Undergraduate nursing students' performance in recognising and responding to sudden patient deterioration in high psychological fidelity simulated environments: An Australian multi-centre study ☆

Fiona Bogossian [a,*], Simon Cooper [b], Robyn Cant [b], Alison Beauchamp [b,e], Joanne Porter [c], Victoria Kain [a], Tracey Bucknall [d], Nicole M. Phillips [d], The FIRST2ACT™ Research Team

[a] The School of Nursing & Midwifery, The University of Queensland, Herston Campus, QLD, Australia
[b] The School of Nursing & Midwifery, Monash University, Berwick Campus, VIC, Australia
[c] The School of Nursing & Midwifery, Monash University, Gippsland Campus, VIC, Australia
[d] School of Nursing and Midwifery Deakin University, Burwood Campus, VIC, Australia
[e] Population Health Strategic Research Centre, Deakin University, Burwood Campus, VIC, Australia

ARTICLE INFO

SUMMARY

Background: Early recognition and situation awareness of sudden patient deterioration, a timely appropriate clinical response, and teamwork are critical to patient outcomes. High fidelity simulated environments provide the opportunity for undergraduate nursing students to develop and refine recognition and response skills.
Objectives: This paper reports the quantitative findings of the first phase of a larger program of ongoing research: Feedback Incorporating Review and Simulation Techniques to Act on Clinical Trends (FIRST2ACTTM). It specifically aims to identify the characteristics that may predict primary outcome measures of clinical performance, teamwork and situation awareness in the management of deteriorating patients.
Design: Mixed-method multi-centre study.
Setting: High fidelity simulated acute clinical environment in three Australian universities.
Participants: A convenience sample of 97 final year nursing students enrolled in an undergraduate Bachelor of Nursing or combined Bachelor of Nursing degree were included in the study.
Method: In groups of three, participants proceeded through three phases: (i) pre-briefing and completion of a multi-choice question test, (ii) three video-recorded simulated clinical scenarios where actors substituted real patients with deteriorating conditions, and (iii) post-scenario debriefing. Clinical performance, teamwork and situation awareness were evaluated, using a validated standard checklist (OSCE), Team Emergency Assessment Measure (TEAM) score sheet and Situation Awareness Global Assessment Technique (SAGAT). A Modified Angoff technique was used to establish cut points for clinical performance.
Results: Student teams engaged in 97 simulation experiences across the three scenarios and achieved a level of clinical performance consistent with the experts' identified pass level point in only 9 (1%) of the simulation experiences. Knowledge was significantly associated with overall teamwork (p = .034), overall situation awareness (p = .05) and clinical performance in two of the three scenarios (p = .032 cardiac and p = .006 shock). Situation awareness scores of scenario team leaders were low overall, with an average total score of 41%.
Conclusions: Final year undergraduate nursing students may have difficulty recognising and responding appropriately to patient deterioration. Improving pre-requisite knowledge, rehearsal of first response and team management strategies need to be a key component of undergraduate nursing students' education and ought to specifically address clinical performance, teamwork and situation awareness.

Introduction

The prevalence of deteriorating hospital patients measured as those who fulfill Medical Emergency Team (MET) criteria has been demonstrated to range from 3.3% in a recent Australian study (Bucknall et al., 2013) up to 18% in a Danish study (Fuhrmann et al., 2008). Studies consistently demonstrate significant findings that patients who fulfill MET criteria for rapid response have in excess of double the risk of mortality both in hospital and at 30 days (Bell et al., 2006; Bucknall et al., 2013; Fuhrmann et al., 2008). Moreover hospital patients who are deteriorating physiologically are frequently mismanaged, leading to international concerns over patient safety (Agency for Healthcare Research and Quality, 2009; Cooper et al., 2011a,b; DeVita et al., 2010).

Nurses as front line care providers are in a position to detect and respond to changes in vital signs and other cues reflecting patient deterioration and in doing so directly impact patient mortality.

Following a series of pilot studies examining the performance of nursing students and qualified staff in simulated settings we have developed a program of learning called FIRST2ACT™ (Feedback Incorporating Review and Simulation Techniques to Act on Clinical Trends) (Buykx et al., 2011). In recent trials the program demonstrated a significant impact on learning, and for hospital nurses, a significant impact on clinical practice (Buykx et al., 2011). Following the intervention an audit of patients' medical records showed improvements in the charting of vital signs, in pain score recording and in the correct delivery of oxygen therapy. The current study builds on the previous research (Buykx et al., 2011) and forms the first phase of a larger program of research funded by the Australian Learning and Teaching Council, the protocol of which has been published elsewhere (Cooper et al., 2012). This phase focuses on understanding clinical performance, teamwork, situation awareness and decision-making in undergraduate nursing students and this paper reports quantitative findings from the first phase.

