Effect of Simulation on Maternity Nurses' Knowledge, Practice and Self-efficacy During Management of Eclamptic Fits

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Abstract

Background: Simulation-based nursing education is an increasingly and wide-spread preferred educational approach. It offers opportunities to acquire clinical skills and decision-making through various situational experiences.

Aim: Evaluation of simulation effects on maternity nurses' knowledge, practice and self-efficacy during management of eclamptic fits.

Design: A quasi experimental design was utilized.

Setting: The study done in Obstetrics and Gynecology Department of Benha Teaching Hospital.

Samples: A convenient samples include 40 nurses.

Tools: Data collecting by using 3 tools: A Structured self-administered questionnaire, observational checklists and self-efficacy scale.

Results: A highly significant difference among pre-intervention and immediate post-intervention and 8 weeks' post-intervention regarding knowledge, practices and self-efficacy of nurses concerning management of eclamptic fits.

Conclusion: Simulation-based training is effective training approach that enhances maternity nurses' knowledge, practice and also increases their self-efficacy regarding management of eclamptic fits.

Recommendations: All maternity nurses in different settings should attend regular simulation-based and refreshing courses to improve their knowledge, practice and self-efficacy.

Keywords: *Simulation; Self-efficacy; Maternity nurses; Eclamptic fits.*

Introduction

Simulation is training methodology and technique to increase applied to health-care education, and provided many benefits for practitioners, patients and the health service. Self- efficacy is a cite results of simulation train programs which could effect and confidence on achieve targets and performances[1].

Simulation has an essential role especially in settings with limited resources who could have shortage of health-care skills. Simulation is used for teaching medical and nursing trainees who had constraints than counterpart in higher setting resources; so, used simulation for increase fundamental obstetric and gynecologic skill would very useful[2].

Eclampsia can be identified as development of generalized fits in preeclampsia cases and without prior history of epilepsy. In developing countries increased eclampsia rates are complicates (16–69) births/10000, while in Europe, was complicates (2–3) births/10000. Shortage or lack of antenatal care utilization, and deficiency in hospital services were mainly the reasons of variance. Appropriate identification and preeclampsia a treatment at global scope was reduced this contrast[3].

Eclamptic fits are life-threatening emergency and could occurred during ante partum (53%), intrapartum (19%), or postpartum (28%). Generally, eclamptic fits commonly persist 60-90 seconds. Postictal confusion, agitation, or combativeness might be follow. Through eclamptic seizure, fetus illustrated hypoxia related bradycardia, while recovers after proper management [4].

Self-efficacy is personal capacity to perform at many levels Bandura (1977), and abilities of selecting, using, and modifying the appropriate teaching strategy. Increasing self-efficacy is achieved throughout increasing understand and experiences and later influenced on teaching and professionally behaviors[5].

As health-care provider, nurses are responsible about diagnosis, and eclampsia managing, so increasing nursing skills for prevent, identify, and management complications of pregnancies such preeclampsia and eclampsia led to reduce maternal and fetal mortalities rate. Increase nursing education and abilities to do decisions would improve their performances [6].

Significance of the study: The pregnant women expect that their labor and obstetric staff have been prepared for dealing with complications and emergencies so, they trust that the hospital will use everything available to ensure the best possible outcomes[7]. In Egypt, maternal mortality ratio was 45/100000 live births (World Health Organization). Our study aim to estimating the prevalence of pregnancy hypertensive diseases in Egypt, (4.2%) had pregnancy inducing hypertension, (3.8 %) eclampsia [8].

Nurses have important roles in hypertensive disorders managing of pregnancy, so it is found that it may be helpful to implement a simulation to improve, knowledge, practice and self-efficacy of maternity nurses in management of eclamptic fits.

Aim of Study: To evaluate the effect of simulation on maternity nurses' knowledge, practice and self-efficacy during the management of eclamptic fits.

Research Hypothesis: Research hypotheses are formulated as: Nurses' knowledge, practice and self-efficacy will improve after implementation of simulation framework regarding management of eclamptic fits.

Subjects and Method

Research design: A Quasi experiment.

Research Setting: This research done at Obstetrics and Gynecology Department of Benha Teaching Hospital. This setting is located in Benha City.

Sample type: A convenient sample was used.

