Nurse Education in Practice 26 (2017) 33–38

Contents lists available at ScienceDirect

Nurse Education in Practice

journal homepage: www.elsevier.com/nepr

Original research

The impact of simulation sequencing on perceived clinical decision making

Aimee Woda [a, *], Jamie Hansen [b], Mary Paquette [a], Robert Topp [c]

[a] Marquette University College of Nursing, P.O. Box 1881, Milwaukee, WI 53201-1881, USA
[b] Carroll University, College of Nursing, 100 N. East Avenue, Waukesha, WI 53186, USA
[c] University of San Diego Hahn School of Nursing and Health Science, 5998 Alcala Park, San Diego, CA 92110, USA

ARTICLE INFO

Article history:
Received 6 June 2016
Received in revised form
24 April 2017
Accepted 18 June 2017

Keywords:
Simulation
Clinical decision making
Nursing student
Self-confidence
Anxiety

ABSTRACT

An emerging nursing education trend is to utilize simulated learning experiences as a means to optimize competency and decision making skills. The purpose of this study was to examine differences in students' perception of clinical decision making and clinical decision making-related self-confidence and anxiety based on the sequence (order) in which they participated in a block of simulated versus hospital-based learning experiences.

A quasi-experimental crossover design was used. Between and within group differences were found relative to self-confidence with the decision making process. When comparing groups, at baseline the simulation followed by hospital group had significantly higher self-confidence scores, however, at 14-weeks both groups were not significantly different. Significant within group differences were found in the simulation followed by hospital group only, demonstrating a significant decrease in clinical decision making related anxiety across the semester. Finally, there were no significant difference in; perceived clinical decision making within or between the groups at the two measurement points.

Preliminary findings suggest that simulated learning experiences can be offered with alternating sequences without impacting the process, anxiety or confidence with clinical decision making. This study provides beginning evidence to guide curriculum development and allow flexibility based on student needs and available resources.

1. Introduction

Schools of nursing have been challenged with the task of incorporating simulated clinical experiences into their curricula (International Nursing Association for Clinical Simulation & Learning [INACSL], 2015). Simulated clinical experiences as part of the undergraduate nursing curriculum can include complex patient situations or clinical scenarios that students may not have the opportunity to encounter during their hospital-based practicums. Simulated learning experiences can utilize a broad range of technology from low to high fidelity simulations. High fidelity simulated learning experiences involve life-size computerized mannequins with anatomically correct features that are programmed to mimic physiological responses to nursing interventions (Bland et al., 2011). Appropriately utilized simulated learning experiences have the potential to facilitate clinical decision making (CDM), increase self-confidence, and decrease anxiety among nursing students by providing students with a safe and controlled environment to confront a variety of patient scenarios (Bland et al., 2011; Lasater, 2007).

Given the increased use of simulation as an important component of nursing curricula, there is a need to determine how to best sequence these learning experiences within the curriculum. There is limited empirical evidence to support the sequencing of simulation in order to facilitate CDM, increase self-confidence, and decrease anxiety among nursing students during the CDM process. The optimal sequence of simulation in coordination with hospital-based learning experiences that results in optimum student outcomes has yet to be determined. The purpose of this study was to determine if there is a difference in perceived CDM among 4 year/undergraduate baccalaureate degree nursing students based on the sequencing of a simulated vs. hospital based learning experiences.

* Corresponding author.
E-mail addresses: aimee.woda@marqeutte.edu (A. Woda), jlhansen@carrollu.edu (J. Hansen), mary.paquette@marquette.edu (M. Paquette), Rtopp@sandiego.edu (R. Topp).

http://dx.doi.org/10.1016/j.nepr.2017.06.008
1471-5953/

2. Literature review

Clinical decision making is a critical component of nursing practice. An increased ability to make clinical decisions results in a decline of medication errors and patient mortality, along with an increased ability to recognize a deteriorating patient status (Dickson and Flynn, 2012; Parker, 2014) and increased patient safety (Weiner et al., 2013). Simulated learning experiences that are incorporated into health professions education have reported positive impacts on patient-related outcomes (Cook et al., 2011). As the health care needs of patients become more complex, nurses must be able to make clinical decisions with a high degree of self-confidence when providing care. For this reason, simulated learning experiences appears to be an exceptional educational instrument that can facilitate clinical decision-making among nursing students (Fisher and King, 2013).

