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Research Article

EFFECTIVENESS OF SIMULATION-BASED LEARNING REGARDING MANAGEMENT OF POSTPARTUM HEMORRHAGE (PPH) IN TERMS OF COMPETENCIES AMONG NURSING STUDENTS IN SELECTED NURSING COLLEGES OF AMBALA, HARYANA

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ABSTRACT
Postpartum Hemorrhage (PPH) is one of the leading causes of maternal mortality and morbidity worldwide and is responsible for about a quarter of all maternal deaths. The aim of the study was to assess the effectiveness of simulation-based learning regarding management of PPH in terms of competencies among nursing students in selected nursing colleges of Haryana. Quasi- experimental design was adopted to assess the effectiveness of simulation based learning in terms of competency of nursing students. Data was collected from 109 students studying in BSc. 4th Year in M.M. College of Nursing and M.M. Institute of Nursing. Purposive sampling technique was used to randomly allocate the participants in experimental and comparison group. The study findings showed that majority (76.7%) and (73.5%) of the nursing students were female in experimental and comparison group respectively. In experimental group, the mean post-test knowledge score (23.7 ± 4.1) and (22.3 ± 4.2) was higher than the comparison group. The mean post-test skills score (27.2 ± 4.3) in experimental group was higher than (24.7 ± 5.3) in comparison group. The mean post-test CDMA score (12.7±2.1) in comparison group was higher than the mean post-test CDMA score (9.6±2.5) in experimental group. The calculated 't' value post-test skills scores (t=2.65; p=0.00*) which was found to be statistically significant at 0.05 level of significance. The study concluded that Simulation based learning was effective in enhancing the competency of nursing students regarding management of PPH.

Keywords: Simulation based learning, Competencies, knowledge, skill, Clinical decision making ability, Management of PPH.

1. INTRODUCTION
According to report of 2020, 861 women were identified as having died of maternal causes in the United States. The maternal mortality rate for 2020 was 23.8 deaths per 100,000 live births compared with a rate of 20.1 in 2019 [1].

Ninety nine percent of maternal mortality due to vaginal bleeding following delivery occurs in low- and middle-income countries. It was estimated that every year around 14 million mothers in the world suffer from vaginal bleeding following delivery, probability 1 in 1000 deliveries, maternal mortality was caused due to postpartum hemorrhage [2].

The pregnancy - related maternal mortality rate in the United States is approximately 7-10 women per 100,000 live births. In the developing world, several countries have maternal mortality rates in excess of 1000 women per 1,00,000 live births, and world Health organization [WHO] statistics suggest that 25% of maternal deaths are due to PPH, accounting for more than 1,00,000 maternal deaths per year [3].

In a national cross-section study, PPH was found to have the highest case fatality rate among all the direct obstetric complications in Ethiopia. PPH is more likely among women with macrosomia, those who had history of PPH, previous caesarean, abnormal placentation, prolonged

third stage of labor, hypertensive disorders of pregnancy, soft tissue lacerations or induction of labour

The supportive study reveals that the main obstacle for high quality PPH care is patients feels lack of information and care given by health professionals in before, during and after the PPH events. Main obstacles in health professionals were lack of clarity of the guidelines, Lack of knowledge and lack of team communication. Team training and checklist flow charts were more helpful for professionals [4].

With this background, the study was carried out to assess the effectiveness of the simulation-based learning regarding management of postpartum hemorrhage (PPH) in terms of competencies among B. Sc Nursing Students in selected nursing colleges of Ambala, Haryana.

2. SUBJECTS AND METHOD

2.1. Study Design

This was a Quasi- experimental Non- equivalent control group pre-test post-test design. The study was conducted in M. M. College of Nursing and M. M. Institute of Nursing at Mullana, Ambala in 2022.

2.2. Population and Sample

The poplulation in this study was B. Sc. Fourth year nursing students who are studying in selected nursing college of Mullana, Ambala. Power analysis was carried out by Cohen's d formula where the calculated sample size was 44 for each group (effect size 0.63) and (power 0.80). Hence, considering the probability of sample loss, 62 samples for each group were decided. Sampling was done by non-probability sampling with purposive sampling.

2.3. Study Variables

The dependent variables is the competencies *i.e.* knowledge, skills and clinical decision making ability. The independent variables are simulation based learning regarding management of postpartum hemorrhage.