Sample size: 40 nurses were recruited from Obstetrics and Gynecology Department of Benha Teaching Hospital.

Tools of Data collecting:

Three tools used to collecting the necessary information's about the study subjects as:

I. **A structured self-administered questionnaire;** which design by the researcher post survey pervious literature and under guidance of supervisors included the following**:**

A: Socio-demographic characteristics of samples such as (personal characteristics, training courses for eclampsia, source of information about eclampsia, etc.) itcontain 8 questions.

B: Assessing knowledge of nurses working in obstetrics and gynecology department at Benha Teaching Hospital regarding management of eclamptic fits through items written in simple Arabic language containing (17 questions) in the form of multiple choice and open-ended questions for assessing the nurses' knowledge regarding the following: Definition, causes, signs and symptoms, prevention, and complications of Eclamptic fits. Management of eclamptic fits, magnesium of sulfate dose, toxicity, antidote and precautions.

Knowledge Scoring: All our variables weight according to include items for every question; answers of questions were classified into 3 categories. The answers are given score (2) for complete knowledge when more than 60% of a given answer was selected, or if correct answer was selected, score (1) for incomplete knowledge when less than 60% of a given answer was

selected, moreover score (0) was given if the participant don't know or wrong answer. Using the following score system to assess the level of knowledge, good= score≥ 75% complete answers). While average = 60 - < 75% complete answers, and poor =< 60% complete answers.

II. Observational checklists: to assess nurses the level of practice, management and nurses role regarding eclamptic fits.

Observational checklists scoring system: Each statement scored as follow: (1) if done and (0) if not done. The total score of practice was classified as the follows: satisfactory level= score ≥ 80%, as well as unsatisfactory level = score<80%.

III. Self-efficacy scale: This tool was adopted from *Christian and Krumwiede[9],* then it was translated into Arabic, post construction and translate our tools, moreover the tool revised by three professors, one Community Health Nursing, and two Obstetrics and Woman's Health Nursing specialty. The scale was implemented by the researcher to assess self-efficacy of the studied nurses regarding management of eclampsia. Scale has 16 statements with five-point about issues that measure self-efficacy of the studied nurses regarding management of eclampsia.

Self-efficacy scoring: Attitude outcome of scale, every statement scored as: (5) if response was "Very confident ", (4) if it was "Confident", (3) "Uncertain", (2) if it was "Not confident" and (1) if it was "absolutely not confident ". Total score used as percentage. Self-efficacy Scores were considered as follows: high self-efficacy= score ≥75%, moderate self-efficacy= score 60 - < 75%; moreover low self-efficacy= score< 60%.

Validity and Reliability of the tools: Data collecting Tools reviewed using expertise panel from three specialized university professionals in obstetrics and genecology fields. According to their judgments on clarified sentence and appropriateness contents, Modifications were done, such as rearranging some questions, some punctuation and merge observational checklists to be:-observational checklist for management of eclamptic fits. Cronbach's alpha coefficient calculating for reliability assessment and each tool consisted as relatively homogenous items. The internal consistency of knowledge was 0.856, the internal consistency of practice was 0.869. Internal consistency of self- efficacy was 0.879.

Ethical considerations: Study aim was explained to every nurse pre applying tools to get confidence and more trust. An oral consent obtained from every nurse to participating in our study or refuse without obligation. No physical, social or psychological risk on her participations. Data collected and treated confidentially. Every nurse informed about time for our study, such as duration of pretest, discussion, previewing simulation video, training on certain procedures, posttest and follow up. In addition to the approval of the Ethical Committee was obtained from Nursing College for our research.

1. Operational Design:

(1) Approval: Official letter from Dean of Benha Faculty of Nursing, contains title and our objectives directed to Director of Benha Teaching Hospital to get official agreement.

(2) Tools: Pervious review either national or international relevant literature related to eclamptic fits, was carried out by using local and international books, journals, periodicals in addition to computer search to develop the study tools and contents. Developing and translating tools into simple Arabic language.

(3) Pilot Study: After developing the tool, a pilot study was carried out on 10% of the total sample size (4) nurses were randomly chosen. The individuals who participated in the pilot study were excluded from the sample. The aim of the pilot study was to test the feasibility and clarity of the tool and also to estimate the time required to fill in the questionnaire.

