3-2018

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Recommended Citation
Camp, S., & Legge, T. (2018). Simulation as a Tool for Clinical Remediation: An Integrative Review. Clinical Simulation in Nursing, 16, 48-61.

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Camp, S., & Legge, T. (2018). Simulation as a Tool for Clinical Remediation: An Integrative Review. *Clinical Simulation in Nursing*, *16*, 48-61. https://doi.org/10.1016/j.ecns.2017.11.003.

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Introduction

Preparing for the professional role of a registered nurse requires completion of a rigorous academic program that includes the acquisition and subsequent practical application of both knowledge and skills in a variety of clinical settings. However, given the imperative of success on the National Council Licensure Examination for Registered Nurses (NCLEX-RN) examination, academic proficiency rather than clinical competence remains the primary focus of nursing education. But what about those students who perform well academically, but are not adept in clinical application? The unintended consequence of emphasizing academic performance over the demonstration of clinical skill at the bedside is the progression and eventual licensure of students who, despite meeting program requirements and passing the NCLEX-RN, have not had an equivalent evaluation of essential clinical competence (Benner, 2015; Brown, Neudorf, Poitras and Rodger, 2007; Butler et al., 2011; Lynn and Twigg, 2011). To ensure that nursing graduates are optimally prepared to provide safe, competent clinical care, it is imperative that nursing programs have an intentional remediation plan designed to monitor, evaluate and improve clinical competence. Ideally, such a plan should include recognition and early intervention on clinical deficiencies with targeted remediation resources distinct from those currently in place for academic success (Evans and Harder, 2013).

Human patient simulators provide realistic practice for students outside of the live clinical setting and are being used more extensively in nursing education to support clinical skill development in a controlled context. Simulation can be used to foster knowledge application, critical thinking and clinical judgment, which are essential components of clinical competency (DeBourgh and Prion, 2011; Decker, Sportsman, Puetz, and Billings, 2008; Fisher and King, 2013; Lejonqvist, Eriksson, and Meretoja, 2016; Lewis, Strachan, and Smith, 2012; Lynn and Twigg, 2011; Wolfgram and Quinn, 2012). Perhaps the strongest evidence supporting simulation as a means of developing clinical competence is the recent results of the National Council State Boards of Nursing simulation study (Alexander et al., 2014). The findings of this longitudinal study support the substitution of simulation for up to fifty percent of clinical hours in current nursing curricula (Alexander et al., 2014). This research provides evidence that simulation is comparable to actual patient care and lends credibility to simulation as a valuable modality in teaching the clinical aspects of nursing. However, exploration of nursing literature revealed a paucity of studies measuring the impact of simulation as a tool for clinical remediation finding only seven articles published since 2000 described or reviewed the use of simulation for remediation in undergraduate nursing education (Bensfield, Olech, and Horsley, 2012; Chunta, 2016; Evans and Harder, 2013; Haskvitz and Koop, 2004; Leach, 2014; Lynn and Twigg, 2011; Wolfgram and Quinn, 2012). Therefore, a study was designed to add to the literature on the use of simulation for clinical remediation by evaluating the effect of simulation in a cohort of nursing students with identified clinical deficiencies.

Project Design

Kolb's (1984) Experiential Learning Theory (ELT) was used as a foundation for this quasi-experimental pre-test, post-test design to evaluate the impact of an extra simulation on the clinical competence of students with identified clinical deficiencies. Subjects were undergraduate nursing students in an adult health clinical course at a private liberal arts university in the Southeastern United States. The project was approved and exempt from full review by the University's Institutional Review Board.

Sample

Purposive sampling was used to identify 93 students enrolled in an Adult Health I clinical course during the 2017 fall semester. Eighty-six students consented to have their scores on two current course simulations included as data in the study. After exclusions, the number of total study participants was 76 with 74 completing a brief demographic survey. Of these, 36 met eligibility criteria for inclusion in the project sample. All 36 students were required to attend an extra simulation to meet course objectives.

Method

The Creighton Competency Evaluation Instrument (CCEI) was used for the standardized evaluation of clinical competence during the study. The evaluative framework of the CCEI is based on the American Association of Colleges of Nursing (AACN) (2008) core competencies and includes critical thinking, communication, assessment, and technical skills (Todd, Manz, Hawkins, Parsons, and Hercinger, 2008). The CCEI has undergone extensive validity, inter- and intra-rater reliability testing during its development and subsequent studies and is an established evaluation tool for clinical and simulated settings (Adamson et al., 2011; Hayden, Keegan, Kargong-Edgren and Smiley, 2014; Parsons et al., 2012; Rizzolo, Kardong-Edgren, Oermann and Jeffries, 2015).

