUCTION

Computerised equipment is increasingly used in fast-paced health care environments such as ICUs where core decisions must be made quickly. Registered nurses working in these environments are expected to be knowledgeable and capable of using a variety of computerised equipment in their everyday clinical practice. Previous studies have examined the range of computerised equipment used (O'Connell and Craig 2008); how these computerised technologies contribute to improving patient care (Zytkowski 2003); and the manner in which ICU nurses practice and document their care, all of which are directly related to computerised technological advances (Rivers et al 2003). Previous research identified nursing education as the major factor for the safe and effective use of computerised technologies in health care to ensure positive patient outcomes (McConnell 1998; Neighbours et al 1991).

There are no general computerised equipment courses for ICU nurses in the Sydney (NSW Australia) metropolitan area; the responsibility for the training and education in these technologies lies with the employing hospital. The expected standard for the handling of computerised equipment is a combination of skills, behaviour and knowledge that are necessary for demonstrating competence (McConnell and Murphy 1990). To achieve this standard, education and in-service training are necessary to provide the knowledge and skills to understand how computerised equipment functions, what it measures, and the interpretation of the data (Pelletier et al 1998). The Dreyfus model purports there are different skill levels that are required for different clinical nursing roles. Skill acquisition in the practice of ICU nursing has been investigated with this model indicating differentiated clinical nursing roles (Benner et al 1992).

For this study, computerised equipment used in the ICU was defined as computerised equipment producing patient data. This comprised all the monitoring systems and individual stand alone computerised equipment that was externally attached or inserted into the patient. The data readout was either manually recorded as occurs in partially

computerised ICUs with CMS, or a computerised readout was generated in fully computerised ICUs with CIS. It was assumed there would be differences in the training needs of registered nurses in these ICUs therefore both types of ICU were included.

The in-depth interviews were conducted as the first stage of a two-stage research project. The themes identified will be used in a survey of ICU nurses during stage two.

AIM OF THE RESEARCH

To explore ICU nurses' training and education experiences with computerised equipment and the relationship between these experiences and their clinical nursing roles.

METHODOLOGY

A qualitative methodology using semi structured, in-depth interviews was used. A phenomenological approach was used because the person's individual experience is at the centre of the study and an honest account of the experience is more likely to be elicited with a close participant relationship with the researcher (Appleton 1995). The interviewer, an ICU nurse with many years experience, was able to facilitate a closer relationship in exploring the participants' experience.

The research was undertaken in two public hospital ICUs in the Sydney (NSW Australia) metropolitan area. The hospitals chosen were representative of the computerised environment and range of equipment used in ICUs in Australia. Additionally, the bed capacity of these units meant that nurse staffing levels were representative of a cross-section of experience, training and education in this population.

From one fully and one partially computerised ICU, three members of nursing staff were asked to volunteer. The first was a CNC, the second a CNS who was a senior member of nursing staff with a minimum of two years experience in ICU and the third a more junior registered nurse with up to twelve months ICU experience. It was anticipated their responses would differ depending on their differentiated clinical role and level of expertise and training.

Table 1: Framework of themes and categories that emerged from the interview data

Themes
Sources of computerised equipment education/training <ul style="list-style-type: none"> • On-the-job experiences • Clinical nurse educator as the main educator • Company representatives • Data manager • Buddying • Formal ICU courses
Positive clinical experiences of using computerised equipment <ul style="list-style-type: none"> • Availability of information • Accuracy • Legibility • One log on • Incident reporting/auditing procedures • Education opportunities
Negative clinical experiences of using computerised equipment <ul style="list-style-type: none"> • Frustration with computerised equipment • Checking of data and equipment • Fear factor • Time consuming
Key themes by differentiated clinical nursing role <p>RN:</p> <ul style="list-style-type: none"> • Focus on patient • Limited situational response • Not at ease in situations <p>CNS:</p> <ul style="list-style-type: none"> • Adaptability to situational change • Heightened perceptions giving a broader view <p>CNC:</p> <ul style="list-style-type: none"> • Broad overview • Better grasp of a situation with precedent/pattern recognition

The Nurse Unit Manager from each unit was contacted and verbal approval sought for staff to participate in interviews. All interviewees agreed to have their interviews taped. These tapes were transcribed and scrutinised to identify themes and categories (table 1).

Ethics approval was obtained from the Human Ethics Research Committee in the relevant area health services and the University of Sydney.

FINDINGS OF THE STUDY

Individual members of staff articulated different perspectives and experiences and these were directly related to their differentiated clinical roles and level of expertise and training. Four main themes emerged and are discussed below. The comments quoted are those that typified the general responses of the participating ICU nurses.