(4) Collection of data: The study was implemented during seven months, start from October 2018 to April end 2019. Implementation of the study was carried out at Obstetrics and Gynecology Department of Benha Teaching Hospital. The researchers began the study by visiting the Hospital two days per week, from 9 A.M. to 2 P.M. At times, researchers collect data at afternoon or Night Shift, the time was determined according to the participating nurses' suitable time.

(5) Procedure of the study:

1. Interviewing and Assessment Phase: The researcher introduced herself and all nurses interviewed, our purposes were explained and an oral consent was taken from them to participate in the study, socio-demographic data collected through pre-test questionnaire depending on knowledge baseline data. This phase took nearly 15-25 minutes.

2. **Planning phases:** Based on pre-test results, the simulation frame work regarding management of eclamptic fits was prepared by our researchers. It was a video to simulate care for eclamptic women; this video was collected from YouTube and translated in Arabic to suit the nurses 'simulation scenario. The second tool was booklet about eclampsia management.

3. **Implementation phase:** All nurses divided to studied groups; every group comprised 4-5 nurses. Simulation was applied through series of sessions;

   Session 1: Discussion of theoretical information on eclampsia through the booklet which lasted for half an hour.

   Session 2: View simulation video which lasted for 10 minutes.

   Session 3: Training the nurses on procedures concern the care of women with eclampsia As: Measuring blood pressure, weighing pregnant women, assessing deep tendon reflex and pitting edema. This session lasted for one hour.

   Session 4: was half an hour for debriefing and feedback from nurses.

4. **Evaluation phase:** After applying the simulation, the researchers used the same previous assessment tools except socio-demographic data posttest, to evaluate simulation effects on nurses' knowledge, practice and self-efficacy regard to eclampsia management, this phase takes approximately 20 minutes.

5. **Follow up:** After eight weeks the researcher used the same previous assessment tool (Posttest) to follow up the effect of simulation on nurses' knowledge, practice and self-efficacy regarding management of eclampsia, this phase lasts for 25-30 minutes.

6. **Statistical analysis:** Data analyzed using SPSS version 20.0 followed by data tabulation and analysis. Descriptive statistics applied. A paired t-test, Chi-square test and Pearson Correlation Coefficients used. $p< 0.001$.

Results

Table (1): Distribution of Studied Sample Regarding their Socio-Demographic Data (N= 40)

Socio-Demographic Data	Frequency	%
Age in years		
21-31	30	75.0
32-41	5	12.5
42-51	5	12.5
Mean±SD	29.02±7.66	
Educational qualification		
Secondary nursing education	13	32.5
Technical nursing education	25	62.5
Bachelor of nursing	2	5.0
Current job		
Bedside nurse	13	32.5
Technical nurse	25	62.5
Head nurse	2	5.0
Years of experience		
<10	28	70.0
10 - <20	7	17.5
20-30	5	12.5
General Idea about Eclampsia		
No	8	20.0
Yes	32	80.0
Source of Information (n=32)		
Studying	9	28.1
Workexperience	23	71.9

Table (1) shows three quarters of nurses (75%) were 21 to 31 years old, (29.02±8.66). 62.5%have technical nursing education, more than two thirds (70%) had experience rang from one to ten years, More than three quarters of nurses (80%) have a general idea about eclampsia, more than three quarters had source of information from work experience.

Table (2): Comparison of mean score of studied sample knowledge regarding magnesium sulfate and management of eclamptic fits.(N= 40)

Variable	Pre-intervention	Immediate post-intervention	Follow up (8 weeks)	Paired t test (1)	P. value	Paired t test (2)	P. value
	Mean±SD	Mean±SD	Mean±SD				
Side effect of magnesium sulfate	.9250±.57233	1.6250±.70484	1.5000±.71611	-4.583	<0.001**	-3.797	<0.001**
Symptoms of magnesium sulfate toxicity	.9750±.86194	2.8000±.46410	2.2250±.83166	11.429	<0.001**	-7.017	<0.001**
Antidote used for magnesium sulfate toxicity	.3250±.47434	.9000±.30382	.6750±.47434	-7.264	<0.001**	-4.149	<0.001**
Level of MgSo4 that cause respiratory decline	.1500±.36162	.8000±.40510	.6500±.48305	-7.093	<0.001**	-4.937	<0.001**
The initial dose of magnesium sulfate	.3500±.48305	.8750±.33493	.7250±.50574	-5.188	<0.001**	2.418	<0.05*
Maintenance dose for magnesium sulfate	.7500±.43853	.9250±.26675	.6500±.48305	-2.014	<0.05*	1.892	>0.05
Deep tendon reflexes (Times for follow up)	.3250±.47434	.7000±.46410	.6250±.50574	-3.365	<0.001**	-2.35	<0.05*
Fetal heart rate	1.8250±.38481	2.0000±.00000	1.7250±.45220	-2.876	<0.001**	1.000	>0.05
Nursing care during eclamptic fit	1.9000±1.46410	3.6000±1.10477	2.9500±1.19722	-6.171	<0.001**	-3.163	<0.001**

