



Review Article

A Study on How Beneficial Simulation Experience Is For Nursing Staff's Advanced Cardiac Life Support Knowledge at the New Najran General Hospital

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Abstract

Background: Simulation has been used widely in medical education. Little is known about its uses in nursing field.

Objective: This study was conducted to examine the effect of simulation-based learning experiences on the acquisition of knowledge regarding Advance Cardiac Life Support (ACLS). Methods: A quasi-experimental design with pre and post-test was used.

Setting: We targeted staff nurses in New Najran General Hospital, which is located to the south of Riyadh, the Capital of the Kingdom of Saudi Arabia.

Participants: The target population was staff nurses.

Results: The test results showed that there were statistically significant differences between the mean scores of pre-test and post-test, indicating that simulation has an effect on increasing the ACLS knowledge of nursing staff.

Conclusion: We assume that simulation experience can positively influence staffs' knowledge acquisition. these staff findings encourage the use of simulation as a dynamic teaching strategy to improve students' knowledge in the application of clinical skills.

Introduction

Across the globe, nursing educators have become interested in the evaluation of knowledge and confidence students have regarding the Advance Cardiac Life Support(ACLS), particular with individuals working in the critical care sector. Nursing students must be able to respond quickly to cardiac arrest, as this ability is closely related to the survival rate of victims (Association,2019). There are a number of different ACLS training and skill mastery methods used by nursing educator, and a particularly interesting approach is the simulated manikin and high fidelity simulation(HFS)(Everett-Thomas et al.,2016). Simulations have been popular since its key advantages became apparent, namely that patient safety is maintained, there are fewer errors, and a potential shortage of clinical staff or real patients is not a drawback for education (Everett Thomas et al.,2016).

Background

As nursing is a holistic and integrated field, nursing competency must be made measurable, which is something a number of researchers have attempted to establish by pinpointing its key components. Matsutani,2010, analyzed the definitions, attributes, elements and structure of nursing competency by

measuring these aspects with different approaches. The present review produces a definition of nursing competency which involves the ability to integrate knowledge under particular situations or settings, with the core abilities necessary for effective and ethical nursing practice. Nurses and other health professionals are increasingly using simulation as a strategy for teaching and learning at all levels which require clinical training. Simulation is considered an effective solution for replacing real-life clinical exposure, as nursing and other health professionals' programs are having to deal with inadequate clinical learning opportunities Miller, 2014 & Hayden, 2014. This, in turn, can lead to competent performance, as the transfer of knowledge and understanding can be applied to other related situations, as well as provide a stronger foundation for critical thinking and discovery.

Problem Statement

How does simulation improve nursing staff's skills and knowledge at the Najran General Hospital? How competent will the nursing staff be when it comes to attending ACLS course?

Purpose of Study

This study examines the effect of simulation-based learning experience on the acquisition of knowledge regarding Advance Life Support(ACLS)

Review Of Related Literature

Mary Anne, 2015 concluded that in order for a practice to be effective, the instructional materials must elicit student confidence and motivation by providing learner control, tailoring the content to the appropriate level of the student. According to Cummins, 2014, one of the key ways in which simulation-based teaching is beneficial is through the timely acquisition of new knowledge and practical skills by exposing student participants to an entire clinical block as well as theoretical simulations. This practice occurs simultaneously, and so students are presented with a wider range of clinical cases across a smaller time frame. In addition to this, a lack of preparation for new nursing students often translates into the phenomenon of culture shock when they are first exposed to a maternity unit's clinical environment. Surcouf, 2013, stated that self-confidence and demonstration of improved abilities in a realistic, simulated scenario is important, and the ACLS simulation-based training model may be a viable option for maintaining adequate levels of competency for specific clinical knowledge, technical, and non-technical skills reflected in low frequency, high stakes situation capabilities or when learning and training in procedural skills is not feasible or appropriate in the context of real patient care. In addition to residency training, the use of in-situ and center-based simulations could be highly relevant for physicians in practice, particularly for certain types of communities where frequency and consequence may be even more critical. Gudhe, 2011 emphasized that nursing staff are encouraged to understand that simulation training is an effective way of preserving patient safety, since any initial mistakes can be corrected in the role-play situation, while posing no risk to real patients. In this context, evidence has been published to suggest that irrespective of the uncomplicated or complicated nature of a simulated environment (for example, role-playing events), training which relies on simulations can improve the effectiveness of the learning process. According to Benner P., M. Sutphen, 2010, the significance of aligning this educational practice with scenarios where students will face in authentic, real-world situations is further exemplified in Benner's novice to expert theory. Simulation is a foundational component of transforming participants from novice to experts, particularly in the field of nursing education. From early constructivist theory to the concepts of active learning and student mastery, scholars demonstrated the importance of practice when it comes to increasing participant performance and understanding by Bandura, A. 1978, Bloom, B. S. 1968 & Dewey, J. 1986. According to Dewey J., 1997, the learning process is an improvement of knowledge through continuous training. 'learning by doing' links knowledge, skills and experience together. Dewey J 1997 and Kolb D. 1997 state that reflection is an essential part of a learning process. Kolb's learning process theory, the Experiential Learning Theory, is based on Dewey's theory and assumes that the learner must be actively involved in the experience of learning.

