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RESEARCH ARTICLE

EFFECT OF SIMULATED LEARNING REGARDING KNOWLEDGE AND CLINICAL PERFORMANCE ABILITY ON ENDOTRACHEAL SUCTIONING

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ABSTRACT

Aim: This research attempted to examine the effects of simulation-based education regarding knowledge and clinical performance ability on Endotracheal suctioning among nursing student.
Design: A quasi experimental approach was used. The sample consisted of 12 numbers of nursing students and were selected by purposive sampling method.
Results: The mean pre-test scores were 6.17 and 8.08 in the post-test. There was a statistically significant difference between the pre-test and post-test in the study group at $p<0.05$. The mean pre-test performance ability was 19.50 in the pre-test as compared to 22.58 in the post-test. There was a statistically significant difference between the pre-test and post-test participants performance ability at $p<0.05$. A significant positive correlation was found between post-test knowledge and performance ability ($r = 0.0325$). The results revealed that increase in knowledge and skill due to simulation intervention enhanced the performance ability of the students. 100 % indicated that the simulation experience provided active deep learning.
Conclusion: Simulation based learning had a positive correlation on knowledge and performance ability regarding endotracheal suctioning.

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INTRODUCTION

Simulation is as old as human being on earth. Not only human beings but even animals use the techniques of Simulation to train their young ones to teach them to adjust in their physical environment.Simulation has been started after the First World War in the training of pilots in air force (Michelle Aebersold and Dana Tschannen, 2013). (Michelle Aebersold, 2013) When teachers schedule a certain amount of time (4 or 6 hours) for laboratory activities, it will beinsufficient for some students and unnecessarilylong for others to acquire a particularskills. Both the activity and the amount of time need to be individualized (Jeffries, 2012). In any educational situation it's easy to assume that the learner knows nothing and needs to know everything, so instructor start at the beginning and deliver all she know.But what about the student on a3RD year of under graduate program whohad given care to patient with cardiac problem ? She may know all about living with the disease and treatments (she's been posted in the wards) orseen on media or had experience with on the topic under discussion, but as an example, her Cardio Pulmonary Resuscitation technique needs improvement (Cant and Cooper, 2010). So skill acquisition is a complex process that can be obtained by learning through Simulation. As a teaching method, Simulation can be used to assess and evaluate a student's skill acquisition. (Leila Jamshidi, 2012) Class room instruction is needed to prepare students for their clinical activities. Student learn prerequisite knowledge in the class room and through independent learning activities that they later apply and test, first in the Simulation laboratory and then in the clinical practice (LeilaJamshidi, 2012). Internationally, simulation has been endorsed by nursing professional bodies National League for Nursing (NLN), 2003; Nursing and Midwifery Council (NMC), 2007) and is a requirement by the Nursing Council of New Zealand (NCNZ) in the undergraduate nursing educational standards, where it is mandated that "all students have access to simulation learning resources in order to prepare them appropriately for clinical experiences to ensure the safety of health consumers, students and staff" (NCNZ, 2010). (Virginia Board of Nursing, 2009) Nursingeducators are challenged with discovering ways to facilitate the education of their students quickly and efficiently without mistake in the Simulation laboratory (Cannon-Diehl, 2009). There by the researchersfelt the need to assess the level of appropriateness

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in selection and implementing Simulation as the instructional method of choice to meet the specific learning objectives among student nurses on Endotracheal suctioning. The aims of the study were

1. Assessingstudent nurse'sknowledge and practice regarding endotracheal suctioning.
2. Implementing the simulation based education on endotracheal suctioning
3. Evaluatingthe effect of Simulationregardingendotracheal suctioningon knowledge and performance skill.
4. Evaluating student's satisfaction towards simulation-.

