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Nontechnical Skills Training and Patient Safety in Undergraduate Nursing Education: A Systematic Review[1,2,3]

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ABSTRACT

Learning nontechnical skills has been recognized to play an important role in enhancing patient safety. This study aimed to synthesize the available evidence regarding nontechnical skills training to enhance patient safety in undergraduate nursing education. We identified the following important categories of nontechnical skills: communication, situational awareness, teamwork, decision-making, and leadership. Future studies need to focus on more rigorous study designs and methodologies and on evaluation systems using high-level outcome measures.

Introduction

An estimated 70%–80% of medical errors have been attributed to the breakdown in nontechnical skills (NTS; Dunn et al., 2007; Glavin & Maran, 2003). NTS consist of seven categories, namely, communication, situational awareness, teamwork, decision-making, leadership, stress management, and fatigue management (Flin, O'Connor, & Crichton, 2008), which can be further classified into social (communication, team working, and leadership), cognitive (situational awareness and decision-making), and personal resource (stress and fatigue management) skills. Acute medical specialties have begun to focus on the contribution of NTS toward safe and efficient performance, leading to the development of a system of NTS that can be observed and rated, including the Anesthetists' Non-Technical Skills (Fletcher et al., 2003), the Non-Technical Skills for Surgeons (Yule, Flin, Paterson-Brown, Maran, & Rowley, 2006), and the Observational Teamwork Assessment for Surgery (Healey, Undre, & Vincent, 2004).

In clinical practice, learning NTS has been recognized to play an important role in increasing patient safety and asserting successful clinical outcomes (Pearson & McLafferty, 2011). Accordingly, Boet et al. (2014) reported that NTS acquired during simulation-based training were carried over to clinical practice, consequently translating into improved patient care. Learning NTS through simulation-based training can potentially contribute to patient safety and optimal care delivery, given that it provides an opportunity for undergraduate nursing students to practice complex skills in a low-risk environment (Goodstone et al., 2013). NTS training is the interface between nurses' internal environment and the real professional world in which they will enter (Pires et al., 2017). Moreover, trainings for NTS that are effective and important for nursing practice are indispensable for undergraduate nursing students. However, a review of the literature has revealed the paucity of published studies on NTS education for undergraduate nursing students. Furthermore, important categories and elements of NTS are yet to be studied toward enhancing patient safety in undergraduate nursing education. Hence, the objective of this study was to review, assess, analyze, and synthesize the available evidence on NTS training to enhance patient safety in undergraduate nursing education.

Material and Methods

Review Question

A systematic review of the literature was conducted to answer the research question, "What are the important categories and elements of NTS to enhance patient safety that undergraduate nursing students should learn before assuming clinical practice?"

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Definition

Flin et al. (2008) defined *NTS* as "the cognitive, social, and personal resource skills that complement technical skills and contribute to safe and efficient task performance."

Design

A systematic literature review was performed in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2010). The PRISMA is the recommended guideline for systematic reviews or meta-analysis, the checklist and flow diagram are used when conducting any literature review and when reporting the results of a literature review, and the PRISMA statement provides the rationale for the review when planning a study to ensure the author conducts it according to standards.

Search Strategy

The following four databases were searched between January 2008 and April 2018: Medical Literature On-Line, Cumulative Index to Nursing and Allied Health Literature, Joanna Briggs Institute Evidence-Based Practice Database, and Japana Centra Revuo Medicina.

Search Terms

Searches were performed using a combination of the following terms: *non-technical skills* or *non-technical skills* and *nursing students*. To ensure maximum retrieval, all words included within the keywords, subject headings, and abstracts or titles were searched.

Inclusion and Exclusion Criteria

Original, peer-reviewed articles that targeted undergraduate nursing students were included, whereas those that did not focus on NTS education to enhance patient safety for undergraduate nursing students were excluded.

The most relevant data regarding the available evidence for educational interventions on NTS training to enhance patient safety for undergraduate nursing students were identified by both the authors. Subsequently, the inclusion and exclusion of each article was determined by the first author, whereas discussions with the second author (M. I.) were made whenever the inclusion of any paper seemed unclear.

