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Standard instruction versus simulation: Educating registered nurses in the early recognition of patient deterioration in paediatric critical care☆,☆☆

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SUMMARY

Identifying and stabilising deterioration in a child with significant clinical compromise is both a challenging and necessary role of the paediatric critical care nurse. Within adult critical care research, high fidelity patient simulation (HFPS) has been shown to positively impact learner outcomes regarding identification and management of a deteriorating patient; however, there is a paucity of evidence examining the use of HFPS in paediatric nursing education.

The aim of this study was to investigate the effect of HFPS on nurses' self-efficacy and knowledge for recognising and managing paediatric deterioration. Further, participants' perceptions of the learning experiences specific to the identification and management of a deteriorating child were also explored.

Registered nurses working in a tertiary-referral paediatric critical care unit were recruited for this quasi-experimental study. Using a pre-test/post-test control-group design, participants were assigned to one of two learning experiences: HFPS or standard instruction. Following the learning experience, nurses were also invited to participate in semi-structured interviews.

30 nurses participated in the study (control n = 15, experiment n = 15). Participants in the HFPS intervention were most likely to demonstrate an increase in both perceived self-efficacy ($p = <0.01$) and knowledge ($p = <0.01$). No statistically significant change was observed in control group scores. The mean difference in self-efficacy gain score between the two groups was 5.67 score units higher for the experiment group compared to the control. HFPS also yielded higher follow-up knowledge scores ($p = 0.01$) compared to standard instruction. Ten nurses participated in semi-structured interviews. Thematic analysis of the interview data identified four themes: self-awareness, hands-on learning, teamwork, and maximising learning.

The results of this study suggest that HFPS can positively influence nurses' self-efficacy and knowledge test scores specific to the recognition and management of paediatric deterioration.

Introduction

Globally, the early recognition and appropriate management of a deteriorating child is a significant challenge for healthcare providers. Recent evidence suggests patient deterioration is 'far more common than cardiac arrest' yet many clinicians lack the skills necessary to identify and manage the deteriorating patient (Cooper et al., 2011c, p. 19). Deterioration in paediatric inpatients is often more difficult to detect in comparison to adult counterparts due to children's compensatory mechanisms which may mask indicators of deterioration (Australian Resuscitation Council, 2010; The Patient Safety and Quality Improvement Service, 2010). However, the early detection of paediatric deterioration is vital with research demonstrating a relationship between the suboptimal care of the deteriorating child and serious adverse events including secondary morbidity and mortality (Australian Resuscitation Council, 2010; Reis et al., 2002). Nurses play a key role in the early identification of paediatric deterioration and subsequent management. As the first responder to a child's deterioration, a nurses' clinical skill, experience, and knowledge will directly influence the patient outcome (Schmid et al., 2007; Tait, 2010).

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Background

Historically, the education of nurses specific to the recognition and immediate response in managing the deteriorating child has comprised hospital workshops, bedside teaching, and attendance at onsite mock emergencies. Extensive discussion exists within the literature regarding the effectiveness of these approaches and their failure to adequately prepare nurses to recognise and manage the early warning signs of patient deterioration (Australian Commission on Safety and Quality in Health Care, 2008; Lim, 2009; Queensland Health Patient Safety and Quality Improvement Service, 2010). In contrast to instructional approaches, high fidelity patient simulation (HFPS) has been suggested as an innovative learning strategy which may foster improved learner and patient outcomes in the context of the deteriorating patient (Cioffi, 2001; Cooper et al., 2011a; Liaw et al., 2011b). As HFPS training has evolved within healthcare provider education, several researchers have demonstrated advantages of simulation learning in comparison to conventional techniques (Alinier et al., 2006; Ford et al., 2010; Wayne et al., 2008). Findings from these programs of enquiry suggest the strength of HFPS lies in its ability to provide active, authentic learning environments without compromising patient safety.

Nurses working with critically ill children in units such as the paediatric critical care unit (PCCU) are situated in a unique position to maximise patient outcomes through the early detection and correct management of the deteriorating child (Australian Resuscitation Council, 2010; Tibballs et al., 2005). To date, simulation research has been conducted with a focus on nursing performance in adult deterioration scenarios rather than paediatric cases. With paediatric patients presenting a unique patient population, it is important to examine the influence of HFPS on paediatric nurses' recognition and management of the deteriorating child.