Keywords are defined as

A) Knowledge: It refers tothe right response scores obtained by the student nurses on Endotracheal suctioningto the Mcq.
B) Performance ability: It refers to theactivity carried out by the student nurses regardingEndotracheal suctioning, which will be measured bythe structured performancepractice checklist.
C) Simulated learning**:** It refers to a technique that amplify real experiences with guided experiences often replicate the real world in a fully interactive fashion.
D) Endotracheal suctioning is a component of bronchial hygiene therapy and mechanical ventilation and involves the mechanical aspiration of pulmonary secretions from a patient with an artificial airway such as endotracheal tube is in place. In this study mastery onEndotrachealsuctioningwas done by Simulation. Use of Simulation design scale assessed the Student satisfaction and self confidence in learning through Simulation.

Research Design

A quasiexperimental pre-test and post- test one groupresearch design is used. Non-probability purposive samplingwas used to take 12 studentsand data were collected from undergraduate students enrolled in bachelor of Science in Nursing' program in the University of Hail, Saudi Arabia. Female Student nurses, who wereattending the theory and practical session onEndotracheal suctioning as part of their curriculum were included.

Tool:1. The knowledge questionnaire was comprised of

Section A: socio –demographic (level of education, duration of simulation training, previous experience with simulation)

Section B: Knowledge questionnaire with 10 objective Type questions on Endotracheal suctioning, the item had only one correct answer each.

2. The performance ability check list on the Endotracheal suctioning consisted of 25 dichotomous questions.
3. "Student satisfaction and self confidence in learning " with 20 items was usedand were asked to rate their answers on a 5-point Likert scale.This survey tool was adapted from National League for Nursing, 2005.

Data Collection

Step 1: Participants were provided with a knowledge inclassroom content on Endotracheal Suctioning.
Step 2: 10 minutes time was allotted for the students to fill out the Knowledge questionnaire (pre)

Table 1. Comparison between the pre and postprogram according to knowledge about Suctioning an Endo tracheal Tube (Open System) (n=12)

	Pre program		Post program		p
	No.	%	No.	%	
Purpose of endo tracheal tubesuctioning :					
Incorrect	12	100.0	12	100.0	-
Correct	0	0.0	0	0.0	
Position of the conscious patient in endo tracheal suctioning					
Incorrect	3	25.0	4	33.3	1.000
Correct	9	75.0	8	66.7	
Pressure of the wall unit suction for an adult patient?					
Incorrect	7	58.3	3	25.0	0.289
Correct	5	41.7	9	75.0	
Method of moistening the suction catheter					
Incorrect	1	8.3	0	0.0	1.000
Correct	11	91.7	12	100.0	
Technique ofopening the sterile suction package					
Incorrect	3	25.0	3	25.0	1.000
Correct	9	75.0	9	75.0	
Hyperventilating the patient before and after endo tracheal suctioning					
Incorrect	7	58.3	1	8.3	0.031*
Correct	5	41.7	11	91.7	
Number ofseconds to do the endotrachealsuctioning					
Incorrect	5	41.7	3	25.0	0.625
Correct	7	58.3	9	75.0	
Time interval between each suctioning					
Incorrect	9	75.0	0	0.0	0.004*
Correct	3	25.0	12	100.0	
Complicationsdue to absence of hyperventilation before doing suctioning					
Incorrect	4	33.3	1	8.3	0.250
Correct	8	66.7	11	91.7	
Frequently of changingendotracheal suction catheter					
Incorrect	7	58.3	8	66.7	1.000
Correct	5	41.7	4	33.3	

p : p value for McNemar test comparing between pre and post program

Step 3: Pre simulation orientation was given for all 12 students for 5 minutes.
Step 4: The 12 students were divided in groups of 4 students each.
Step 5: Case scenario was given. The setup of the environment as a real Critical care unit with the necessary equipment was arranged by the investigator and the instructors in the Simulation laboratory. Students were expected to assess the patient's condition on mannequin and to determine for endotracheal suctioning and post procedure documentation. The primary investigator and the instructors assessed theperformanceability of the students on Endotracheal suctioning (pre- test performanceability)by use of check list. It took 15 minutes.
Step 6: Debriefing was done for 10 minutes.
Step 7: Students satisfaction survey was done to assess the level of students satisfaction survey towards learning by simulation.
Step 8: One week later the students were exposed to thePatients in Critical care unitand their performance ability and knowledge (post- test) on Endotracheal suctioningwas assessed.