*Significant (P<0.05), ** Highly Significant (P<0.001). Paired (t1) before intervention and immediately after. Paired (t2) before intervention and after 8 weeks follow up

Table (2): Shows a highly statistically significant improvement immediately post-intervention and during follow-up (8 weeks) compared to pre-intervention regarding: side effect of magnesium sulfate, symptoms of magnesium sulfate toxicity, antidote used for magnesium sulfate toxicity, respiratory decline (P<0.001), and there is significant improvement immediately post-intervention compared to pre-intervention regarding: Maintenance dose for magnesium sulfate and there is significant improvement during follow-up (8 weeks) compared to pre-intervention regarding: the initial dose of magnesium sulfate and deep tendon reflexes (P <0.05). It was found no statistically significant difference between pre intervention and follow-up (8 weeks) regarding maintenance dose for magnesium sulfate (P >0.05).

Table (3): Frequency Distribution of Studied Sample Practice Regarding Management of Eclamptic fits (N= 40)

Item	Pre-intervention				Immediate post-intervention				Follow up (8 weeks)				Chi square (1)	P value	Chi square (2)	P value
	Not done		Done		Not done		Done		Not done		Done					
	No	%	No	%	No	%	No	%	No	%	No	%				
Call obstetric team	26	65.0	14	35.0	10	25.0	30	75.0	14	35.0	26	65.0	12.92	<0.001**	7.20	<0.05*
ABC (Airway, Breathing, Circulation)	16	40.0	24	60.0	1	2.5	39	97.5	4	10.0	36	90.0	16.80	<0.001**	9.60	<0.05*
Put oral airway	29	72.5	11	27.5	0	0.0	40	100	4	10.0	36	90.0	45.49	<0.001**	32.23	<0.001**
Perform nasopharynx suction	34	85.0	6	15.0	19	47.5	21	52.5	21	52.5	19	47.5	12.57	<0.001**	9.83	<0.05*
Ensure safe environment and put in lateral position.	14	35.0	26	65.0	0	0.0	40	100.	5	12.5	35	87.5	16.97	<0.001**	5.59	<0.05*
Give oxygen by face mask	29	72.5	11	27.5	0	0.0	40	100	5	12.5	35	87.5	45.49	<0.001**	29.46	<0.001**
Prepare bed for fits and protect with padded side rails.	13	32.5	27	67.5	0	0.0	40	100	3	7.5	37	92.5	15.52	<0.001**	7.81	<0.05*

