Effectiveness of simulation-based education in critical care nurses’ continuing education: a systematic review

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CRD summary
This review concluded that the effectiveness of simulation-based education on critical care nurses’ knowledge and skills remained uncertain because of a lack of published studies and robust evidence. The evidence was based a single small study and methods used to collect the data may not have been particularly robust. Given the paucity of evidence, the authors’ conclusions seem appropriate.

Authors’ objectives
To assess the effectiveness of simulation-based education in critical care nurses’ continuing education.

Searching
Eight databases, including MEDLINE and the Cochrane Library, were searched for peer-reviewed studies published from 2002 up to 2011 in English, Swedish, or Finnish. Search terms were reported.

Study selection
Eligible for inclusion were randomised controlled trials (RCTs) and case-control studies that assessed the effectiveness of high-fidelity or full-scale simulation-based education on registered critical-care nurses’ continued education. The outcomes of interest were nurses' knowledge and skills. Studies in neonatal and paediatric settings were excluded.

The included study was conducted in the USA, in adult critical care and intensive care settings. The study compared medication administration error rates and nurse knowledge using traditional lecturing methods versus simulation-based training. Medication administration by nurses (four hour sessions) was observed at baseline, at one to four weeks after intervention, and at eight to 12 weeks post-intervention. Medication errors were classified according to the United States Pharmacopeia MEDMARX system. Nurse knowledge was assessed using a multiple-choice quiz.

Two reviewers independently screened studies for inclusion.

Assessment of study quality
Two reviewer independently assessed study quality using the Joanna Briggs Institute Critical Appraisal Checklist for Cohort/Case control Appraisal; scores ranged from 0 to 9.

Data extraction
Outcome data were extracted before and after the educational interventions.

The authors did not state how many reviewers extracted outcome data.

Methods of synthesis
The evidence was presented narratively by outcome.

Results of the review
A single-centre, prospective, controlled study (24 critical care nurses, two adult patients) was included in the review. The quality of the study was considered high (scoring 7 out of 9 on the appraisal tool).

Simulation-based education significantly reduced medication administration error rates from 30.8% to 4.0% at one to four weeks post-intervention, and continued decreasing to 6.2% at the final observation (both p<0.001). By comparison, traditional lecturing significantly increased medication administration error rates from 20.8% to 36.7% at the final observation (p=0.002).

Mean quiz scores significantly improved after both simulation-based training (p<0.001) and traditional lecturing (p=0.002) but the difference between the two interventions was not statistically significant (p=0.33).
Authors' conclusions
The effectiveness of simulation-based education on critical care nurses' knowledge and skills remained uncertain because of a lack of published studies and robust evidence.

CRD commentary
The review question and supporting inclusion criteria were broadly stated. An adequate number of sources were searched for relevant articles, but the search restrictions meant that potentially relevant data may have been missed. It was unclear whether data extraction was performed in duplicate.

Study quality was assessed using previously published criteria, and study quality was considered to be high. The single study included had only a small sample size, and the experience of nurses and intensity of training was unclear. Outcome data were collected through observation and a quiz, which may not have been particularly robust methods.

Given the paucity of evidence, the authors' conclusions seem appropriate.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that well-conducted RCTs were needed to evaluate the effectiveness of simulation-based education versus other educational interventions in critical care settings. Future research should include standardised outcome measures to further facilitate the relationship between clinical outcomes and simulation-based education.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.