Throughout the literature, CDM has been used interchangeably with critical thinking, clinical judgment, and clinical reasoning. For the purposes of this study, Standing's (2007, pg 266) definition of CDM will be used:

> *Clinical decision making is a complex process involving information processing, critical thinking, evaluating evidence, applying relevant knowledge, problem-solving skills, reflection, and clinical judgment to select the best course of action which optimizes a patient's health and minimizes any potential harm.*

The utilization of simulated learning experiences within nursing curricula has been linked to increased clinical reasoning, clinical judgment, problem solving, and contributes to the development of competency (Meakim et al., 2013). Simulated learning experiences increase student knowledge (Elfink et al., 2010; Lewis and Ciak, 2011; Shinnick and Woo, 2015), and build CDM skills (Jeffries, 2005; Nagle et al., 2009; Rush et al., 2008). Prior research has shown that a lack of self-confidence, coupled with anxiety in the clinical setting, negatively affects students' ability to engage in the CDM process (Baxter and Rideout, 2006; Haffer and Raingruber, 1998; Melincavage, 2011). In contrast, simulated learning experiences used to address a variety of patient situations has been shown to result in increases in student self-confidence (Dearmon et al., 2013; Jeffries, 2005; Kaddoura, 2010; Lewis and Ciak, 2011; Mould et al., 2011; Schlairet, 2011; Thomas and Mackey, 2012).

This body of literature supports the efficacy of simulated learning experiences within undergraduate nursing curricula to improve student's CDM skills, and increase self-confidence. Studies to evaluate the benefits of simulation as compared to other educational activities have considerable variation in designs and methods (Cant and Cooper, 2009). Lasater (2007) acknowledges that nursing curricula that incorporate simulation promote the integration of learning from the theory course, skills laboratory experiences, personal and course related reading, and personal experiences in the clinical practicum. Data from several studies indicates that simulated learning experiences prior to a practicum experience: promote self-confidence to perform skills (Lamb, 2007) and provide patient education (Goldenberg et al., 2005; Wagner et al., 2009), and improve clinical performance (Lyngagh et al., 2007; Wilson et al., 2005).

The results from the National Council of State Boards of Nursing (NCSBN) National Simulation Study supports that high quality simulated learning experiences can be used to substitute up to 50% of traditional clinical hours (Hayden et al., 2014). Currently, no studies have evaluated the sequencing of a block of simulated learning experiences with regard to (prior to or following) the hospital based learning experiences on the nursing students' perceived CDM or perceived self-confidence and anxiety with the CDM process.

3. Theoretical framework

The NLN/Jeffries Simulation Theory (Jeffries, 2015) served as the theoretical framework for this study. The theory includes the conceptual components: design, simulation experience, and outcomes with relationships between the components (Jeffries, 2015). Specific variables related to the simulation experience may impact learner outcomes. Within the NLN/Jeffries Simulation theory the design was referred to as the study intervention. The design intervention for this study was the sequence of the simulated learning experiences, either prior to or following students' hospital based learning experience. The conceptual component measured in this study was participant outcomes. Based on this theory, it is hypothesized that having a practicum that provides a block of simulated learning will provide students with additional nursing care experiences that will increase the students perceived CDM and self-confidence while decreasing their perceived anxiety with the CDM process.

4. Purpose

The purpose of this study was to explore whether there is a difference in learning outcomes based on the order in which nursing students receive patient care learning experiences. Specifically, this study examined whether there were differences in students' perception of CDM and CDM-related self-confidence and anxiety based on the sequence (order) in which they participated in a block of high fidelity simulated vs hospital based learning experiences.

5. Method

5.1. Research design

Using a quasi-experimental crossover design, a convenience sample of undergraduate baccalaureate nursing students ($n = 117$) were recruited from a 3rd year junior level medical-surgical nursing theory course. Institutional review board (IRB) approval was received prior to data collection and recruitment of subjects. Power analyses indicated that a minimum sample of 40 students from each group would be sufficient for a repeated measures ANOVA to detect a moderate effect size ($ef = 0.30$) with an α level of 0.05 while maintaining minimal statistical power of 0.80. Subjects were randomly assigned to two study groups and outcomes were measured prior to and following the semester.

