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The impact of simulation based education on nursing confidence, knowledge and patient outcomes on general medicine units

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ABSTRACT

The ability to quickly and reliably detect a clinically deteriorating patient and intervene appropriately is a skill nurses are expected to bring into practice. Simulation education has been shown to improve nurses' knowledge, confidence and communication, especially when focused on deteriorating patients.

In a simulation center at a large tertiary level Canadian teaching hospital, a 4 h simulation based education session was developed for general medicine nursing staff. The education included a didactic lecture followed by four 40 min simulation scenarios focused on deteriorating patient.

This study was designed as a pre- and post-analytic design. It utilized a paper based survey completed at three separate time points to measure confidence and knowledge. The study also examined data from the Critical Care Outreach nurse audits and site code blue audit data. Results demonstrated statistically significant improvements in nursing confidence and knowledge, and were sustained over the three month follow-up period.

1. Background

The ability to quickly, accurately and reliably detect a clinically deteriorating patient and intervene appropriately is a skill nurses are expected to bring into practice. However, the literature suggests there are often delays in recognition, intervention, and sometimes even an absence of action, resulting in a negative impact on patient care. A review by the National Health Service – England reported that 11% of deaths reviewed by the patient safety board were a result of clinical deterioration not being recognized and acted upon (National Patient Safety Agency, 2007). Multiple factors are suspected to cause the delay and lack of recognition including knowledge, communication, and confidence in one's own assessment skills (Australian Commission on Safety and Quality in Health Care, 2014; National Safety National Patient Safety Agency, 2007; O'Leary et al., 2015).

Simulation education has been shown to improve nurses' confidence, knowledge and communication, especially when focused on deteriorating patients (Bell-Gordon et al., 2014; Boling and Hardin-Pierce, 2015; Bultas et al., 2014; Figueroa et al., 2013; Hallenbeck, 2012; Hart et al., 2014; Hommes, 2014; Liaw et al., 2011a,b; Schubert, 2012). Bultas et al. (2014) used simulation education to demonstrate an improvement in both knowledge and confidence over a 6 month period in specialized paediatric nurses. Similarly Figueroa et al. (2013) used simulation education to demonstrate a sustained improvement in knowledge and confidence at the 3 month follow up mark, but this study evaluated teamwork skills in the post-paediatric cardiac surgery specialty. Similar findings were reported by Hart et al. (2014) who focused their research on undergraduate nurses.

While literature on simulation education has increased over the past few years, the majority of current literature focuses on students, interdisciplinary teams, or nurses in critical care areas such as the intensive care unit or emergency department. Limited research has been done exploring the impact of simulation education on post-licensure nurses, with a staffing mix of both licensed practical nurses (LPN) and registered nurses (RN) employed on general medical units. In addition, studies that do focus on post-licensure nurses have typically measured nurses' experiences, self-perception of improvements, or knowledge/technical skill changes immediately after the intervention (Bultas et al., 2014; Cooper et al., 2011; Kaddoura, 2010; Maneval et al., 2012). Although these studies have shown improvement, it is often a challenge to link this back to patient care and outcomes.

The purpose of this research project was to address these gaps in the literature by examining the effect and sustainment of simulation education on nursing confidence and knowledge in post-licensure nurses on general medical units, as well as to examine the trends found in critical care outreach data and site code blue records in relation to the

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recognition of patient deterioration.

2. Adult learning theory

From a pedagogy perspective, adult education is most impactful when it engages learners in activities directly relevant to their own experience. According to Knowles' (1975) adult learning theory, adults learn through experience, problem solving and learning information relevant to their job or personal life. The theory of constructivism and the theory of social constructivism involve the idea of learning by doing (Dewey, 1920) and providing an environment of self-exploration for adult learners (deVries, 2000). Through a variety of situations, adults gain the ability to learn socially from each other (Jones and Brader-Araje, 2002; Lave and Wenger, 1991). These theories together guided the course curriculum and design. Educational strategies used in this simulation based education integrate the concepts of relevance to practice and learning by doing (Reese, 2011). This allows practicing nurses an opportunity to draw from life experiences while involved in a more realistic situation that promotes self-direction and problem-solving in a safe atmosphere for learning. Simulation provides many unique features, including teaching technical and non-technical skills, allowing participants to practice scenarios not frequently seen, and providing a safe and controlled environment in which to learn (Bradley, 2006).

