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Situation awareness in undergraduate nursing students managing simulated patient deterioration

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SUMMARY

Background: Nursing work often occurs in complex and potentially hazardous settings. Awareness of patient and practice environments is an imperative for nurses in practice.
Objectives: To explore nursing students' situation awareness while engaging in simulated patient deterioration scenarios.
Design: The educational process of FIRST^{2}ACT was the model for the nurse intervention. Situation awareness was measured quantitatively using the Situation Awareness Global Assessment tool. Four domains were measured: physiological perception (patient parameters), global perception (surroundings), comprehension (interpretation of information), and projection (forecasting outcomes).
Settings: Clinical laboratories at each of three participating universities.
Participants: Ninety-seven nursing students from three Australian universities.
Methods: Between March and July 2012, students participated in three video-recorded simulation events, in which a trained actor played patient roles and groups of three students worked as teams. To measure situation awareness, following the simulation each team leader was taken to a separate room and asked to report on a question set regarding the patient's vital signs, bedside setting and medical diagnosis.
Results and Conclusions: Overall, situation awareness was low (41%). Of the four domains, physiological perceptions scored the lowest (26%) and projection the highest (59%).
Final year nursing students may not have well developed situation awareness skills, especially when dealing with these types of scenarios. Education providers need to consider ways to assist students to fully develop this attribute. Findings suggest that this is an aspect of undergraduate nursing education that requires significant consideration by curriculum developers.
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Introduction

Nursing work environments are complex and potentially hazardous as the work is cognitively demanding and also interdependent. Such work requires effective formulation of priorities and focused attention, with little margin for human error. In such environments, recognising and responding to the deteriorating patient can be difficult. Non-technical aspects such as social and cognitive skills, including situation awareness (SA), are paramount for timely clinical decision-making, appropriate management and quality patient care outcomes. However, to date little focus in undergraduate nursing education has been placed on the development of SA skills.

Background

Situation awareness has been defined as "one's perceptions of the elements of the environment, the comprehension of their meaning, and the projection of their status in the near future" (Wright and Fallacaro, 2011). According to Flin et al. (2008), SA is simply "knowing what is going on around you." SA is the first step in decision-making because it provides an understanding of what is happening and what is likely to occur next, and has been described as an inherent model for safe decision-making (Stubbings et al., 2012; Singh et al., 2006).

The concept of SA was first recognised in the aviation industry and in industrial engineering (Sitterding et al., 2012) occupations identified as requiring workers to think on their feet and make decisions while under

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duress. The importance of SA in health care delivery has gained recent recognition in nursing (Sitterding et al., 2012; Stubbings et al., 2012; Wright and Fallacaro, 2011), medicine (Singh et al., 2006), surgery (Hazelhurst et al., 2007) and anaesthetics (Fioratou et al., 2010).

Three hierarchical levels of SA have been identified: Perception, Comprehension and Projection (Endsley, 1988, 2000). 'Perception' of the current situation is the first and most basic level of SA that can be activated through a number of receptors: visual, auditory, tactile, olfactory, or taste — resulting in a gathering of information. This is defined as one's perception of the elements of the environment (Sitterding et al., 2012; Wright and Fallacaro, 2011). 'Comprehension' includes interpreting information and is critical as to how the individual integrates and assigns meaning to multiple pieces of information to enable prioritisation of tasks, that in turn influence performance (Sitterding et al., 2012). 'Projection', the third and highest level of SA, is the ability to forecast future events (such as impending patient decline) (Sitterding et al., 2012). The ability to forecast what can happen in the future and anticipate future situations is key to early recognition and averts serious patient deterioration (Stubbings et al., 2012).

Situation awareness has emerged as an important attribute for nurses, primarily due to the increased understanding of the influence of human factors in nursing and patient care (Bucknall, 2003; Sitterding et al., 2012). Nursing has been identified as being a profession that is particularly cognitively demanding requiring task prioritisation and continuous focused attention to mitigate against patient deterioration. Thus the starting point for thinking in action in nursing is to perceive and understand the nature of a clinical situation (Stubbings et al., 2012) and avert risk of patient care errors.

Situation awareness plays an important role in effective identification and management of patient deterioration. Close monitoring of physiological parameters, such as vital signs, can facilitate recognition of variations from normal before a patient's condition becomes severe. Furthermore, effective communication and teamwork can ensure that patient concerns are transferred throughout different shifts and relevant health professionals (Beaumont et al., 2008). This can also include impairment in patient communication. Cioffi et al. (2009) report that detection of patient deterioration could be mediated in patients from culturally and linguistically diverse backgrounds or where they were cognitively impaired and unable to voice what they were experiencing. Hence, it is an important aspect for development in nurses.