5.2. Sample

One hundred twenty six students were approached to participate in the study, with one hundred nineteen originally consenting. Two students were excluded due to failing performance or withdrawing from the course. This left sixty-eight 3rd year junior level undergraduate baccalaureate nursing students and 49 direct entry masters students both with no prior clinical experience. This group was completing their first medical-surgical practicum attending a metropolitan private university. Direct entry master's students are non-nursing graduates who hold a baccalaureate degree in fields other than nursing. Undergraduate and direct entry master's students were assigned to either a block of simulated learning followed by hospital based learning experiences (S-H) or the hospital based learning was followed by a block of simulated learning experiences (H-S) group by the advising coordinator based on student

schedules and convenience. Inclusion criteria were students in the same 3rd year junior level medical-surgical theory course and medical-surgical practicum. Two study groups were utilized.

5.3. Procedure

5.3.1. H-S and S-H groups

All students in the H-S and S-H groups were enrolled in the same 14-week adult medical-surgical content theory course and were randomly assigned to each group and their corresponding clinical locations. The H-S group participated in a hospital based learning experience for the first 7 weeks followed by a block of simulated learning experiences over 7 weeks for one semester. The S-H students reversed this order (see Fig. 1). During the 7 weeks of hospital based learning, students were in a variety of medical-surgical hospital settings in a large metropolitan city. There were approximately eight students in each hospital practicum section who engaged in two 8 h days/week for 7 consecutive weeks.

The simulated learning occurred during a 7-week simulation practicum session. Each student had an active role in three simulations that lasted approximately 4 h. These 4 h included pre-briefing, orientation to the simulation room and mannequin, a pre-quiz, and an unfolding patient care scenario with debriefing. Three simulations were used, these include HF, COPD/pneumonia, and pain management. To prepare for simulation, the students were required to review the objectives, complete an assigned reading, a pre-quiz, review the mock patient's chart, medication administration record (MAR), analyze laboratory results, read the patient report, and develop a tentative plan of care. The students' preparatory paper work was identical to the paper work they complete prior to caring for patients in the hospital-based practicum.

Each of the simulated learning experiences included four different patient vignettes. The unfolding cases spanned across a 24 h period. The students typically begin the scenario assessing their patient and developing the nurse/patient relationship. Several times during the simulation there is a decline in the patient status. The student has the opportunity to implement effective and/or ineffective nursing interventions. The student must then evaluate the patient's response to their interventions. Each vignette also includes some component of patient education. Based on the students' CDM and implementation of nursing interventions may alter the sequence of events within the scenario.

During the simulated learning experience students entered the simulation in groups of two. Their roles included new RN and RN preceptor. This setup served to benefit both students, allowing the "new RN" to have another resource available, and for the "RN preceptor" to observe the entirety of the simulation without over-focusing on any one aspect. Based on the patient situation, expected student performance behaviors and interventions were identified. Once the assessments/interventions were completed or after approximately 20 min when the student(s) was unable to identify the assessments/interventions needed, the scenarios were paused.

The simulation instructor facilitated group debriefing to discuss and reflect on the simulation scenario. Debriefing included a reaction, analysis, and a consolidation phase (Gum et al., 2012). During the reaction phase, the active participants were first asked to reflect on their personal performance and discuss behaviors that they believe they performed well and areas they needed to improve. Student observers provided suggestions for improved performance or asked clarifying questions. The analysis phase was focused on what happened during the scenario, identifying what was done correctly, but also identifying any errors and areas for improvement. Application of learning occurred during the consolidation phase. During this phase, the simulation instructor identified the relevance of the events that occurred during the simulation, making specific references to patient care in the hospital environment. Debriefing would end with lessons learned and new goals for the next scenario were established.

At the conclusion of debriefing, the next patient vignette was presented to the students, and two new students then completed the simulated clinical experience. This sequence of events occurred four times. At the end of the patient vignette, a final discussion and reflection facilitated by the simulation instructor occurred. The topics of discussion varied, as the nature of the discussion was based on the students' performance and the patient's response to the students' assessments and interventions.