In addition, McCaughey CS, Traynor MK, 2010 agreed with the theory of Dewey J, 1997 that the experiential learning theory is suitable for simulation because caregivers participate in realistic, dynamic and complex care situations. In 2010, research conducted by Sanford PG involved simulation in Nursing Education, and a review of the research including reflections from caregivers based on either a theory or one's own real or simulation experience, resulting in improved critical thinking and, therefore, better care. The practical skills learned in the simulation are applied and integrated with prior skills. The types of skills require practical education during the care of patient, and are not only taught in theory-based classes, as noted by Benner and Tanner. Along the same lines, Husebo et al, 2015 specifically focus on the debriefing phase of simulated learning in their theory. According to their work, the student is trained in different care situations for patient, in order to gain experience. Maran NJ, 2003, author of low- to High Fidelity Simulation, said that a continuum of medical education with learning through simulation complements the learning that takes place in their everyday work, and this can enhance both the nurse's abilities and care givers. Also, Gonzales L, 2017 produced a paper entitled Practice for Mastery Learning in Nursing Clinical Simulation in Nursing, and stated that with simulation, skills that are rarely used and are at risk of being forgotten are instead used and retained. Similarly, West C., 2012, conducted a case study of pre-registration nursing education and lessons learned, stating that nurses are given the opportunity to improve based on their own skill levels and existing knowledge. Murphys, 2011 put forward the notion that experience through simulation can allow students to be more prepared for complex situations in the future, described in the study entitled "Merging Problem-based learning and Simulation as an Innovative". Reedy G. 2015 used the Cognitive Load Theory to inform simulation design and practice, and this approach produces a simulation based on the nursing students' expected level of knowledge and experience, involving minimal disruptive or irrelevant outside influences. According to Rall and Dieckman 2005, simulation of patient scenarios, such as events concerning ethical problems, can assist caregiver in their profession. In these simulation, effective learning is transformed into care action, while the caregiver gains experience from manage different situations, these simulations can be designed for training and prepare nurses for their future responsibilities

Methodology

Sitting

The study conducted in the Najran Training Center. This facility serves both healthcare providers and graduate students, who use various teaching methods and techniques to meet individualized participant learning needs. The lab provides the opportunity to practice many procedures related to advanced nursing skills (e.g., advanced cardiac life support [ACLS], BLS,

and AED). The lab contains relevant teaching materials (models, videotapes, and advanced technology materials such as simulators) and in order to provide participants with real situations for practice, it also includes new simulation rooms that each contain a computerized manikin.

Research Design

A quasi-experimental design was used in this study, with a pretest-post-test experiment used to examine the effect of simulation experience on nursing staff's ACLS knowledge.

Ethical Issues

The study methods and protocols were reviewed and approved by the research and ethics committee of the Najran Training Center. Written informed consent was obtained from all participants who agreed to participate in the study. The participants received both oral and written information about the purpose, content, and extent of the study. Students' participation was completely voluntary, and they were assured their responses were confidential. Confidentiality of participants was protected by providing a code number for each participant at the stage of data collection and analysis. In addition, the collected questionnaires were kept in a locked cabinet to keep the participants' information private and confidential. After the study was completed, all questionnaires were destroyed. The participants were informed that they had the right not to participate and could withdraw from the study at any time. They were also told that demographic data and information regarding their knowledge of ACLS and confidence would be collected two times—once before and once after the intervention. In addition, the procedure of the data collection process was explained to all participants and information regarding the estimated time and number of contacts with participants was provided. The participants were not subject to any physical, psychological, social, or economical harm or risk, as the data collection process primarily relied on a descriptive, noninvasive questionnaire. Participants should be made aware that the information they provide was using solely for research purposes (Weir et al., 2011). Ethical approval for the study is a significant aspect of any research study, and in this case, was granted by the training center ethical committee.