2.4. Operational Definition of Variables

Effectiveness refers to which the simulation-based learning regarding Management of Postpartum Hemorrhage achieves the desired effect on enhancing knowledge, and improving the skills and clinical decision-making ability of nursing students as evident from significant gain in competencies score. Simulation-Based Learning refers to the opportunities provided to nursing students to practice their clinical and decision-making skills through as close as real-life situational experiences without harming patient.

Nursing Students: In this study, it refers to nursing students pursing 4th year B. Sc. Nursing studying in Nursing college recognized by State Nursing Council and affiliated to Indian Nursing Council. The nursing students who had their regular teaching on PPH.

2.5. Study Instruments

The data was collected using selected variables that were prepared by the researchers which comprised of gender, nursed a patient with PPH, previous sessional marks and clinical evaluation marks, structured knowledge questionnaire (Kuder Richardson (KR) 20 = 0.70) comprised of 35 multiple choice questions that were categorised into concept of postpartum hemorrhage, risk factor, sign and symptoms and management of postpartum hemorrhage. Each item had a single correct answer and awarded "one" and for an incorrect answer as a "zero" OSCE checklist (inter- rater reliability =0.95) comprised of 5 stations which comprised of initial assessment of patient with PPH, identify amount of blood, steps of blood transfusion, steps for management of retained placenta and steps of bimanual compression which assessed the skills of the students. For each correct step, score of 1 was awarded and wrong step and not done was awarded as a score of 0. Clinical Decision Making Ability Questionnaire (Kuder-Richardson-(KR) 20 Formula) comprised of 5 different case scenario which comprised of 4 questions each and total 20 clinical decision making ability questions was there to check the decision making ability of the students.

2.6. Simulation Based Learning

Simulation Based learning (SBL) video on management of PPH as a part of interventional tools was shown to the experimental group of nursing students before the intervention. SBL session on management of PPH was carried out among the nursing students. Total 10 SBL sessions were conducted using two parallel case scenarios on management of PPH for 62 students of intervention group where each session comprise of 10 students and one last group comprise of 12 students which was divided into 6 groups. SBL was conducted with the following objectives:

- Assessment of the patient with PPH
- Management of the patient with PPH

2.6.1. Planning of Simulation

- Two case scenarios on postpartum hemorrhage was prepared and checked by the advisors.

- Environmental set up of the case was arranged and prepared the needed articles for the scenarios.

2.6.2. Development of Video

Simulation based learning video was made regarding management of PPH for the students to direct about the intervention.

2.6.3. Implementation

2.6.3.1. Briefing

- Introduction of self and topic was given to the participants.
- Explained about the simulation-based learning and gain Confidentiality of the participants.
- Orientation to the environmental setup of the case scenario was given to the participants.
- The case scenarios was explained in detailed.
- Role of each participants were divided by their own willing and explained their role in the case scenario.

2.6.3.2. Act

- Allow the participants to act as a real case and believable for themselves and others as possible
- Maintain the confidentiality.
- Instructed to be open, respectful and avoid harm to other participants.

2.6.3.3. Debriefing

- All the points which was noted by the observer throughout the scenario was collected from the observer prior to debriefing session.
- Allow all the participants to share their experienced or reaction after the screenplay with their role.
- Analysed the parts which was left to reflect in the simulated scenarios and make them understand which was to be happen in a structured manner.
- Summarized the case scenario with all the points which were noted by the observer were covered in debriefing.
- Take home message were taken from the participants.

2.7. Data analysis

The data was analysed using SPSS (Armnok, NY, USA: IBM Corp) version 20. Kolmogorov-smirnov test was applied to check the normality of the data. Parametric test were applied for the knowledge and skills as the data was normally distributed and non parametric test were applied for clinical decision making ability as the data was not normally distributed.

2.8. Research Ethics

Formal administrative approval (IEC no. 2144) was obtained from the institutional ethical committee of Maharishi Markandeshwar (Deemed to be) University. Mullana, Ambala, Haryana to conduct the final study. Formal administrative approval was obtained from Principal of M.M. College of Nursing of Mullana-Ambala and Principal of M.M. Institute of nursing Mullana-Ambala for the study. Informed consent was obtained from the nursing students regarding their willingness to participate in the study.

3. RESULTS

The result of the table 1 comprised of selected variables which showed that majority (76.7%) and (73.5%) were females in Experimental and Comparison Group respectively. Nearly two third (67.8%) and less than two third (80%) in Experimental group and Comparison group have never nursed a patient with PPH. Nearly two third (66.07%) and (60.7%) in Experimental group and Comparison group had Sessional Marks between 38-75. More than half (55.3%) in comparison group and (62.2%) in the comparison group were having clinical marks between 71-100.