Training regarding the role of the simulation instructor, debriefing, and grading was provided for all simulation instructors involved. Attempts were made to run each simulation standardly by providing each simulation instructor with a manual that included step by step instructions, pre-briefing and debriefing questions, the expected student behaviors, and patient situations and transitions. Debriefing questions and a standardized debriefing tool (Gum et al., 2012) were used with each simulation.

Over the 7 week time allotted for simulation each student also independently completed an online medium-fidelity Type 2 Diabetes simulation. This assignment was an additional activity to promote clinical decision making among students that focused on the five components of the nursing process when planning care for a patient with a chronic illness. Students also completed on-line modules regarding quality improvement (QI) and completed a group QI project and presentation.

5.4. Data collection instruments

A demographic questionnaire including the participant's age, gender, and previous work experience was collected at baseline. The conceptual components were measured using the Clinical Decision Making in Nursing Scale (CDMNS) and the Nurse Anxiety and Self-Confidence with Clinical Decision Making (NASC-CDM), to determine if there was a difference in nursing student CDM, self-confidence and anxiety with the CDM process in relationship to the sequencing of simulated versus hospital based learning experiences students participated in over the course of the semester.

The CDMNS was operationalized by each subject completing a 40 item instrument with a 6-point Likert type response scale that measures perceived categories of CDM (Jenkins, 1985). These categories include searching for alternatives or options, canvasing objectives and values, evaluation and re-evaluation of consequences, and searching for information and unbiased assimilation of new information. The Cronbachs's alpha for the CDMNS is 0.83 (Jenkins, 1985).

The NASC-CDM is a 27 item instrument with a 6-point Likert type response scale that measures the participants' perceptions of their level of self-confidence and anxiety as they move through the CDM process (used with permission, White, 2014). Items on the scale were designed intentionally using broad generic phrasing so that the NASC-CDM scale might be used in a number of clinical situations and a numbers of clinical settings. It has utility in both real-life and simulated learning environments. There are two subscales of the NASC-CDM scale: self-confidence and anxiety. The Cronbach's alpha for self-confidence is 0.97, and anxiety is 0.96 (White, 2014). Students completed the CDMNS and the NASC-CDM during the first week and the last week of the semester.

6. Results

Data was analyzed in two steps. The first step involved

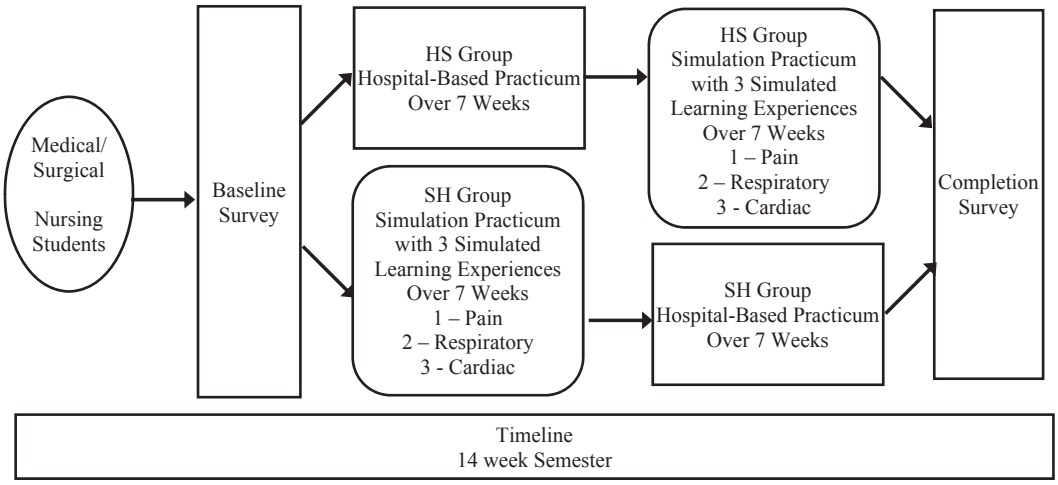

Fig. 1. Simulation/Hospital Hospital/Simulation Procedure.
Study procedure for hospital practicum followed by simulation practicum (H-S) nursing course sequence compared to simulation practicum followed by hospital practicum (S-H).

descriptive statistics that compared the two study groups at baseline. Table 1 indicates the study groups significantly differed ($p < 0.05$) on student type, direct entry master's verses undergraduate and age. These findings indicate that there was a greater proportion of undergraduate students in the S-H (66% of undergraduates, 31% of direct entry masters) group and this group was younger than the H-S group (34% of undergraduates, 69% of direct entry masters). Despite this difference in assignment, no significant difference in CDM, self-confidence, and anxiety between the undergraduate and the direct entry master's students was observed at baseline ($p < 0.00$, chi squared $= 14.42$).