Item	Pre-intervention				Immediate post-intervention				Follow up (8 weeks)				Chi square (1)	P value	Chi square (2)	P value
	Not done		Done		Not done		Done		Not done		Done					
	No	%	No	%	No	%	No	%	No	%	No	%				
Consider loading dose of magnesium sulphate and assess for its toxicity. or IV diazepam if seizure does not stop spontaneously	31	77.5	9	22.5	0	0.0	40	100	3	7.5	37	92.5	50.61	<0.001**	40.10	<0.001**
Arrange transfer to Labour Suite area/Additional Obstetric Care area	29	72.5	11	27.5	10	25.0	30	75.0	13	32.5	27	67.5	18.06	<0.001**	12.83	<0.001**
Ensure good IV access	31	77.5	9	22.5	5	12.5	35	87.5	9	22.5	31	77.5	34.14	<0.001**	24.20	<0.001**
Send bloods for investigation	34	85.0	6	15.0	0	0.0	40	100	4	10.0	36	90.0	59.13	<0.001**	45.11	<0.001**
Start continuous CTG monitoring (depending on gestational age)	19	47.5	21	52.5	0	0.0	40	100	4	10.0	36	90.0	24.91	<0.001**	13.73	<0.001**
Insert bladder catheter and start hourly urine measurements	32	80.0	8	20.0	1	2.5%	39	97.5	3	7.5	37	92.5	49.56	<0.001**	42.71	<0.001**
Commence a chart for hourly observation of blood pressure, pulse, oxygen saturation, urine output, fluid input (IV and oral)	35	87.5	5	12.5	1	2.5	39	97.5	4	10.0	36	90.0	58.38	<0.001**	48.08	<0.001**
Commence/continue serial blood results sheet	14	35.0	26	65.0	1	2.5	39	97.5	5	12.5	35	87.5	13.86	<0.001**	5.59	<0.05*
Inform Obstetric Consultant	33	82.5	7	17.5	13	32.5	27	67.5	16	40.0	24	60.0	20.46	<0.001**	15.22	<0.001**
Inform Obstetric Anaesthetist	39	97.5	1	2.5	3	7.5	37	92.5	7	17.5	33	82.5	64.96	<0.001**	52.37	<0.001**
Inform Neonatal Unit if < 37 weeks gestation	28	70.0	12	30.0	4	10.0	36	90.0	8	20.0	32	80.0	30.00	<0.001**	20.20	<0.001**
Consider need for antihypertensive treatment	29	72.5	11	27.5	3	7.5	37	92.5	8	20.0	32	80.0	35.20	<0.001**	22.17	<0.001**
Review laboratory results	17	42.5	23	57.5	1	2.5	39	97.5	4	10.0	36	90.0	18.35	<0.001**	10.91	<0.001**

***Significant** (P<0.05) ** **Highly Significant** (P<0.001)

Table (3): Shows a highly statistically significant improvement immediately post-intervention compared to pre-intervention for all items of nurses practice regarding management of pre eclampsia (P<0.001), also, there is highly statistically significant improvement during follow-up (8 weeks) compared to pre-intervention regarding all items except for call obstetric team, ABC (Airway, Breathing, Circulation), perform nasopharynx suction, ensure safe environment, prepare bed for fits and protect with padded side rails and continue serial blood results sheet, where there is significant improvement during follow-up (8 weeks) compared to pre-intervention (P <0.05).

Table (4): Correlation matrix between Studied Sample Total Knowledge, Practice and Self-Efficacy at Different Phases of Assessment (N= 40).

Variables		Pre-intervention			Immediate post intervention			Follow up (8 weeks) after intervention		
		Practice	Knowledge	Self-efficacy	Practice	Knowledge	Self-efficacy	Practice	Knowledge	Self-efficacy
Total practice	Pearson Correlation (r)	1	.277	.336*	1	.353*	.414**	1	.343*	.674**
	P value		.084	.034		.025	.000		.030	.000
Total knowledge	Pearson Correlation(r)	.277	1	.116	.353*	1	-.010	.343*	1	.427**
	P value	.084		.475	.025		.953	.030		.006
Total self – efficacy	Pearson Correlation(r)	.336*	.116	1	.414**	-.010	1	.674**	.427**	1
	P value	.034	.475		.000	.953		.000	.006	

Table (4): Shows a highly statistically significant positive correlation between practice and self-efficacy during post intervention and follow up (8 weeks). Also, there is highly statistically significant positive correlation between knowledge and self-efficacy during follow up (8 weeks) after intervention. Also, there is highly statistically significant positive correlation between self-efficacy and practice during post intervention and follow up (8 weeks) and with knowledge during follow up (8 weeks).

Discussion

Eclampsia is obstetric emergency and occurs in approximately 2–3% of severe cases of preeclampsia who not receive seizure prophylaxis. It is carrying high risk for maternal and fetal morbidity and mortality. Tonic-clonic seizures happen throughout antenatal, intrapartum or postpartum period as well. It is commonly preceded with preeclampsia, although its association is not clearly linear [10].

The current studies showed significant total knowledge improvement immediately post-intervention and after eight weeks follow up. Before intervention a few nurses had good knowledge, while half of nurses had poor knowledge, after the intervention more than three quarters of the sample exhibited good information, also after eight weeks follow up about two thirds of nurses had good knowledge. Similar findings were reported by Emam and Saber [11] who found increased in level of nurses' knowledge after intervention. Before intervention less than one third had good knowledge, and after intervention three quarters of them had good knowledge. This represents the effectiveness of the intervention, content and the importance of the topic for emergency nurses. This urged working interested nurses to participate in the study to acquire more knowledge and practice.