Aims

The aims of this study were firstly to identify characteristics that may predict primary outcome measures of clinical performance, teamwork and situation awareness in the management of deteriorating patients. Secondly, to explore interactions between the outcome measures in order to identify factors potentially amenable to modification for the improvement of patient safety.

Method

A mixed method multi-centre study was designed to focus on undergraduate nursing students and their experiences in caring for deteriorating patients. Undergraduate nursing students were recruited from three Australian universities, two from Victoria and one from Queensland. In order to be able to recognise and respond to sudden patient deterioration, students required some level of exposure to relevant theory and clinical practice, through a standard educational program on emergency care, thus only final year students were considered eligible.

Although instruments and design had been previously tested in a group of registered nurses (Cooper et al., 2011a,b) the current research is predominantly descriptive and thus the determination of an a priori sample size is unnecessary. Based on previous studies, in which response rates varied from 46% for nursing students to 82% for registered nurses, we anticipated a response rate in excess of 50%.

Following ethical approval from each of the three universities final year nursing students were invited to participate in the study. Students were provided with standardised information about the project via email in the first instance and then via a 5-minute power point presentation conducted by a faculty member who was not a part of the research team. Students responded in the form of an expression of interest, if they wished to participate. Study inclusion was on a first come, first served, basis at each site and students reconfirmed their participation when allocated a scheduled session time and date. These strategies were employed to maximize participation within the physical and human resource limitations on the number of students who could participate at each university site.

The intervention and data collection were conducted over 2 days at each site over a 3-week period. In order to ensure the highest possible level of reliability and validity over the multiple sites and days, the intervention was delivered by a core roving team including three members of the research team (SC, JP & AB) and one trained actor who were supported by other members of the research team based on the relevant university site.

At each site a clinical simulation space that replicated a ward-like environment and standardised equipment was assembled to provide a consistent student experience across all sites. Students proceeded in groups of three through the research stages (i) pre-intervention briefing, (ii) the simulation intervention and (iii) post-intervention debriefing (see Table 1).

Pre-intervention Briefing

The pre-intervention briefing included written participant information and a standard verbal explanation of the project prior to written consent. This was followed by the completion of a questionnaire in order to collect demographic and clinical experience data and an 11 item multiple-choice questionnaire (MCQ). Each participant was assigned a participant number during the pre-intervention stage and all data collected (written and video) from the individual participant was assigned this number. The assignment of the team leader role order for the intervention within each trio of students was randomly determined.

The Simulation Intervention

Each trio of students then moved to the clinical simulation space waiting area. For each scenario the assigned team leader was given a brief handover and was instructed to enter the room. Video filming began and the team leader responded to the cues of the environment and the patient actor and was able to call for assistance from other team members at any time. The total duration of each simulation scenario was 8 min, with subtle deterioration cues evident in the first 4 min prior to more obvious and significant signs of deterioration in the final 4 min (Cooper et al., 2011a,b).

Two assessors assessed the clinical and non-technical skills performance of the participant trio, and then agreed a final score. Blinding was not possible. At the conclusion of each scenario the team leader was taken aside and asked a series of rapid-fire situation awareness questions by a research team member to ascertain their understanding and awareness of the situation as well as their prediction of future events in relation to the simulation.

Post Intervention Debriefing

Following completion of the clinical simulation component participants underwent debriefing which consisted of video review, performance feedback and written participant evaluation of the experience. Participant trios under the guidance of member of the research team undertook video review of their performance who encouraged participants to self-evaluate and give a reflective account of their performance and decision making in a process called 'photo elicitation' (DiGiuseppe et al., 2002; Harper, 1994). Following this, participants were asked to complete a written evaluation of the experience.

Table 1
Phases and related activities in First2Act simulation.

Pre-intervention	Intervention			Post-intervention
	Scenario	Roles	Measures	
Consent	Cardiac	Leader A	SAGAT	Debriefing
Briefing		All team	OSCE TEAM	Photo elicitation and video review
Participant ID assigned	Shock	Leader B	SAGAT	Self evaluation
Participant information questionnaire demographic and clinical experience		All team	OSCE TEAM	Instructor feedback
Multiple choice questionnaire (MCQ) 11 items to test knowledge	Respiratory	Leader C	SAGAT	Written evaluation of simulation experience
		All team	OSCE TEAM	