The second step in the data analysis included calculating repeated measures ANOVA to determine within and between group differences in the three outcome variables over the duration of the study. The level of significance for each of these three calculations was set at 0.017 in order to maintain the overall type 1 error rate of 0.05. Outcome variables that indicated a significant group, time, or interaction effect were then further analyzed with Tukey post hoc comparisons to determine specific group differences over the duration of the study. Table 2 presents the result of the repeated measures ANOVA of the outcome variables CDM, self-confidence with CDM, and anxiety with CDM.

Between and within group differences were found relative to the NASC-CDM specifically in regards to self-confidence with the decision-making process. When comparing groups, at baseline (T1) the S-H group had significantly higher self-confidence scores compared to the H-S group; however, at 14-weeks (T2) both groups were not significantly different. Between group differences in NASC-CDM mean scores related to anxiety with making clinical decisions were not significantly different at T1 or T2. Significant within group differences were found in the S-H group only demonstrating a significant decrease in clinical decision-making anxiety across the 14 week semester. No significant differences in NASC-CDM scores between T1 and T2 were found within the H-S group. Finally, there were no significant difference in scores on the CDMNS within or between the two study groups at the two measurement points.

7. Discussion

The purpose of this study was to determine if there is a difference in perceived CDM, self-confidence and anxiety with the CDM process among nursing students who receive two different sequences of a block of simulated and hospital based learning experiences. The sequencing did impact the students' differently in areas of self-confidence and anxiety with CDM process but did not affect their CDM. While there are many studies describing the benefits of adding simulation to nursing curriculums, the best sequencing of simulated learning experiences within nursing curricula is lacking (Harder, 2010).

Although Jeffries (2005) noted that critical thinking is improved by simulation, there was not a significant increase in perceived CDM among the participants of the present study. Similar to others who have evaluated a staggered timing model over one semester, there was no significant difference in student performance (Meyer et al., 2011; Schlairet and Fenster, 2012; Hansen and Bratt, 2017), clinical judgment (Meyer et al., 2011), critical thinking (Schlairet and Fenster, 2012) or perception of clinical decision making (Woda et al., 2016) at the end of the semester. Keeping in mind that in the present study this was the first clinical practicum experience for this group of students, it may be that one semester of medical-surgical practicum, regardless of the sequencing of simulated learning is not enough time to significantly increase CDM.

Regarding self-confidence, the S-H group had higher perceived self-confidence with the CDM process at baseline. Students having a block of simulated learning experiences first began the semester more confident with making clinical decisions. This perceived self-confidence may be related to the fact that they were caring for simulated patients' verses patients in a health care setting. Another possible explanation for the higher self-confidence in the S-H group may be attributed to the student make up of that group, which consisted of 66% undergraduate students. It may be that the undergraduate students have had less exposure to health care settings or taking care of acutely ill patients resulting in an inflated perceived self-confidence. Other studies have not specifically reported the students' perception of their confidence with CDM, but have attributed simulated learning experiences to promoting self-confidence (Dearmon et al., 2013; Jeffries, 2005; Kaddoura, 2010; Lewis and Ciak, 2011; Mould et al., 2011; Schlairet, 2011; Thomas and Mackey, 2012).

Both groups were equally anxious at the start of the semester (see Table 2), but the S-H group had a significant decrease in perceived anxiety with the CDM process over the course of the semester. This decrease in anxiety may be due to having time to get used to caring for patients in the simulation setting. This is supported by Ganley and Linnard-Palmer (2012) where students

Table 1
Comparison of demographic variable characteristics.

