Intensive & Critical Care Nursing xxx (2018) xxx–xxx

Contents lists available at ScienceDirect

Intensive & Critical Care Nursing

journal homepage: www.elsevier.com/iccn

Research article

Standardised simulation-based emergency and intensive care nursing curriculum to improve nursing students' performance during simulated resuscitation: A quasi-experimental study

Jie Chen [a,b], Jian Yang [c], Fen Hu [c], Si-Hong Yu [a], Bing-Xiang Yang [a], Qian Liu [a], Xiao-Ping Zhu [c,*]

[a] Wuhan University School of Health Sciences, No. 115 Donghu Road, Wuchang District, Wuhan 430071, China
[b] University of Connecticut School of Nursing, 231 Glenbrook Road, Storrs, CT 06269-2026, USA
[c] Nursing Department, Zhongnan Hospital of Wuhan University, No. 169 Donghu Road, Wuchang District, Wuhan 430071, China

ARTICLE INFO

Article history:
Accepted 6 February 2018
Available online xxxx

Keywords:
Resuscitation
Simulation training
Curriculum
Baccalaureate nursing education

ABSTRACT

Background: Simulation-based curriculum has been demonstrated as crucial to nursing education in the development of students' critical thinking and complex clinical skills during a resuscitation simulation. Few studies have comprehensively examined the effectiveness of a standardised simulation-based emergency and intensive care nursing curriculum on the performance of students in a resuscitation simulation.
Objective: To evaluate the impact of a standardised simulation-based emergency and intensive care nursing curriculum on nursing students' response time in a resuscitation simulation.
Design: Two-group, non-randomised quasi-experimental design.
Setting: A simulation centre in a Chinese University School of Nursing.
Participants: Third-year nursing students (N = 39) in the Emergency and Intensive Care course were divided into a control group (CG, n = 20) and an experimental group (EG, n = 19).
Methods: The experimental group participated in a standardised high-technology, simulation-based emergency and intensive care nursing curriculum. The standardised simulation-based curriculum for third-year nursing students consists of three modules: disaster response, emergency care, and intensive care, which include clinical priorities (e.g. triage), basic resuscitation skills, airway/breathing management, circulation management and team work with eighteen lecture hours, six skill-practice hours and twelve simulation hours. The control group took part in the traditional curriculum. This course included the same three modules with thirty-four lecture hours and two skill-practice hours (trauma).
Results: Perceived benefits included decreased median (interquartile ranges, IQR) seconds to start compressions [CG 32 (25–75) vs. EG 20 (18–38); $p < 0.001$] and defibrillation [CG 204 (174–240) vs. EG 167 (162–174); $p < 0.001$] at the end of the course, compared with compressions [CG 41 (32–49) vs. EG 42 (33–46); $p > 0.05$] and defibrillation [CG 222 (194–254) vs. EG 221 (214–248); $p > 0.05$] at the beginning of the course.
Conclusion: A simulation-based emergency and intensive care nursing curriculum was created and well received by third-year nursing students and associated with decreased response time in a resuscitation simulation.

* Corresponding author at: Nursing Department, Zhongnan Hospital of Wuhan University, Wuhan, Hubei, China.
E-mail address: zxp-1028@163.com (X.-P. Zhu).

https://doi.org/10.1016/j.iccn.2018.02.003
0964-3397/

Please cite this article in press as: Chen, J., et al. Standardised simulation-based emergency and intensive care nursing curriculum to improve nursing students' performance during simulated resuscitation: A quasi-experimental study. Intensive & Critical Care Nursing (2018), https://doi.org/10.1016/j.iccn.2018.02.003

Implications for Clinical Practice

- The impact of a standardised high-technology simulation-based emergency and intensive care nursing curriculum on third-year nursing students' nursing management and teamwork during simulated resuscitation scenarios included decreased median seconds to start compressions and defibrillation at the end of the course.
- The simulation-based emergency and intensive care nursing curriculum provided a safe learning environment to nursing student and allowed repeated practice, the debriefing process facilitated closing the simulated resuscitation performance gaps.
- New graduate nurses may also benefit from this course since the curriculum may also improve their ability to deliver chest compressions and defibrillation in intensive care unit, thus increase their confidence and boost protection of patients' safety.