Data Collection

Participants divided into groups to facilitate the learning process. Each group received a pre-test exam that was measured their knowledge of ACLS, and then they received two hours' training using a simulator and facilitator in the lab. After the

two hours of learning, participants were completed a post-test questionnaire in a different order to before. Training based on simulation scenarios which uploaded to the computer for use, accompanied by an illustration and debriefing presented by one of the research team. The content scenarios focus on different cardiac arrest situations, the causes, the interventions required, and the ACLS skills employed. Lecture content derived from different resources, such as critical nursing care textbooks, the American Heart Association (AHA) website and other available resources.

Data Analysis

The Statistical Package for Social Science (SPSS) Version 17 was used to analyze the data (SPSS, Inc., Chicago, IL, USA). Descriptive statistics was define the sample characteristics and a paired t-test used to examine whether there was statistically significant differences between the pre-test and post-test scores for ACLS knowledge.

Result

The following figures shows the frequency and percentage of scores obtained by the study participants before and after the simulation experience. In the pre-test stage, the participants were asked different questions related to their ACLS knowledge and their responses were recorded on a questionnaire. Afterwards, participants were provided simulation-based training and the same questions related to ACLS were asked again, with responses were recorded as post-test. Each participant was awarded scores from 1 to 10 based on the correct answers given at the pre-test and post-test stages. A total of 55 people participated in the experiment.

Figure 1 clearly shows that, at the pre-test stage, there were no candidate with 10 scores, while there were 3 candidates with scores 8 and 9. Six candidates scored 7, and 21 participants only scored 6. However, at the post-test stage, the scores of the participants increased significantly, as shown in the diagram. The number of candidates with scores of 7, 8, 9 and 10 had increased from 6 to 12, 3 to 14, 3 to 7 and zero to 6 respectively. Also, the number of candidates with scores of 4, 5, and 6 had decreased at the post-test stage. This clearly shows the positive effect of simulation experience on the knowledge of nursing staff related to ACLS. Figure 2 shows the percentage of participants for each possible value of score. It is seen that the percentage of participants with scores of 7, 8, 9 and 10 at the post-test stage had increased, while the percentage of participants for scores 4, 5 and 6 had decreased significantly at the post-test stage as compared to the pre-test stage.

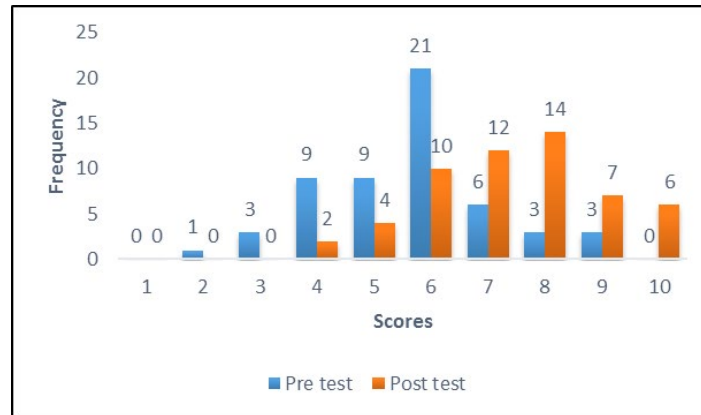


Figure 1: Frequency of Score by Participants (N=55).

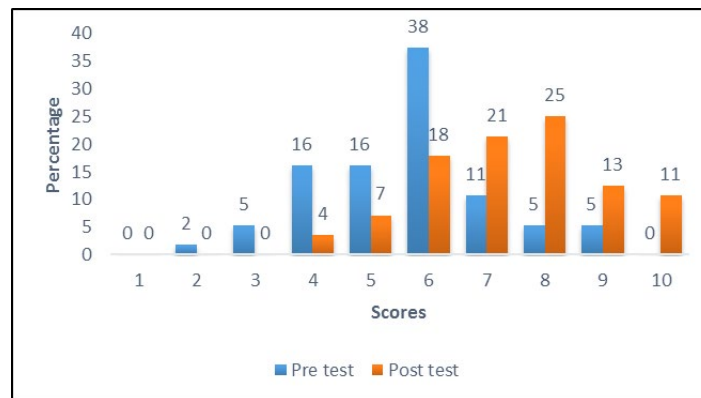


Figure 2: Percentage of Score by Participants (N=55).