Characteristic	Simulation-Hospital *n* (%)	Hospital-Simulation *n* (%)	χ^2	*p*
Age[a]	21.12 (2.34)	22.3 (2.60)	2.59	0.01
Gender				
Female	58 (96.7)	53 (93.0)	0.82	0.37
Male	2 (3.3)	4 (7.0)		
Ethnicity				
Caucasian	56 (93.3)	50 (89.3)	4.21	0.52
Other	4 (6.7)	6 (10.6)		
Academic Program				
BSN	45 (75.0)	23 (40.4)	14.42	<0.01
Direct Entry Masters	15 (25.0)	34 (59.6)		
Experience				
Nursing Assistant	10 (16.7)	8 (14.0)	0.156	0.69
Nurse Intern/Extern	3 (5.1)	1 (1.8)	0.97	0.33

Note. BSN = Bachelor of Science in Nursing.
[a] Age is presented as *M (SD)* and evaluated using a *t*-test rather than χ^2.

Table 2
Comparison of average scores for differing nursing practicum sequences.

Outcome	Simulation-Hospital		Hospital-Simulation	
	Beginning	End	Beginning	End
Clinical Decision Making	111.06 (6.83)	113.11 (7.35)	113.13 (6.08)	113.26 (5.50)
Self-Confidence with Clinical Decision Making	106.97 (19.18)[a]	118.75 (16.97)	99.94 (20.12)	113.33 (17.04)
Anxiety with Clinical Decision Making	74.00 (21.97)	60.50 (16.38)	77.16 (18.76)	64.64 (18.76)

Note. Data presented as mean (standard deviation).
Shading indicates a significant change within the specific study group between the Beginning and the End.
[a] Indicates a significant difference between the Simulation-Hospital group and the Hospital-Simulation group at a specific data collection point.

reported that simulation was a safe environment where they were not embarrassed by their mistakes and could function without anxiety and fear of failing. Similarly, Partin et al. (2011) reported that participating simulated learning experiences decreased anxiety. Other studies have had mixed results, reporting that students perceive increased stress and anxiety during simulation due to fear of being singled out or appearing to lack knowledge (Elfink et al., 2010; Lasater, 2007).

7.1. Study limitations

While efforts were made to minimize study limitations, some were unavoidable. The study population included a small homogenous sample from a single baccalaureate nursing program. Significant difference in age and type of student may have impacted results. Only self-report instruments were used to identify perceived CDM, and self-confidence and anxiety with the CDM process and no objective measures were utilized. Data collection at two points could have increased participant familiarity with questions and response recall. Due to the nature of the research topic, there was potential for socially desirable results. Several other external factors could have influenced student CDM, self-confidence, and anxiety with the CDM process such as site of their practicum rotation, hospital or simulation instructor, and patient acuity.

7.2. Implications for nursing education

Schools of nursing are experiencing difficulty securing quality hospital practicum placements for nursing students, resulting in creative integration of simulation into nursing curricula. Study findings indicated that students who were having a block of simulated learning experiences first were equally as anxious as the student caring for hospitalized patients. The S-H group had a significant decrease in anxiety with the CDM process over the course of the semester when compared to the H-S group. It may be that students with high anxiety levels would benefit from a sequenced practicum, starting with simulation first. Students in the S-H group were given the opportunity to familiarize themselves with a hospital setting. They performed assessments, administered medications, and utilized hospital equipment. Additionally, during the debriefing process a standardized format was utilized and students were given specific feedback that they were expected to incorporate into their weekly reflections. These types of activities may have contributed to the significant decrease in anxiety among the S-H group. These findings may suggest that implementing the use of simulated learning experiences early in a curriculum may decrease anxiety with the CDM process among students prior to caring for hospitalized patients.

8. Conclusion

The sequencing of learning experiences does not appear to impact students' perceptions of their clinical decision making ability, self-confidence, nor anxiety with making decisions at the conclusion of both sequences. However, students having simulated learning experiences first did perceive decreased anxiety and increased self-confidence which may enable them to learn better and ultimately improve their clinical performance.

Preliminary findings suggest that simulated learning and hospital based learning experiences can be offered with alternating sequences without impacting the process, anxiety or confidence in clinical decision making. This study provides beginning evidence to guide schools of nursing in curriculum development and allow flexibility in providing learning experiences based on student needs and available resources. Further studies are needed comparing the sequencing of simulated learning versus hospital based learning experiences that include an objective measurement of additional outcomes such as student performance and clinical competency.