The current study showed a significant improvement of nurses' practice regarding management of eclamptic fits immediately post-intervention and after eight weeks, where before intervention about one third of nurses had satisfactory practice while the two thirds had unsatisfactory practice. This may be due to paucity of cases and lack of experience of studied nurses.

This result is in agreement with Emam and Saber [11] and found that before intervention, less than majority of nurses had poor and average practice while after intervention, majority of nurses had good practice.

Moreover, this result is supported by *Adoyi* et al. [12] who found that providers' skills on eclampsia were insufficient because essential tools were not available such as sphygmomanometers and stethoscopes, urine dipsticks and drugs including magnesium sulfate (MgSO4) and anti-hypertensive. After the intervention majority of studied sample had satisfactory practice. This improvement shows the effectiveness of simulation in improving nursing practice in emergency situations.

Self-efficacy concepts are depending on belief everyone has to evaluate his ability to perform a given task successfully which would strongly influenced on task approach, Persistence to accomplish the same as effort level [13]. Highly statistically significant improvement of nurses' self-efficacy directly post-intervention and post eight weeks follow up in our study($P<0.001$).

Our results in agreement with *Christian and Krumwiede*[9], **Kimhiet** et al. [14] who reported the high significant relation were observed among self-efficacy scores before training and directly post training and 8 weeks following training.

Our results in accordance with **Larsen** [15], who noted those who received simulation-based lessons had more positive experience and higher rating self-efficacy compared to the group who received traditional lessons, also *Centrella-Nigro* et al. [16] found a self-competence scores differences for simulation cohort.

Dettinger et al. [17] reported that, participants valued simulation training; with statistically and practically improving in knowledge, self-efficacy, and team function.

On the same line, Hsu et al. [18] noted that, traditional classroom lectures and simulation-based communication training produce enhanced communication competency and self-efficacies, and increase simulation-based communication training could be better than former in learner satisfaction. So, introduction of simulation-based training to in-service nursing education could enhance nurses' communication performance in clinical practice.

Our result also in agreement with **Kimhiet et al.**[14] who revealed that simulation increase self-confidence equivalently if done pre or post clinical experience. Also *Roh* et al. [19] who found that simulation-based resuscitation skills combining with clinical practicum increase the enhancing mastery learning and self-efficacy.

According to *Vuk et al.* [20] reported the simulation training as interactive and effective method of teaching prior to implementation of electronic medical records in medical institution. Also, *Dunn et al.* [21] found that, high-fidelity simulation could be valuable for increase nursing student's efficacy. These results are also supported by *Franklin and Lee* [22] who found that, simulation is very effective method to increase self-efficacy for nurses comparing with traditional method.

The current study showed a significant total self-efficacy improvement immediately post-intervention and after eight weeks, where before intervention almost all of studied nurses had low and moderate self-efficacy regarding management of eclamptic fits. This could be due to lack of knowledge and experience of studied nurses. These results supported by *Evensen* et al. [23] who reported that increasing confidence persisted in most topic areas for at least 6 months either pre or post study.

Conclusion

Using simulation learning for management of eclamptic fits was effective and provided nurses with proper knowledge and practice and increased their level of self-efficacy. Moreover, highly statistically significant positive correlation between practice and self-efficacy were observed during after intervention and follow up. High positive correlation between knowledge and self-efficacy follow up after intervention. Meanwhile highly statistically significant positive correlation between self-efficacy and practice during post intervention and follow up and with knowledge during follow up. The above mentioned findings have mainly supported the study hypothesis.

Recommendations:

- **Simulation based training** regarding eclamptic fits is recommended for all nurses working at obstetrics and gynecology units.

- Workplace and skill lab need more essential equipments to deal with cases of preeclampsia, eclampsia fits and other high-risk complications.

Further study needs to be performed:

- It is important to conduct an extensive study on large sample size and at different settings to improve nurses' knowledge, practice and self-efficacy regarding management of preeclampsia and eclampsia fits.

- Study the comparison between the effectiveness of simulation and traditional method on maternity nurses' self-efficacy.

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