The effect of the simulation experience on nursing staff knowledge can be seen through the data in Table 1 also. At the pre-test stage, 43 out of 55 participants scored less than 7, while only 12 participants were able to score 7 or more. In percentage terms, approximately 77% of participants scored less than 7 and almost 21% of participants scored 7 or higher. In contrast, scores at the post-test stage rose significantly, with 39 out of 55 participants scoring 7 or more, and those with scores less than 7 decreasing to 16. In percentage terms, 70% of all participants scored 7 or more, while roughly 29% of participants scored less than 7 scores at the post-test stage. Therefore, the simulation experience increased the percentage of participants scoring 7 or more from 21% to 70%. The knowledge of nursing staff related to ACLS has increased significantly due to the simulation experience.

		Pre-test score		Post-test score	
		Less than 7	7 or more	Less than 7	7 or more
Scores	Frequency	43	12	16	39
	Percentage	78	21	29	70

Table 2 shows the descriptive statistics for the pre-test and post-test stages. The average score obtained from participants was 5.65 at the pre-test stage, while the average score for participants at the post-test stage was 7.40. This shows a significant increase in the mean value of scores obtained by participants. The most repeated value (mode) was 6 at the pre-test stage, while the value of the mode increased to 8 at the post-test stage.

Table 2		
Descriptive Statistics		
	Pre-test	Post-test
Number of observations	55	55
Mean	5.6545	7.4000
Median	6.0000	7.0000
Mode	6.00	8.00
Std. Deviation	1.53017	1.55873
Minimum	2.00	4.00
Maximum	9.00	10.00

Table 3 shows the results of an independent t-test. This includes Levene's test for equality of variances and a t-test for equality of means. The Levene test assumes equal variances in null hypothesis and unequal variances in alternative hypotheses. The p-value for Levene's test shows that the null hypothesis cannot be rejected and that the variances for pre-test and post-test scores are equal.

Table 3						
Levene's Test for Equality of Variances						
		F-test		P-value		
Scores	Equal variances assumed		.338		.562	
	Equal variances not assumed					
t-test for Equality of Means						
Mean Scores		Mean Difference	t-test	P-value	95% Confidence Interval of the Difference	
Pre-test	Post-test				Lower	Upper
5.6545	7.4000	-1.74545	-5.926	.000	-2.32926	-1.16165

The t-test for equality of means examines whether the difference between the mean value for the pre-test scores and post-test scores is statistically significant or not. The results for the t-test (-5.926) and p-value clearly indicate that the mean difference between pre-test and post-test scores is statistically significant. This shows that the knowledge of nursing staff regarding ACLS has increased significantly after their simulation experience. Thus, the effect of simulation experience on the knowledge of nursing staff related to ACLS is statistically significant. The 95% confidence interval value of the difference shows that the maximum difference between the mean value of pre-test and post-test scores can be 2.33 and the minimum difference between the mean values of pre-test and post-test scores can be 1.16. Overall, the analyses conducted show that the simulation experience had a significant positive impact on the knowledge of nursing staff related to ACLS

Discussion

The current paper intended to analyse whether simulation education affected the level of ACLS knowledge of staff nurses at the Najran Hospital. The results show that, following simulation training, knowledge relating to ACLS was much greater in students at the post-test stage than at the pre-test stage. It was also shown that simulation affected staff's cognitive ability in relation to knowledge acquisition, denoting that a knowledge test prior to the simulation training could raise students' cognitive learning as defined by the International Nursing Association for Clinical Simulation and Learning (2016). It is considered that a learning stimulus is able to increase participant awareness regarding their existing knowledge and current knowledge gaps they may have. By defining their knowledge gaps before the simulation scenario, they might pay more attention during training (Haukedal, Reiersen, Hedeman, & Bjork, 2018). The current paper encourages the implementation of simulation methods in nursing education, as an education tool to boost the quality of learning. Also, simulations are able to offer a practical and risk-free learning environment for nursing staff and educators.

Conclusion

Nurse knowledge levels were tested and compared at the pre-test and post-test stages, and it was shown that scores were significantly higher post simulation. These results put forward the notion that simulation experiences can positively affect the knowledge acquisition of students. Overall, this study's findings encourage the use of simulation as a dynamic teaching strategy to improve students' knowledge in the application of clinical skills.

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