Data Extraction

Common methodologic matrix tables (Garrard, 2017) were used to extract information regarding author names, year of publication and location, study design, study objectives, participants, intervention types, measurements, summary of results, and category outcomes of NTS evaluated in each study (Table 1).

Quality Assessment

The study quality was evaluated using the Rating System for the Hierarchy of Evidence (Melnyk & Fineout-Overholt, 2015). This hierarchy evaluates the level of evidence (LOE) regarding the effectiveness of an intervention. The LOE are assigned to studies based on the methodological quality of their design, validity, and applicability to patient care. The hierarchy of evidence is classified into seven levels with the respective sources of evidence as follows: Level I, systematic reviews or meta-analysis of all relevant Randomized Controlled Trial (RCTs); Level II, a single well-designed RCT; Level III, well-designed nonrandomized controlled trials; Level IV, well-designed case–control and/or cohort studies; Level V, systematic reviews of descriptive and/or qualitative studies; Level VI, a single descriptive or qualitative study; and Level VII, opinions of authorities and/or reports of expert committee.

Analysis

Studies were critically evaluated according to the PRISMA statement (Moher et al., 2010). In addition, categories and elements of NTS that could be important in undergraduate nursing education to enhance patient safety were synthesized (Table 2).

Results

The search summary flowchart following the PRISMA guidelines (Moher et al., 2010) is presented in Fig. 1, whereas the characteristics of retained studies are presented in Table 1. Accordingly, a large proportion of articles had been removed after the title and abstract screening stage of the review, considering that many of the articles targeting registered nurses, medical students, surgeons, and anesthesiologists were apparently reviews or did not contain any original research data. Subsequently, two reviewers evaluated all articles to ensure consistency and validity in evaluation.

Characteristics of Eligible Studies

A total of eight studies were ultimately included in accordance with the inclusion and exclusion criteria. Such studies reported data from the United Kingdom ($n = 2$), Korea ($n = 2$), Australia, Ghana, Norway, and Japan ($n = 1$ each). Study design for the included studies were cohort study ($n = 4$), single group cross-sectional ($n = 3$), and nonequivalent control group ($n = 1$). Sample sizes in each study were small (range: 40–216 participants). Intervention types included situational ($n = 7$) and classroom ($n = 1$) training. Intervention contents included high-fidelity simulations ($n = 3$), low- or medium-fidelity simulations ($n = 2$), ward round simulation ($n = 2$), and the situation awareness training ($n = 1$). Low-fidelity simulations involved the use of strategies, such as basic written case studies and/or role playing, whereas medium-fidelity simulations involve the use of more realism, wherein mannequins or actors trained to demonstrate a scenario are utilized. Low- and medium-fidelity simulations are the most cost-effective methods and usually focus on tasks and discrete situations. High-fidelity simulations involve the most realistic experience, primarily using computer-based mannequins; these techniques are used to teach advanced clinical skills to students. The outcome measures used to determine the effectiveness of NTS training were descriptive questionnaires, rating scales, or checklists.

Synthesizing Category Outcomes of NTSs

The key categories of NTS that were most frequently evaluated to enhance patient safety in undergraduate nursing education included communication ($n = 7$), situational awareness ($n = 5$), teamwork ($n = 4$), decision-making ($n = 4$), and leadership ($n = 1$; Table 2). Categories related to stress management and coping with fatigue were not examined in this study. Moreover, none of the studies included all seven categories of NTS. Because only two studies had clearly defined each element of the categories of NTS in the text (Murray, McKenzie, & Kelleher, 2016; Pearson & McLafferty, 2011), we extracted the category outcomes of NTS from the context and the questionnaire item in each text of other six studies.

Communication

The elements of communication skills defined in the seven studies were as follows: sending and receiving information (Ishiura, Ishimaru, & Yasuda, 2016; Murray et al., 2016; Pearson & McLafferty, 2011); clear and concise presentation of information, including