The six interviews revealed common experiences and perceptions regardless of differentiated clinical nursing role. However there were also differences in the responses related to the nursing role. Only two of the participants considered themselves computer literate, one fairly proficient and the other reasonably computer literate. The other four participants considered their computer literacy as poor to average. The level of computer literacy however is not a barrier to computerised equipment competency.

DISCUSSION

Experiences of critical care computerised equipment education/training

The nurses' education and training to use computerised equipment was mainly through on-the-job experiences. In general, the more experienced nursing staff reported feeling comfortable with their training with computerised equipment.

The Clinical Nurse Educator (CNE) was the main trainer in both types of units, but other members of staff also could be involved. In the fully computerised unit there was a data manager who, even though holding a non-clinical position, could be called on to give in-service lectures and troubleshoot technical difficulties with equipment. The other person in both types of units was the preceptor or buddy, who was the key resource person for new staff members. Orientation to the ICU normally involved having a preceptor working along side the junior registered nurse for the first four weeks.

Only limited orientation and restricted buddying occurred in the partially computerised unit due to staffing issues.

The junior registered nurse felt that: *“only a basic level of computerised equipment knowledge was received in [her] orientation...[and]...there was a need for more education as computerised equipment is so complex and so complicated.”*

Staffing problems identified included decreased staffing levels and a busy unit. Trying to accommodate new 12 hour day/night shift patterns to relieve staffing shortages also created problems with buddying new staff, who only worked day shifts.

Representatives from the company installing the equipment were also a source of training. Both CNCs acknowledged they had received good training and had positive experiences with company representatives demonstrating and troubleshooting computerised equipment. One commented: *“You could ask them all the hard things and they would either find out or they would know.”*

Formal ICU courses did not provide training in using computerised equipment. This is understandable with the diversity and non-standardisation of computerised technologies used in ICUs. The four senior members of nursing staff had all completed critical care courses, either through the hospital or tertiary system. When asked if their ICU courses introduced them to computerised equipment the consensus was they had not: *“We all had different equipment in our hospitals and it really depended on what equipment your hospital had, as to what you were using and got to know about.”*

Positive clinical experiences of using computerised equipment in the ICU

The most positive aspect of full computerisation was the ready access to patient data. As the CNS commented: *“the availability of information at your fingertips... saves time” [and therefore] “you are more likely to follow things through.”*

The creation of a more user-friendly system with only one log on, which permitted access to all data, was the major advantage of a fully computerised

system over a partially computerised system that required multiple user passwords. This gave a more comprehensive picture of the patient’s progress at any given time.

On a fully computerised system the legibility of typed documentation eliminated any possibility of misinterpretation of medication orders or patient’s progress notes. Data capture accuracy was also a major advantage in a fully computerised unit giving a time specific picture of the patient’s physiological condition from the bedside monitor.

“The computerised system... downloads exactly what it sees on the monitor... [and] tells you exactly what the observation was...”

The junior registered nurse preferred the fully computerised equipment because: *“Having a fully monitored patient gives predictive information of future problems which can then be treated...”*

Fully computerised systems allow for continual monitoring and auditing of data. Further education is required where there are blanks or spaces on fully computerised 24 hour care charts, thus the nurse unit manager can regularly audit the data and address any problems. Auditing practices, such as incident reporting, were viewed positively by staff from both units because they contributed to the nurses’ continuing professional education. All participants were familiar with how to complete incident forms. The use of such forms highlighted problems and gave some information as to what factors may have had an impact on the situation, such as staffing levels or time of day.

“... one of the contributing factors may be that there was not enough staff for all of those patients, [or]... it was tea-time so there was only half the staff around and... no one was there to watch someone....”

Another positive experience of using computerised equipment was the opportunity to have extra education in an effort to overcome any fear of the new technology. As a CNS commented: *“...extra training days... helped overcome computer literacy problems.”*

Negative clinical experiences of using computerised equipment in the ICU

Frustration with computerised technologies was a common complaint but differed in the type of unit. In the fully computerised unit, staff expressed irritation with their dependency on external technical support staff and the time consuming problem it created.

“Before you had full manipulation and you could see how things worked... [now] you have to tell the company, wait for them to fix it and you are left without anything to fix yourself...”