RESULTS

The participants were doing 4th year graduate B.Sc Nursing, all 100% had 3 credit hours and underwent 20hrs of training, and all the participants 100% had undergone 20 hrs of training. Majority 66.7 % had previous experience.

Table 2. Comparison between the pre and postprogram according to knowledge about Suctioning an Endo tracheal Tube (Open System) (n=12)

	Preprogram	Postprogram	t	p
Total Score of knowledge				
Min. – Max.	3.0 – 9.0	4.0 – 10.0	3.960*	0.002*
Mean ± SD	6.17±1.75	8.08±1.56		

t, p_1: t and p values for Paired t-test between pre and post program
*: Statistically significant at $p \leq 0.05$

Table 3. Comparison between the pre and postprogram according to Performance skills (n=12)

		Pre program				Post program				p
		Incorrect		Correct		Incorrect		Correct		
		No.	%	No.	%	No.	%	No.	%	
Q1	Identify the specific purpose	4	33.3	8	66.7	0	0.0	12	100.0	0.125
Q2	Gather the equipment	0	0.0	12	100.0	0	0.0	12	100.0	-
Q3	Follow Standard Protocol	0	0.0	12	100.0	0	0.0	12	100.0	-
Q4	Prepare the equipment	0	0.0	12	100.0	0	0.0	12	100.0	-
Q5	Assess for pain or the potential to cause pain. Administer pain medication, as prescribed, before suctioning	12	100.0	0	0.0	5	41.7	7	58.3	0.016*
Q6	Position the patient	0	0.0	12	100.0	0	0.0	12	100.0	-
Q7	Turn suction to appropriate pressure.	4	33.3	8	66.7	2	16.7	10	83.3	0.687
Q8	Occlude end of the connecting tubing wearing clean gloves to check suction pressure	4	33.3	8	66.7	1	8.3	11	91.7	0.375
Q9	Open sterile suction package using aseptic technique	0	0.0	12	100.0	1	8.3	11	91.7	1.000
Q10	Manipulate the catheter using dominant hand with sterile gloves and must remain sterile	0	0.0	12	100.0	3	25.0	9	75.0	0.250
Q11	Connect suction catheter to tubing	4	33.3	8	66.7	0	0.0	12	100.0	0.125
Q12	Moisten the catheter by dipping it into the container of sterile saline	4	33.3	8	66.7	0	0.0	12	100.0	0.125
Q13	Hyperventilate the patient using a manual resuscitation bag on the non-dominant hand and deliver three to six breaths	4	33.3	8	66.7	1	8.3	11	91.7	0.375
Q14	Open the adapter andremove the manual resuscitation bag with non-dominant hand.	0	0.0	12	100.0	0	0.0	12	100.0	-
Q15	Using dominant hand, gently and quickly insert the catheter.	4	33.3	8	66.7	1	8.3	11	91.7	0.375
Q16	Apply suction by intermittently occluding the Y-port on the catheter with the thumb of non-dominant hand, and gently rotate the catheter as it is being withdrawn	4	33.3	8	66.7	2	16.7	10	83.3	0.687
Q17	Hyperventilate the patient using a manual resuscitation bag on the non-dominant hand and deliver three to six breaths	4	33.3	8	66.7	1	8.3	11	91.7	0.250
Q18	Flush catheter with saline	6	50.0	6	50.0	4	33.3	8	66.7	0.687
Q19	Allow at least a 30-second to 1-minute interval if additional suctioning is needed	0	0.0	12	100.0	1	8.3	11	91.7	1.000
Q20	Discard equipment	4	33.3	8	66.7	0	0.0	12	100.0	0.125
Q21	Assist patient to a comfortable position. Raise bed rail and place bed in the lowest position	8	66.7	4	33.3	0	0.0	12	100.0	0.008
Q22	Offer oral hygiene after suctioning	0	0.0	12	100.0	4	33.3	8	66.7	0.125
Q23	Reassess patient's respiratory status, including respiratory rate, effort, oxygen saturation, and lung sounds	0	0.0	12	100.0	1	8.3	11	91.7	1.000
Q24	Remove additional PPE, if used. Perform hand hygiene	0	0.0	12	100.0	0	0.0	12	100.0	-
Q25	Document the following	0	0.0	12	100.0	2	16.7	10	83.3	0.500