Conflict of interest statement

I attest that I Aimee A Woda along with the co-authors do not have any conflicts of interest.

Acknowledgements

I would like to thank the one hundred seventeen students who participant in this study, and specifically Alex Miller a honor student that assisted in the manuscript development. This work was funded by Sigma Theta Tau International/National League of Nursing (grant number 74772).

References

Baxter, P., Rideout, E., 2006. Second-year baccalaureate nursing students' decision making in the clinical setting. J. Nurs. Educ. 45, 121–127.
Bland, A., Topping, A., Wood, B., 2011. A concept analysis of simulation as a learning strategy in the education of undergraduate nursing students. Nurs. Educ. Today 31, 664–670.
Cant, R., Cooper, S., 2009. Simulation-based learning in nurse education: systematic review. J. Adv. Nurs. 27, 3–15.
Cook, D., Hatala, R., Brydges, R., Zendejas, B., Szostek, J., Wang, A., Erwin, P., Hanstra, S., 2011. Technology-enhanced simulation for health professions education: a systematic review and meta-analysis. J. Am. Med. Assoc. 306 (9), 978–988.
Dearmon, V., Graves, R., Hayden, S., Mulekar, M., Lawrence, S., Jones, L., Smith, K., Farmer, J., 2013. Effectiveness of simulation-based orientation of baccalaureate nursing students preparing for their first clinical experience. J. Nurs. Educ. 52 (1), 29–38.
Dickson, G.L., Flynn, L., 2012. Nurses' clinical reasoning: processes and practices of medication safety. Qual. Health Res. 22 (1), 3–16.
Elfink, V., Kirkpatrick, B., Nininger, J., Schubert, C., 2010. Using learning outcomes to inform teaching practices in human patient simulation. Nurs. Educ. Perspect. 31 (2), 97–100.
Fisher, D., King, L., 2013. An integrative literature review on preparing nursing students through simulation to recognize and respond to the deteriorating patient. J. Adv. Nurs. 69 (11), 2375–2388.
Ganley, B., Linnard-Palmer, L., 2012. Academic safety during nursing simulation: perceptions of nursing students and faculty. Clin. Simul. Nurs. 28 (2), e49–e57.
Goldenberg, D., Andrusyszyn, M., Iwasiw, C., 2005. The effect of classroom simulation on nursing students' self-efficacy related to health teaching. J. Nurs. Educ. 44 (7), 310–314.
Gum, L., Greenhill, J., Dix, K., 2012. Debriefing Guide for Facilitators; Simulation Learning and Training Network Toolkit. Flinders University Rural Clinical School for Country Health.
Haffer, A., Raingruber, B., 1998. Discovering confidence in clinical reasoning and critical thinking development in baccalaureate nursing students. J. Nurs. Educ. 37, 61–70.
Hansen, J., Bratt, M., 2017. Effect of sequence of simulated and clinical practicum learning experiences on clinical competency of nursing students. Nurse Educ. http://dx.doi.org/10.1097/NNE.0000000000000364.
Harder, B., 2010. Use of simulation in teaching and learning in health sciences: a systematic review. J. Nurs. Educ. 49 (1), 23–28.
Hayden, J.K., Smiley, R.A., Alexander, M., Kardong-Edgren, S., Jeffries, P.R., 2014. The NCSBN national simulation study: a longitudinal, randomized, controlled study replacing clinical hours with simulation in prelicensure nursing education. J. Nurs. Regul. 5 (2), C1–S64.
International Nursing Association for Clinical Simulation & Learning [INACSL], 2015. Mission and vision. Retrieved from. http://www.inacsl.org/i4a/pages/index.cfm?pageid=3278.
Jeffries, P., 2005. A framework for designing, implementing, and evaluation simulations used as teaching strategies in nursing. Nurs. Educ. Perspect. 26, 96–103.
Jeffries, P.R., 2015. The NLN Jeffries Simulation Theory. A NLN Publication.
Jenkins, H., 1985. A research tool for measuring perceptions of clinical decision making. J. Prof. Nurs. 1 (4), 221–229.
Kaddoura, M., 2010. New graduate nurses' perceptions of the effects of clinical simulation on their critical thinking, learning, and confidence. J. Cont. Educ. Nurs. 41 (11), 506–516.