Adult Health I instructors evaluated clinical students using the CCEI during the first adult health I course simulation in September 2017. Students' raw scores served as the pre-scores for the study. The intervention group completed the extra simulation before the second course simulation, and the control group completed the extra simulation after the second course simulation. Adult Health I instructors then re-evaluated clinical students using the CCEI during the second course simulation in October 2017. Students' raw scores served as the post-scores for the project.

Results

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) 25.0 statistical analysis software including descriptive analysis, χ^2, independent *t* test and paired *t* test. The only significant difference (F (1, 30) = 4.40; *p* = .04) found between the two groups was the age between the intervention group (m=21.06; SD 1.35) and control group, (m=20.27; SD .594). The total class sample (n = 76) had a mean age of 20.82 (SD 1.44) and consisted of 88.2 percent females and 9.2 percent males.

An independent samples *t*-test indicates no statistically significant difference (t (31) = -.431, *p* = 0.67, *d* = -0.15) in the mean CCEI pre-scores between the control group (M=14.80, SD=1.52) and the intervention group (M=14.61, SD=0.98) (Cohen, 1988). Paired samples t-tests reveal significant improvement in CCEI post-scores for both the intervention (t (17) = 2.75, *p* = .014, d = .65) and control group (t (14) = 3.64, *p* = .003, d = .65). However, an independent samples t-test indicates no significant difference (t (31) =-1.70, *p* = 0.252; d=-0.41) in the intervention group CCEI post-scores (M=16.78, SD=3.00) and the control group CCEI post-scores (M=17.93, SD=2.60)..

Discussion

Mean post CCEI scores in the intervention group increased after participation in the extra simulation, supporting the hypothesis that additional simulation improves clinical competency scores; but the control group post CCEI scores also increased. The increase in post scores has both practical and statistical significance, as the improvement moved the students in both groups from a failing score to a passing score on the simulation (<76%, to 80% in the intervention group and <76% to 85% in the control group). Findings align with prior research which affirms simulation as effective in improving integral components of clinical competency such as critical thinking and clinical decision-making (Birkhoff and Donner, 2010; Cant and Cooper, 2010; Fisher and King, 2013; Lejonqvist et al., 2016; Lewis et al., 2012; Rhodes and Curran, 2005).

There was a lack of support for the hypothesis that CCEI scores would improve more in the intervention group than in the control group. This could be explained by an insufficient amount of simulation used as the intervention for remediation. Other studies which have evaluated the use of simulation as a tool for clinical remediation found that incorporating at least three simulation encounters improved clinical competency (Bensfield et al., 2012; Gas, Buckarma, Mohan, Pandian and Farley, 2016; Leach, 2014; Lynn & Twigg, 2011).

The findings from this study are consistent with the literature supporting simulation as an effective method for development of clinical competency in undergraduate nursing students (Bensfield et al., 2012; Gas et al., 2016; Leach, 2014; Lynn & Twigg, 2011). However, recognizing the lack of significant improvement in the intervention group over control group after an extra simulation, additional research on the timing and intervals at which simulation is offered may help determine best practices for the use of simulation as a tool for remediation in undergraduate nursing education. Additionally, a larger sample size would improve the ability to detect the effect of simulation on clinical competency. Furthermore, the fact that subjects are students enrolled in a course of study with defined learning objectives means that they are also exposed to varied clinical experiences and diverse faculty expertise both of which could impact the development of clinical competency. Competency in this study was measured at one point in time and further student progress throughout the semester was not captured. Additional studies are necessary to quantify the transfer of competencies gained in simulation to a live clinical setting and to determine ideal intervals for the assessment of improvement. Finally, students self-selected dates which assigned them to either the intervention or control group which could have introduced selection bias. A pure research design in which all confounding variables are controlled is difficult to achieve in the context of nursing education and would not be realistically replicable for sustainable practice.

Conclusion

A plan for remediation of undergraduate nursing students who have clinical deficiencies must be actualized to maximize student success. Use of simulation for clinical remediation is based on its demonstrated success in fostering the development of critical thinking and clinical competency. Simulation allows application of theory to practice and can be beneficial in enhancing the potential of students to be successful in clinical preparation and completing an undergraduate program. Development of clinical competence should be a high priority for nurse educators in the interest of supporting students throughout the nursing program and beyond the NCLEX. Focus on the remediation of clinical competencies represents an investment in each students' safe and confident entry to practice.

Acknowledgements: The authors would like to acknowledge Beth Hallmark, PhD, MSN, RN, CHSE, and Tracy Johnson, DNP, RN for their expertise and help which contributed to this study.

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