In the operating room, SA has been identified as involving awareness of everything taking place within the room, understanding what is happening and what might occur next (Wauben et al., 2011). Mitchell et al. (2011) assert that scrub nurses need to use situation awareness to think ahead of the surgeon to anticipate what instruments will be required next. Within the operating room environment, situation awareness of team members has been identified as a key attribute for communication and coordination of roles and responsibilities and subsequently, assurance of patient safety (Fioratou et al., 2010; Hazelhurst et al., 2007; Parush et al., 2011). Similarly, situation awareness for each team member is important to ensure patient safety in other areas where teams must work closely together (Mitchell et al., 2011; Parush et al., 2011; Wauben et al., 2011).

There is evidence demonstrating that a range of individual and environmental factors can impair and distract a nurse's SA including stress, tiredness, noise, technology and heavy work demands requiring the nurse to multi-task (Bucknall, 2003). Time pressure can also be a significant constraint that can lead to panicked (reactive) decision-making, a factor that has particular application in nursing (Thompson et al., 2008, 2009). Flin et al. (2008) also identify that fixation on one aspect, contradictory or ambiguous information, and personal conflicts can all hinder one's SA.

Despite its importance, few studies have examined SA in nursing. Cooper et al. (2011) examined the abilities of 44 nurses in managing patient deterioration in one Australian rural hospital using scenarios with patient actors. The researchers found low SA in the areas of global perception and comprehension, and that younger nurses had higher SA. In another study, Cooper et al. (2012a) studied how 35 registered nurses from one ward in a rural Australian hospital managed patient deterioration. Using trained actors as simulated patients with either Acute Myocardial Infarction (AMI) or Chronic Obstructive Pulmonary Disease (COPD), they found that the registered nurse participants demonstrated poor situation awareness in recalling physiological parameters and moderate understanding of the situation.

Similarly, little work has examined SA in nursing students. In Australia, Cooper et al. (2010) explored 51 final year undergraduate nursing students' abilities to assess, identify and respond to two scenarios of patient deterioration in a simulated mannequin-based setting. Measured situation awareness showed high variability although relatively low scores. Most students identified physiological indicators and scored least well on comprehension of what was wrong and why. This suggests that overall all aspects of situation awareness require attention in undergraduate curricula.

Greater understanding of SA in acute care nursing and identification of factors that influence nurses' SA could lead to the design and implementation of interventions which maximise nurse attention, minimise external noise and distraction thus reducing patient care error. If a critical incident should occur, it is essential for nurses to know what clinical information is relevant and anticipate what assessment data is required to accurately inform correct decisions and nursing management (Wright and Fallacaro, 2011). To make fully informed and safe decisions nurses must recognise relevant information and pertinent environmental data (Thompson et al., 2009). The aim of developing learners' situation awareness is to have them avoid critical situations from occurring by being able to perceive elements in the environment, comprehend their meaning and project future happenings (Stubbings et al., 2012).

As part of a larger study, this paper reports on the situation awareness of final year nursing students enrolled in pre-service nursing programmes at three Australian universities, located in two different states. While findings from the actual simulations are reported elsewhere (in review), this paper explores the situation awareness of students in the simulated clinical environments.

Methods

The larger study, of which this research was a part, employed mixed methods to gather data on nursing students' assessment and management of a deteriorating simulated patient while working in teams of three. The study employed a triangulated convergent design involving a structured multiple choice knowledge questionnaire (MCQ), three video recorded team-based simulations, and video review to facilitate reflective performance review. Data collection tools included the MCQ, OSCE evaluations of the simulation exercises, the Team Emergency Assessment Measure (TEAM) and Situation Awareness Global Assessment Technique (SAGAT) (Buykx et al., 2012; Cooper et al., 2012b). Background information was collected about the students' particular course and year level. This paper focuses on the findings related to SA. Prior to conducting the study, ethical approval was obtained from each of the three participating universities. Data collection occurred between March and July 2012. Data were collected at each site by three members of the research team following a briefing in the applicable questioning technique.

Final year students were invited to participate by a member of the research team in each university, who was not directly engaged in their teaching. These students were chosen as it was more likely that they had more experience with acutely ill patients than students in other years. Those interested were provided with an explanatory statement about the study and provided written consent. Groups of three students (and two pairs of students from each cohort where attendance was insufficient) participated in three eight-minute scenarios with actors simulating a patient and their deterioration. Groups arrived in

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