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Review Article

Virtual Patients and Nontechnical Skills in Undergraduate Health Professional Education: An Integrative Review

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KEYWORDS

virtual simulation;
virtual patient;
nontechnical skills;
communication;
decision-making;
teamwork;
undergraduate health
professionals;
integrative review

Abstract

Background: Technology enhanced simulation such as virtual patients offer flexible, reproducible, and accessible learning experiences for student to develop nontechnical skills.

Method: Integrative review methods were used to synthesize empirical and theoretical literature to provide a comprehensive understanding of virtual patients in curricula relative to nontechnical skills.

Results: Twenty-eight articles were included in the review. Results suggest interactions with virtual patients develop communication, teamwork, and decision-making. Additional themes related to transfer of learning to practice, socialization into roles, and authenticity emerged.

Conclusions: The educational design of the simulation experience, sequencing learning activities surrounding the virtual patient, and authenticity of the virtual patient interaction are identified as important factors for consideration.

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Analysis of accidents and adverse events within high-risk industries including health care has revealed that 65% to 80% of errors are attributed to breakdowns in communication, teamwork, and decision-making, which are often called *nontechnical skills* (Flin, O'Connor, & Crichton, 2008).

These are “the cognitive, social and personal resource skills that complement technical skills and contribute to safe and efficient task performance” (Flin et al., 2008, p. 1). There is general agreement in the literature that nontechnical skills are comprised of situational awareness, decision-making, communication, teamwork, leadership, managing stress, and coping with fatigue (Flin et al., 2008; Nestel, Walker, Simon, Aggarwal, & Andreatta, 2011). All are important

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for safe and efficient performance of a range of activities and tasks in high-risk industries. While the term “nontechnical skills” may inaccurately represent critical aspects of professional clinical practice (Nestel et al., 2011), for this article, we use the term while acknowledging its limitations.

Key Points

- Online resources such as virtual patients offer learning experiences that are flexible, reproducible and accessible.
- VPs develop undergraduate students' non-technical skills in teamwork, communication and decision-making.
- Authenticity of emotion, empathy and variability must be considered in VP design.

Background

Historically, nontechnical skills are poorly articulated and addressed in undergraduate health professional education programs (Pearson & McLafferty, 2011). Skills required for competent practice in the clinical setting, such as teamwork, are traditionally left to be attained through “on-the-job” learning experiences (Brennan et al., 2010). Early professional education in nontechnical skills may afford learners a basic un-

derstanding of the factors influencing human performance, improved team communication, and support development of solutions for minimizing risks to patients (Flin & Patey, 2009). The development of the Patient Safety Curriculum Guide by the World Health Organization, which aims to build the knowledge and skills of health professionals to better prepare them for safer practice, supports the importance of addressing these concepts in undergraduate health professional programs (Walton, 2011).

Learning through simulation is suggested to provide a robust and effective strategy to successfully develop nontechnical skills (Unsworth, Melling, Allan, Tucker, & Kelleher, 2014) with examples across the learning continuum. Simulation is positively associated with improved communication in handover, the development of leadership skills (Lewis, Strachan, & Smith, 2012), improvements in team behaviors and team performance in crisis situations, and developing situational awareness skills (Lewis et al., 2012).

Simulation has its limitations in undergraduate curricula. Face-to-face simulation approaches are costly, resource intensive for staff, and challenging to schedule when used in an interprofessional approach (Andreatta et al., 2010). Furthermore, there is a risk that implementation of the simulation in relation to facilitation and debriefing approaches may not be standard across the student cohort (Andreatta et al., 2010), and there is often little opportunity for repetitive practice to enable students to develop required knowledge, skills, and attitudes.

Technology-enhanced simulation provides a possible approach to develop nontechnical skills. Technology enhanced simulation is defined as “an educational tool or device with which the learner physically interacts to mimic an aspect of clinical care for the purpose of teaching or assessment” (Cook, Erwin, & Triola, 2010, p. 309). One form of technology-enhanced simulation is the virtual patient. Virtual patients “are interactive computer simulations of real-life clinical scenarios for the purpose of healthcare and medical training, education, or assessment” (Ellaway, Poulton, Fors, McGee & Albright, 2008, p. 1). Virtual patients are flexible, reproducible, can be disseminated across large undergraduate student numbers, and permit access to essential, but at times unavailable, clinical situations for practice and learning (Posel, Fleischer, & Shore, 2009).

Virtual patient learning outcomes have historically been focused on developing knowledge and diagnostic and clinical reasoning skills (Cook et al., 2010). Diagnostic or clinical reasoning is a complex process “based on knowledge, experience, and other important contextual factors” that along with history, physical assessment, results of laboratory testing and imaging studies, assist the practitioner to develop a mental picture of the presenting case, and make a diagnosis about the patient’s presenting condition (Cox, Irby, & Bowen, 2006, p. 2218). The decision-making referred to in the nontechnical skills literature is not exclusively related to a patient situation and is defined as the “skills for reaching a judgement to select a course of action or make a diagnosis about a situation” (Flin, Glavin, Maran, & Patey, 2003, p. 13). This integrative review focuses on the learning outcomes of virtual patients, whose aim was to develop nontechnical skills, including situational awareness, decision-making (excluding clinical or diagnostic reasoning), communication, teamwork, leadership, managing stress, and coping with fatigue.

The Study/Review

There is considerable literature on the integration of virtual patients into health professional curricula; however, there is little evidence on how interactions with virtual patients develop nontechnical skills.

Aim

This integrative review aims to describe and synthesize literature regarding the use of virtual patient methodology to support learning nontechnical skills in undergraduate health professional education.

Design

Integrative review methods summarize “empirical and theoretical literature to provide a comprehensive

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