The result of parametric test in table 2 shows the non significant difference in the mean post- test knowledge score regarding management of postpartum hemorrhage. The difference in the mean scores within the experimental group was computed by paired‘t’ test. In experimental group, the calculated‘t’ value ($t=10.33$; $p=0.00$) was found to be statistically significantat 0.05 level of significance. This shows that mean difference in ‘pre-test’ and ‘post-test’ knowledge score was a true difference but not by chance.

As observed in table 3**,** in experimental group, the mean skill score (16.36 ± 3.05) was higher than the mean skill score (15.43 ± 4.02) in comparison group, with the mean difference of 0.92 and standard error of mean difference of 0.68. The calculated‘t’ value ($t=1.35$; $p=0.17$) was found to be statistically non-significant at 0.05 level of significance. Whereas, there was significant difference in the mean post test skill score. The paired‘t’ test was applied to see the significant difference in the Mean skill score within the group. The calculated‘t’ value ($t = 15.41$; $p=0.00$) was found to be statistically

significant at 0.05 level of significance. This shows that mean difference in pre-test and post-test skill score was true difference but not by chance.

The result in table 4 shows that there was significant difference between the mean pretest and posttest of clinical decision making ability i.e. (z=-6.12, p=0.00*). There was significant difference within the group which means that simulation based learning was effective in enhancing the clinical decision making ability of the students.

Table 1: Frequency, percentage distribution and Chi- square in terms of selected variables of experimental group and comparison group

Sr. No	Selected variables	Experimental group n= 56 f (%)	Comparison group n= 53 f (%)	χ^2	df	P Value
1.0	**Gender**					
1.1	**Male**	13 (23.21%)	14 (26.4%)	0.15	1	0.69^{NS}
1.2	**Female**	43 (76.7%)	39 (73.5%)			
2.0	**Nursed a patient with PPH**					
	Yes					
2.1	**No**	18 (32.14%)	8 (14.28%)	4.35	1	0.37^{NS}
2.2		38 (67.8%)	45 (80.3%)			
3.0	**Sessional marks**					
3.1	**0 - 37**	19 (33.9%)	19 (33.9%)	0.04	1	0.83^{NS}
3.2	**38 - 75**	37 (66.07%)	34 (60.7%)			
4.0	**Clinical Marks**					
4,1	**35 - 70**	25 (44.6%)	20 (37.7%)	0.53	1	0.46^{NS}
4.2	**71 - 100**	31 (55.3%)	33 (62.2%)			
					χ^2 (1)	**= 3.84**

*N = 109; ^{NS} Not significant (p>0.05); *Significant (p<0.05)*

Table 2: "t" test shows the pre-test and post-test knowledge score regarding management of Postpartum Hemorrhage among nursing students in Experimental and Comparison group

Variables	Experimental Group	Comparison Group	t§	p value
pre-test	15.88 ± 4.44	16.19 ± 4.3	0.37	0.71^{NS}
post-test	23.75 ± 4.1	22.30 ± 4.2	1.82	0.07^{NS}
***t*† value**	10.33	7.66		
p value	0.00*	0.00*		

*N = 109; ^{NS} Not significant(p>0.05); t (107) =1.98; t=I-t I, *Significant (p<0.05)*

Table 3: "t" test shows the pre-test and post-test skill score regarding management of PPH of Nursing Students in Experimental and Comparison Group

Variables	Experimental Group	Comparison Group	t§ value	p value
Pre-Test	16.36 ± 3.05	15.43±4.02	1.35	0.17^{NS}
Post-Test	27.2 ± 4.38	24.77 ± 5.39	2.65	0.00*
***t*† value**	15.41	12.31		
p value	0.00*	0.00*		

*N=109; ^{NS} Not significant (p>0.05); t (107) =1.98; *Significant (p<0.05***)**

Table 4: Mann whitney U Test shows the pre-test and Post-test clinical decision making ability score regarding management of PPH of Nursing Students in Experimental and Comparison Group N=109

Variables	Experimental Group	Comparison Group	Z §	p
pretest	5.59 ± 1.80	5.40 ± 2.66	-0.07	0.94
post-test	12.79±2.10	9.66±2.52	-6.12	0.00*
***Z*† value**	-5.82	-6.52		
p value	0.00*	0.00*		

