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Review Article

Do Simulation Studies Measure up? A Simulation Study Quality Review

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Abstract: Simulation-based education has become a ubiquitous teaching approach in nursing. However, ensuring the quality of simulation research is critical. We reviewed the methodological quality of 26 quantitative studies published in *Clinical Simulation in Nursing*, 2017. The Medical Education Research Study Quality Instrument and Simulation Research Evaluation Rubric showed that nearly all studies were of moderate to high quality (rated $\geq 50\%$). Correlation coefficients showed that inter-rater agreement was high overall (≥ 0.94). In conclusion, this was a valid approach for examining simulation study quality. Although most included studies were of high quality, some elements of study reporting can be improved upon.

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Simulation-based education (SBE) has become a ubiquitous component of nursing education and a strategy recognized for its potential to improve learners' competence and confidence (Motola, Devine, Chung, Sullivan & Issenberg, 2013). SBE offers a wide range of realistic and "life-like" simulated clinical experiences through which learners can engage with computerized "patient" manikins, standardized patients (actor), or other simulation

modalities, in preparation for practice (Cant & Cooper, 2017; Cantrell, Franklin, Leighton, & Carlson, 2017). A key element of SBE is the provision of formative and/or summative feedback which enables reflection on performance to enhance learning (INACSL, 2016; Levett-Jones & Lapkin, 2014).

SBE has been used in both prelicensure and post-graduate nurse training (Cantrell et al., 2017; Rutherford-Hemming & Alfes, 2017). Internationally, several countries have acknowledged the value of simulation for nursing education by approving the use of SBE as partial replacement of clinical practice hours. For example, in the United

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States, the National Council for State Boards of Nursing Study has determined that SBE could be substituted for clinical practice hours (NCSBN, 2010; Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014). A national survey of 432 academics in US nursing schools reported that three-quarters of the schools were substituting SBE for clinical hours (Breymer et al., 2015). In the United Kingdom, the Nursing and Midwifery Council (2010) ruled that up to 300 hours (13%) of the required 2300 hours of clinical practice can be replaced with simulation-based practice (p. 9).

Key Points

- We assessed the quality of simulation studies in nursing using two valid tools.
- The Medical Education Research Study Quality Instrument and Simulation Research Evaluation Rubric were found valid and feasible.
- Most studies were high in quality; however, some elements of reporting can be improved.

One of the challenges to the use of SBE and its use as a replacement for or supplementation of clinical placement hours is the variable quality of simulation studies. The strength of evidence for the contribution of SBE to learning is under

scrutiny. In nursing, reviews of literature have regularly cited a lack of studies with comparative research designs as a limiting factor in reporting overall effectiveness (Cant & Cooper, 2017; Doolen et al., 2017; Rutherford-Hemming & Alfes, 2017). In a review of simulation studies in nursing, Cantrell et al. (2017) found that the evidence relied too heavily on self-reported measures. A review of 72 studies of SBE in prelicensure nurse education identified that although many studies presented valid empirical evidence for knowledge gain, larger parallel studies were required to enable cross-sectional comparisons (Cant & Cooper, 2017). A meta-analysis of randomized controlled trials of simulation investigating nurses' skills and knowledge reported a small effect in favor of simulation, but the quality of evidence was regarded as low, and the overall impact was thus uncertain (Hegland, Aarlie, Strømme, & Jamtvedt, 2017). Doolen et al. (2017) in reviewing simulation use in undergraduate nursing suggested a need for more methodologically sound research. Teaching and learning research in simulation-based studies is thus difficult to plan for and to conduct.

The reviews cited previously include 172 primary simulation studies and 104 reviews of simulation literature. None of these were able to reach unreserved conclusions about the overall benefit of SBE because of a lack of similarity and various limitations in the design and implementation of reviewed studies. Ideally, we would base education practices on unequivocal approval of the empirical evidence provided in research. All these suggest an imperative to examine the methodological quality of

current simulation studies to inform the development of future research.

The aim of this study is therefore to examine the methodological quality of quantitative research publications that evaluate the use of SBE in nursing. We will critique recent nursing simulation research using valid assessment instruments.

Methods

This study presents a “systematic search and review” of current literature, based on Grant and Booth's (2009, p. 95) operational definitions. It will produce the best evidence of the state of simulation designs/methodologies and study outcomes and make recommendations for high-quality research.

Sample

A purposeful sample of relevant publications was extracted from a key simulation journal in publications between January and December, 2017. This period was chosen as it reflects the most current state-of-the-art simulation in nursing. The journal *Clinical Simulation in Nursing* (CSN) is the official journal of the International Nursing Association for Clinical Simulation and Learning and thus is highly regarded for nursing simulation publications worldwide. Forty-five primary simulation studies published in 2017 were identified and screened for inclusion in the review (see Figure 1).

Inclusion and Exclusion Criteria

All primary quantitative simulation research studies published in CSN in 2017 which reported a simulation intervention and study outcomes were selected. Studies of nurses or nursing students using any level of simulation fidelity were included. Interprofessional (e.g., team training) studies were excluded, as well as descriptive or methods studies such as studies of course design, prebriefing, or debriefing as they did not meet the assessment instrument criteria. The publications were downloaded into an electronic library database and examined by title and abstract. Eight ineligible studies were removed at this stage, leaving 37 potential studies to be included.

Synthesis

The study characteristics were tabulated to identify study details, including country of origin, topic, research design, sample, simulation intervention, evaluation measures, and main outcome. Once this detail was examined, 11 studies were found ineligible and were removed, leaving 26 studies to be included in the analysis. Studies that were not of a quantitative design, did not have nursing data, were

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