Self-efficacy is the belief in one's own ability to complete a task or behaviour (Bandura, 2006). Bandura (1993, 1997) posits that efficacious individuals are able to handle diverse conditions and are prepared to meet new challenges whilst people with low self-efficacy beliefs will shy away from difficult situations, dwelling on personal deficiencies and perceiving challenges as threats. In the context of paediatric deterioration, a nurse's positive or negative self-efficacy beliefs may be an important influence on the subsequent recognition and response behaviours and contribute to patient outcome. Knowledge enhances one's self-efficacy and has been linked to this important construct along with competence (Bandura, 1995). Previous studies have indicated that HFPS training can have positive outcomes on graduate nurses' confidence and ability to respond to clinical emergencies (Gordon and Buckley, 2009); however, the impact of HFPS training on paediatric nurses' deterioration of self-efficacy remains unknown.

The aim of the study was to investigate the effect of HFPS on paediatric critical care nurses' knowledge and self-efficacy specific to the recognition and management of patient deterioration. To fulfil this aim, the study asked the following research questions:

1. Is there a difference in the knowledge and perceived self-efficacy of paediatric critical care nurses who participate in HFPS compared to nurses who participate in standard instruction?
2. How do the perceptions of paediatric critical care nurses regarding HFPS as a learning experience compare to those of nurses who participated in standard instruction?

Methods

Design

The study utilised a quasi-experimental design combined with semi-structured interviews to examine the aforementioned research questions.

Setting and Participants

The study was conducted during the period of June 2013–January 2014 at The Royal Children's Hospital (RCH) Paediatric Critical Care Unit (PCCU), Brisbane, Australia. The PCCU comprises an eight-bed paediatric intensive care unit (PICU) and a six-bed high-dependency unit (HDU). Ethics approval was obtained from the Children's Health Services Queensland, Human Research and Ethics Committee (HREC), and the Queensland University of Technology HREC.

All registered nurses working in the PCCU were screened and invited to participate in the study by the principal investigator upon satisfying the following inclusion criteria: registered nurses who were permanent or contracted staff members of the RCH PCCU. Exclusion criteria included (1) all other disciplines or qualifications and (2) agency, casual, pool, or relief staff.

Data Collection

Participant characteristics were collected via a demographic tool (10 items) which included age, nursing role, years of experience, and HFPS experience. Data on the primary outcome measures, patient deterioration knowledge, and self-efficacy were collected at two time points, pre and post the learning experience using study instruments: knowledge multiple choice questionnaire (MCQ) (5 items) and self-efficacy questionnaire (14 items).

Instruments

A short knowledge MCQ was developed to provide a measure of fundamental nursing knowledge relating to paediatric deterioration. Tool content was guided by key domains of patient deterioration identified in a review of the literature: (1) knowledge, (2) assessment, (3) interpretation, (4) critical thinking, and (5) action (Advanced Paediatric Life Support, 2011; Akhu-Zaheva et al., 2013; Cooper et al., 2010; Cooper et al., 2011a; Mecham, 2006; Monaghan, 2005; Tawalbeh and Tubaishat, 2014). Tool construction was guided by the writing and design principles identified by Collins (2006). The knowledge MCQ was administered on paper, pre and post the learning experience and was constrained to five items in an effort to maximise the response rate through minimising participants' non-clinical time during data collection. The knowledge MCQ content and face validity were assessed by a panel of two PCCU nurse educators from the RCH.

A 14-item self-efficacy survey was constructed to measure participants' perceptions of patient deterioration self-efficacy. Item sequence followed the key concepts of the recognition and management of patient deterioration, identified from a review of the literature: observation and assessment, interpretation of physiological data, communication, and initiate appropriate management (Buykx et al., 2011; Cooper et al., 2011a, 2011b; Endacott et al., 2007, 2010; Gordon and Buckley, 2009; Hope et al., 2011; Lauder et al., 2008; Liaw et al., 2011a; van Schaik et al., 2011). Tool construction was guided by the work of self-efficacy pioneer Bandura (1977, 1997, 2006), Chang and Crowe's (2011) guidelines for validating self-efficacy tools and validated self-efficacy tools (Dykes et al., 2010). A likert scale was utilised as the scale of measurement (Bandura, 1977, 1997, 2006) and required participants to rate their degree of confidence on a scale between zero and ten. The self-efficacy survey was administered on paper, pre and post the learning experience. Content and face validity were assessed by a panel of two RCH PCCU nurse educators. The Cronbach's alpha internal reliability coefficient for the self-efficacy tool was 0.96, demonstrating a good internal reliability (Bland and Altman, 1997).

Learning Experience

A convenience sample of PCCU nurses were allocated to one of two learning experiences: HFPS (intervention) or standard instruction

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