*N=109; ^{NS} Not significant (p>0.05); t (107) =1.98; *Significant (p<0.05***)**

Table 5: Correlation between the mean pre-test and post test score of knowledge, CDMA and Skill of nursing students regarding management of postpartum hemorrhage in Experimental and Comparison group

Groups			Skills		Clinical decision making ability	
			Pre-test	Post-test	Pre-test	Post-test
Experimental group (n=56)	Knowledge	Pre-test	0.37(0.00*)		0.06 (0.65^{NS})	
		Post-test		0.41(0.00*)		0.19 (0.14^{NS})
			Pre-test	Post-test	Pre-test	Post-test
Comparison group (n=57)	Knowledge	Pre-test	0.44(0.00*)		0.07 (0.65^{NS})	
		Post-test		0.31(0.02*)		0.00 (0.99^{NS})

*N=109; ^{NS} Not significant (p>0.05); r= 0.32; *Significant (p<0.05)*

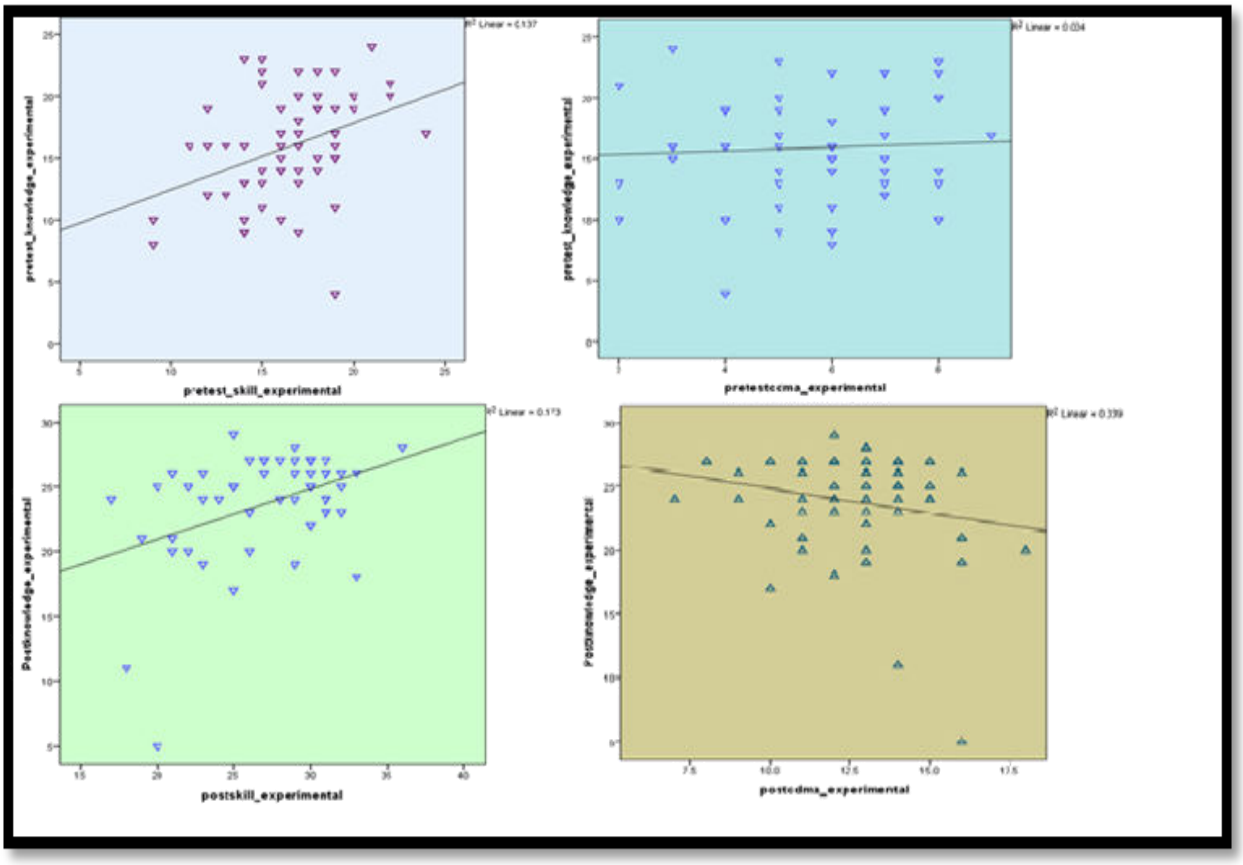

Fig. 1: Scatter diagram showing correlation between pre-test and post-test of Knowledge, skills and Clinical Decision Making Ability Scores of nursing students in Experimental group

4. DISCUSSION

4.1. Findings related to description of selected variables among nursing students in experimental and comparison group

The result of the study indicate the majority 43(76.7%) and 39 (73.7%) of nursing students were female in experimental and comparison group. These findings were similar to the study conducted by Rajeshwari Patidar, Prof. (Mrs) Dolly John Shiju which showed that the majorities 20 (100%) of the respondents were female and none of the respondents were male [5].