Lamb, D., 2007. Could simulated emergency procedures practiced in a static environment improve clinical performance of a critical care air support team? A literature review. Intensive Crit. Care Nurs. 23, 33–42.
Lasater, K., 2007. High-fidelity simulation and the development of clinical judgment: students' experiences. J. Nurs. Educ. 46 (6), 269–276.
Lewis, D., Ciak, A., 2011. The impact of a simulation lab experience for nursing students. Nurs. Educ. Perspect. 23 (4), 256–258.
Lyngagh, M., Burton, R., Sanson-Fisher, R., 2007. A systematic review of medical skills laboratory training: where to from here? Med. Educ. 41, 879–887.
Meakim, C., Boese, T., Decker, S., Franklin, A.E., Gloe, D., Lioce, L., Sando, C.R., Borum, J.C., 2013. Standards of best practice: simulation standard I: terminology. Clin. Simul. Nurs. 9, S3–S11. http://dx.doi.org/10.1016/j.ecns.2013.05.010.
Melincavage, S., 2011. Student nurses' experience of anxiety in the clinical setting. Nurse Educ. Today 31, 785–789.
Meyer, M., Connors, H., Hou, Q., Byron, G., 2011. The effects of simulation on clinical performance: a junior nursing student clinical comparison study. Soc. Simul. Health care 6 (5), 269–277.
Mould, J., White, H., Gallagher, R., 2011. Evaluation of a critical care simulation series for undergraduate nursing students. Contemp. Nurse J. Aust. Nurs. Prof. 38 (1), 180–190.
Nagle, B., McHale, J., Alexander, G., French, B., 2009. Incorporating scenario-based simulation into a hospital nursing education program. J. Cont. Educ. Nurs. 40 (1), 18–25.
Parker, C.G., 2014. Decision-making models used by medical-surgical nurses to activate rapid response teams. Res. Pract. 23 (3), 159–164.
Partin, J., Payne, Slemmons, M., 2011. Students' perception of their learning experiences using high-fidelity simulation to teach concepts relative to obstetrics. Nurs. Educ. Perspect. 32 (3), 168–188.
Rush, K., Dyches, C., Waldrop, S., Davis, A., 2008. Critical thinking among RN-to-BSN distance students participating in human patient simulation. J. Nurs. Educ. 47 (11), 501–507.
Schlairet, M., 2011. Simulation in an undergraduate nursing curriculum: implementation and impact evaluation. J. Nurs. Educ. 50 (10), 561–568.
Schlairet, M., Fenster, M., 2012. Dose and sequence of simulation and direct care experiences among beginning nursing students: a pilot study. J. Nurs. Educ. 51 (12), 668–675.
Shinnick, M., Woo, M., 2015. Learning style impact on knowledge gains in human patient simulation. Nurs. Educ. Today 35, 63–67.
Standing, M., 2007. Clinical decision-making skills on the developmental journey from student to registered nurse: a longitudinal inquiry. J. Adv. Nurs. 257–269.
Thomas, C., Mackey, E., 2012. Influence of a clinical simulation elective on baccalaureate nursing student clinical confidence. J. Nurs. Educ. 51 (4), 236–239.
Wagner, D., Bear, M., Sander, J., 2009. Turing simulation into reality: increasing student competence and confidence. Educ. Innov. 48 (8), 465–467.
Weiner, S.J., Schwartz, A., Sharma, G., Binns-Calvey, A., Ashley, N., Kelly, B., Dayal, A., Patel, S., Weaver, F.M., Harris, I., 2013. Patient-centered decision making and health care outcomes: an observational study. Ann. Intern. Med. 158 (8), 573–579.
Wilson, M., Shepherd, I., Kelly, C., Pitzner, J., 2005. Assessment of a low-fidelity human patient simulator for the acquisition of nursing skills. Nurse Educ. Today 25, 56–67.
White, K., 2014. Development and Validation of a tool to measure self-confidence and anxiety in nursing students during clinical decision making. J. Nurs. Educ. 53 (1), 14–22.
Woda, A., Gruenke, T., Alt-Gehrman, P., Hansen, J., 2016. Nursing student perceptions regarding simulation experience sequencing. J. Nurs. Educ. 55 (9), 528–532. http://dx.doi.org/10.3928/01484834-201608 16-07.