p : p value for McNemar test comparing between pre and post program

Table 4. Comparison between the pre and post program according to total score of Performanceskills (n=12)

	Preprogram	Postprogram	t	p
Score of performanceskills				
Min. – Max.	18.0 – 20.0	19.0 – 25.0	7.400*	<0.001*
Mean ± SD	19.50 ± 0.80	22.58 ± 1.51		

t, p_1: t and p values for Paired t-test between pre and post program
*: Statistically significant at $p \leq 0.05$

Table 5. Correlation between pre-test knowledge and performance ability

Variables	Pre-test knowledge	Pre-test performance ability
Pre-test knowledge	-	r = -0.052, NS
Pre-test performance ability	r = -0.052 NS	-

Table 6. Correlation between post-test knowledge and performance ability

Variables	Post-test knowledge	Post-test performance ability
Post-test knowledge	-	r = 0.325, p<0.05
Post-test performance ability	r = 0.325 p<0.05	-

DISCUSSION

The student nurses selected for this study were female and all of them were learning Critical care Nursing and had undergone 20 hours of training as part of their curriculum.This finding co-relates with the study conducted by Charlotte Ladd *et al*.(2013) among undergraduate nursing students. All of the 12 students volunteered and more than half of the student nurses (66.7 %) had previous experience with simulation learning. It proved that student nurses had interest in gaining knowledge and performance skill by Simulation learning. These findings were supported in a study about "Nursing students perception of simulation as a clinical teaching method in the Cape town Metropole, South Africa by Neletal (2015). In terms of knowledge gain, the mean pre simulation knowledge scores of Nursing students on Endotracheal suctioning ranged from 6.17±1.75 and in post simulation 8.08±1.56, suggesting that simulation based learning was effective in increasing the knowledge of student nurses regarding endotracheal suctioning. All the student nurses fell into the category of adequate level of knowledge in the post simulation. The pre simulation and post simulation performance ability on endotracheal suctioning had statistically significant differences. This result is in agreement with a more recent study by Tamsin Pike *et al*. (2010) reported that educational strategies such as clinical simulation enhances learner's self-efficacy in terms of knowledge and psychomotor aspects.Regarding the correlation between post simulation knowledge score of student nurses regarding endotracheal suctioning was found to be significantly higher than the pre simulation score, ($p< 0.001$) and post simulation performance skill was found to be significantly higher than the pre simulation performance skill.

Previous studies by Cynthia Ann Blum (2016) and Chariotte Ladd (2016) which emphasizes the role of simulated learning. Most of the students rated to strongly agree that they clearly understood the purpose and objectives of the simulation on endotracheal suctioningand they indicated that the simulation should be a mandatary component of their education.

Implication

This study helped the students to develop an interactive learning and successful integration in performing endotracheal suctioning. Helps to raise awareness among students and instructors about the simulation based teaching and learning.

Recommendations

A comparative study can be undertaken to evaluate different teaching strategies with simulation based education.

Conclusion

Simulation based learning had positively increased the level ofknowledge and performance ability regardingendotracheal suctioning among the student nurses.

Ethical clearance

Taken from college of nursing ethical committee

Source of funding: Self

Conflict of Interest: Nil

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