Introduction

Nursing students lack actual resuscitation experience, but are required to learn resuscitation skills during their education. Once they graduate and assume clinical positions, they are expected to participate in cardiopulmonary resuscitation (CPR) for cardiac arrests (Cook et al., 2012; Sullivan et al., 2015). It is suggested that the nursing curriculum should incorporate elements of resuscitation at an early stage of students' education, in order to build confidence and provide preparation for this important skill in clinical practice (Abe et al., 2013; De Buck et al., 2015; Ramm et al., 2015).

Standardised simulation-based education interventions using high fidelity simulations have been recognised as facilitating active learning in a reproducible and safe environment, and can improve health professionals' resuscitation knowledge, skills, and teamwork (Cheng et al., 2015; Khanduja et al., 2015; Mundell et al., 2013). Simulation is increasingly crucial in nursing education in order to develop the critical thinking and complex clinical skills required within the health care arena (Ballangrud et al., 2014; Hebbar et al., 2015; Gerolemou et al., 2014. Simulation activities improve acquisition of CPR skills in nursing students and clinical nurses (Bukiran et al., 2014; Hernández-Padilla et al., 2015; Cook et al., 2012).

Previous studies on the use of embedded simulation in medical education curriculums, have demonstrated improvement in participants' self-assessment as well as performance of medical management and teamwork skills in simulated resuscitation scenarios (Fang et al., 2014; Stone et al., 2014). Few studies have been completed on the incorporation of simulation into an emergency and intensive care curriculum in nursing education, including both nursing management and teamwork. Additionally, no study combining simulation into an emergency and intensive care nursing curriculum with the goal of decreasing nursing students simulated resuscitation response time had been reported.

The purpose of the current study was to develop a standardised high-technology simulation-based emergency and intensive care nursing curriculum and to evaluate the impact of this curriculum on third-year nursing students' response time and teamwork during simulated resuscitation scenarios.

Methods

Study design

A non-randomised, quasi-experimental study design was used following the creation of a standardised high-technology, simulation-based emergency and intensive care nursing curriculum from September 2014 through May 2015. This study was approved by the ethics committee of Wuhan University HOPE School of Nursing in Wuhan, China (NO. 20140011).

Study participants

A group of third-year nursing students enrolled in the course of emergency and intensive care was recruited in the study using convenience sampling. To avoid contamination of intervention effects between groups, participants were placed into groups based on the semesters in which they took the emergency and intensive care nursing course. Those who participated in the course from September to December 2014 were assigned to the control group (CG) and those who enrolled in the course from March to May 2015 were designated into the experimental group (EG). The EG participated in a standardised high-technology, simulation-based emergency and intensive care nursing curriculum, whereas the CG participated in the traditional curriculum.

Intervention: the curriculum

From September through December 2014, the CG participated in the routine curriculum. This traditional curriculum included three modules: disaster response, emergency care and intensive care. This included thirty-four lecture hours and two skill-practice hours (trauma) which were offered by Researcher A (JC).

From March through May 2015, the EG participated in a simulation-based curriculum. The standardised simulation-based emergency and intensive care nursing curriculum for third-year nursing students consisted of three modules: disaster response, emergency care, and intensive care, incorporating clinical priorities (e.g. triage), basic resuscitation skills, airway/breathing management, circulation management and team work. This was derived from the Advanced Life Support (ALS), National League for Nursing (NLN), triage and teamwork literature (Cheng et al., 2015; Mundell et al., 2013). These modules included eighteen lecture hours, six skill-practice hours and twelve simulation hours, with two simulation sessions in each of the three modules. These six simulation sessions consist of earth quake and fire scenarios in disaster response, trauma and cardiac arrest scenarios in emergency care, sepsis shock and cardiac arrest scenarios in intensive care. To shortening lecture hours, the students were asked to review the content after class time. Besides trauma care, the circulation, airway and breathing (CAB) were covered in the six skill-practice hours as well as in the simulation sessions. During the intervention, each of the six sessions was conducted twice, for a total of twelve simulation scenarios. Each simulation session was 60 minutes in length and repeated twice, consisting of an introduction (review of scenario and learning objectives), the resuscitation simulation and a debriefing.

Debriefing with Good Judgment (Rudolph et al., 2008), a theory-based method aiming at closing performance gaps in medical education was adopted to direct debriefing in this study. The process of debriefing in this model are to: 1) note the performance gaps related to learning objectives, 2) provide feedback depicting the gaps, 3) explore the basis of performance gaps, 4) help close the gaps through discussion. All the students could share their experiences in the scenarios during the debriefing. The students may be

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