3. Methodology

3.1. Study design

This study used a pre- and post-analytic design. It utilized two different data sources, (1) a paper based survey, and (2) high level hospital quality improvement data with no patient identifiers. The study involved a single cohort of nurses who completed a paper based survey to measure confidence and knowledge of staff at three separate time points (1) a baseline assessment immediately prior to the intervention, (2) immediately post- and (3) three months post-intervention. The study also examined 3 months pre- and 3 months post-intervention data from the Critical Care Outreach records and site code blue reports.

3.2. Setting

The study took place at a large tertiary-level Canadian teaching hospital with over 650 in-patient beds. Registered nurses (RNs) and licensed practical nurses (LPNs) on ten different general medicine units were invited to attend a paid 4 h simulation education session focusing on early recognition of deteriorating patients.

3.3. Sample

Using a convenience sample, all staff who attended the education session were invited to participate in the research project. The inclusion criteria were: any RN or LPN employed (permanent or casual) on one of the general medicine units, who participated in the 4 h education course. Any nurses who had critical care, high acuity or equivalent advanced licensure training, and any student/non-licensed nurse were excluded. Based on the instruments used for measurement, a calculated sample size of 85 was the target.

3.4. Data collection instrument

The paper based survey used to collect data had three components: demographic, self-confidence, and knowledge (see Table 1). The demographic data collected included: gender, nursing designation, employment status, years of practice as a nurse, years in current role, level of nursing education, and past experience in participating in a code blue event (cardiopulmonary arrest).

To measure self-confidence the “Clinical Decision-Making Self-Confidence Scale” developed by Hicks et al. (2009) was used. This 12 item self-confidence scale has been validated and utilized in the literature for measuring nurses' self-confidence in relation to caring for patients in acute deterioration (Hicks et al., 2009). It measures four dimensions of confidence: 1) accurately recognizing a change in patient's condition; 2) performing basic physical assessments; 3) identifying basic nursing interventions; and 4) evaluating the effectiveness of interventions during acute deterioration. The items are rated on a Likert response scale ranging from 1 (not at all confident) to 5 (very confident). Internal consistency was demonstrated by the instrument's author with Cronbach's alphas of 0.93 and 0.96 (Hicks et al., 2009). Permission to use the scale for this project was granted (Hicks, personal communication, December 17, 2015).

For the knowledge section, a multiple choice 17 item questionnaire was developed and piloted using research and existing tools (Cooper et al., 2014; Liaw et al., 2011a,b; Liaw et al., 2011a,b). The questionnaire was reviewed by clinical nurse educators and medicine clinical nurse specialists for content validity. It was then piloted with 15 non-critical care trained nurses working in similar medical surgical units, but whom were not part of the study. Feedback was incorporated into the final questionnaire developed for this study.

In addition to the survey, 3 months pre- and 3 months post-intervention data trends from critical care outreach audits and site code blue records were reviewed. Critical care outreach is a consultative service provided by an experienced ICU nurse available on request by any direct care nurse throughout the hospital. In this study, outreach data that were examined included: the number of total consults conducted, and the number of recognized versus unrecognized (as determined by the critical care outreach nurse) patient deteriorations. Code blue arrest records collected by the site code blue committee were also reviewed. Data examined included the number of code blue arrest calls, the nature of the call (pulseless cardiac arrest versus pre-arrest), and the outcome of the call.

3.5. Simulation intervention

The simulation intervention was provided in the hospital high-fidelity simulation center. Over a three week period, seven 4 h education sessions were held in the simulation center. The education began with a 1 h didactic lecture on the principles of the deteriorating patient including assessment, signs of deterioration, communication and case studies. Subsequently, participants were divided into groups and rotated through four scenarios. The scenarios were developed in collaboration with unit educators, course facilitators and simulation educator. The scenarios were designed to last 40 min and consisted of a progressive patient deterioration. During and after the sessions facilitators debriefed with participants.

Each group had approximately six (range 4–8) participants who were asked to engage in each scenario as if they were the patient's primary nurse. The facilitator supported the scenario by providing the background, observations, patient information and tips to move the scenario along. Of the simulation scenarios, one provided skill training, two provided hands-on task training and one was high-fidelity.

The high-fidelity simulation scenario began with a patient who was tachycardic, hypotensive and febrile. This provided participants an opportunity to use critical thinking by assessing, intervening and reassessing their nursing actions while interacting with the life-like mannequin. The participants practiced communication techniques for speaking to physicians and how to recommend actions to improve patient care. Despite the participants' actions, clinical deterioration advanced to decreased level of consciousness and severe hypotension. Participants were expected to reassess the patient, intervene by administering oxygen, putting the patients head down and calling for help (either by calling the ICU outreach team or a code blue).

The two task training scenarios employed simulation equipment