Further, these findings were contraindicated with the findings of the study conducted by Meena Sharma (2015) where it was found that majority 56% were male of the nurses were male and 44 % female [6].

In terms of nursed a patient with PPH, more than two third (67.8%) and (80%) have never nursed a patient with PPH in experimental and comparison group.

Sessional marks wise, majority of the nursing students (66.07%) and (60.7%) in experimental and comparison group

In the present study, management of postpartum hemorrhage were effective in knowledge of the students, the mean post knowledge (23.75 ± 4.10) was significantly higher than the mean pre-test knowledge (15.88 ± 4.44). These finding were similar to the study conducted by Eman Mohamed Abd Elhakm and Hemmat Mostafa Elbana which showed that the simulation-based training program illustrated that there was significantly improvement of nurses' knowledge post intervention compared to pre intervention [7].

The findings of the present study revealed that the Mean Post-test Skill Score regarding management of postpartum hemorrhage of nursing students in experimental group and comparison group was found to be 27.2 ± 4.38 and 24.77 ± 5.39 with the mean difference 2.49 and standard error of mean difference 0.94. The finding was found to be significant 2.65 t (107) =1.98; p=0.00*. The findings were consistent with the findings of Eman Mohamed Abd Elhakm which showed that there was improvement in skills of the nurses after **s**imulation and improvement in knowledge, team spirit and structured communication [7].

The finding were similar with the study conducted by Galal Ahmed Elkholy et which showed that there was significant gain in the nurses after administration of the simulation (p=0.03*) and enhancement in the knowledge and skills of the nurses [8].

In the present study, management of postpartum hemorrhage were effective in clinical decision making ability score of the students, The mean post-test clinical decision-making ability score 12.79 ±2.104 was higher than the mean pre-test clinical decision-making ability score 5.59 ± 1.807. The result was found to be statistically significant. These results are supported by Fawaz MA. et al, (2016), they asserted that the intervention group exhibited higher mean score of clinical judgment with significant improvement due to exposure to high fidelity simulation than the control group

The findings of the present study showed that there was statistically significant correlation between pre-test and post-test knowledge, skill (r=0.37, p-0.00) (r=-0.41, p-0.00) in experimental group but there was no correlation between the pre-test and post-test knowledge, CDMA (t=0.06,p=0.65) (r=0.19, p=0.14) in experiment group. Whereas, in comparison group the findings showed that there was statistically significant correlation between pre-test and post-test knowledge, skill (r=-0.44, p=0.00) (r=0.31, p=0.02) in comparison group but there was no correlation between the pre-test and post-test knowledge, CDMA (r=0.07, p=0.65) (r=0.01, p=0.99) in comparison group.

These findings are also consistent with the study conducted by Eman Mohamed Abd Elhakm and Hemmat Mostafa Elbana [7] which showed that there is positive correlation between the knowledge and practices of the nurses and used their knowledge and experience for making accurate clinical judgments which increased their self-confidence.

4.2. Recommendations

- The study can be replicated on a large sample size of nursing students for wider generalization of findings.
- A similar study can be conducted using High-Fidelity manikins with larger sample sizes should be conducted to determine the effect of HFS on students' competency.
- A similar study can be done in different settings.
- A similar study can be done to explore the effect of simulation training program for maternity nurses on health outcome of mother deteriorating from PPH.

5. CONCLUSION

The findings of the study concluded that Simulation based learning (SBL) was effective in improving the competency in terms of knowledge, skill and clinical decision making ability regarding management of postpartum hemorrhage as there was significant gain in competency score after administration of SBL among nursing students. Similarly, conventional teaching on management of postpartum hemorrhage showed efficient improvement of competency in terms of knowledge, skills and clinical decision making ability regarding management of PPH among nursing Students in both experimental and comparison group.

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Conflict of interest
There are no conflicts of interest

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