In the partially computerised unit a different type of problem presented, with the CNC stating: *“... we currently have manual data entry onto the database which is time consuming...it just puts someone else in between the people who want to use the information [the clinicians] and the actual information...”*

All participants felt that computerised systems were generally accurate, however inaccuracies do occur. ICU nurses use their experience and training and do not just rely on the equipment. In fully computerised units, staff attentiveness to the correct positioning of computerised equipment for an accurate data measurement was vital. In partially computerised units, computerised equipment was checked for accuracy of measurement with comparisons made against non-invasive methods. Sometimes computerised equipment could supply inaccurate information as it did for the junior registered nurse: *“I have just had to do a non invasive blood pressure because my arterial line is not giving me the correct blood pressure so...you are still making sure that your computerised equipment is working properly...”*

The clinical nurse specialists and the registered nurses acknowledged that both types of computerised system had aspects that could be overwhelming or daunting. The lack of familiarity with individual pieces of computerised equipment could create a fear factor initially.

“I found it quite daunting...even my typing is atrocious...it took me a long time to get over the whole computerised thing...”

This fear factor did decrease with time and practice. The junior registered nurse also said: *“...once you know how to use it, it is quite simple...”*

Participants from both units complained that computerised equipment could be time consuming and thereby take the focus away from patient care.

The same junior RN noted, *“seeing all the monitors and the computer and everything and wondering if there actually was a patient under there.”*

Perceived Nursing Roles in the Intensive Care Unit

It was clear from participants' responses that their different levels of skill in using computerised equipment impacted on their reactions to it and their confidence level.

RNs:

The narratives of the junior registered nurses focused on what had to be done for the patient during their shift. The multiple and competing tasks that needed to be performed caused concern and anxiety as to how to organise and prioritise these tasks:

“.. we had been told you will be focusing on your patient... but every time they described how to use everything I just kept looking at it going, I am never going to remember this.”

Junior registered nurses assessed situations in terms of how it affected them, not in terms of the situation or how the patient responded.

“Not working out what the problem was... like the alarm went off... what is it and then you... calm yourself down; look it might be something just simple, but you always think the worst.”

The junior registered nurses also acknowledged it take time to familiarise themselves with the equipment and they are not at ease with situations as were more experienced nurses.

“I still have to go and ask someone how to put in the different data into the Percutaneous Insertion Continuous Cardiac Output machine....”

CNSs:

The more experienced CNSs showed greater proficiency by recognising that situational change

requires actions other than those they may have envisioned.

"..If there is an issue at the time...like someone might point it out... and give a little in-service on it at that time. Often the person in-charge... sees what has been done and what hasn't been done and something might have been missed that can [be rectified] at that time. Instead of waiting for something to happen..."

The transition from analysis and interpretation to direct understanding by the CNSs captures their heightened perception of a situation.

"... because it is...not really familiar...When I am there I think it is easy, it is...just that you've got to apply it to the patient, you've got to act when something happens..."

CNCs:

As an expert practitioner, the CNC is expected to grasp a situation immediately and act accordingly. They have a broad overview of the situation that is informed by formal and informal knowledge and years of clinical experience.

"I think on that first day they [orientating RNs] get a bit of information overload... not until they actually work with the patient and see why they are doing something can they say OK I need to do that; I need to press these keys and... go through these screens, to get some meaning behind why they do it"

[Problems with software?] *"Usually the company people do that. Every so often if it is a mechanical thing our local people do it. But usually it always ends up going back to the company- like if we have trouble with our modules, they can go downstairs to our biomedes".*

The capacity for pattern recognition is another attribute of the expert practitioner.

"... We orientate a lot of people... they obviously come from a variety of ages. I do perceive... that the younger graduates... take on the computerized system with a lot more ease than senior nurses that come from another area. They may be well experienced... but they certainly do find it a challenge working with

the computerised system if they have worked their whole lives on paper."

CONCLUSION

The diversity of participant's responses indicated there were a range of issues requiring consideration. The overall impression gained from interviewing the ICU nursing staff was that the education given in the fully computerised unit gave staff a more confident user approach. Perhaps the fact there was no paper used in this unit allowed the focus to be on the computerised equipment. This creates a different mind set. There were both positive and negative experiences in both types of unit. However the better relationship with education and training is reflected by staff working in the fully computerised unit who all commented on more positive experiences. The negative clinical experiences using computerised equipment, the frustration, the fear factor, the numerous user passwords and the time consuming nature of managing computerised equipment remain indicative of problems with complex technologies that continue to impact on clinical nursing practice in the ICU. Different clinical nursing roles in the ICU demonstrated different degrees of confidence that could also be related to their years of experience.

Further research should be undertaken to investigate ICU nurses' education and training experiences including what methods ICU nurses would like to see employed for future computerised equipment education.

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