

How to Cite:

Elbadrawy, S. E., Elmoneim, E. F. A., & Mohamady, S. H. (2022). Assessment of nurses' knowledge and skills toward postpartum hemorrhage prevention. *International Journal of Health Sciences*, 6(S4), 10013–10031. <https://doi.org/10.53730/ijhs.v6nS4.11288>

Assessment of nurses' knowledge and skills toward postpartum hemorrhage prevention

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Abstract--Background: Maternal death from postpartum hemorrhage is a key maternal health indicator and directly reflects the care provided during the intrapartum and postpartum periods. The aim is to assess nurses' knowledge and skills toward postpartum hemorrhage prevention. Study design: A descriptive design was utilized to conduct the study. Study Setting: The study was conducted at the postpartum unit at the obstetrics and gynecology department at Mansoura university hospital. Sample: A convenience sample of maternity nurses (70). Tools: Three tools were used for data collection: Tool I: A structured interviewing questionnaire. Tool II: knowledge assessment sheet toward postpartum hemorrhage prevention. Tool III: observational checklist to assess nurses' skills toward postpartum hemorrhage prevention. Results: The present study reveals that more than half of the nurses' total knowledge toward postpartum hemorrhage prevention was poor, while nearly two-third of the nurses' total skills toward postpartum hemorrhage prevention were inadequate. The study indicated a statistically high significant relation between the total nurses' knowledge and their total skills toward postpartum hemorrhage prevention. Conclusion: The present study concluded that the nurses had inadequate total skills score toward postpartum hemorrhage prevention. Recommendations: Development of educational programs to improve nurses' knowledge and skills toward prevention of postpartum hemorrhage.

Keywords---knowledge, nurses, postpartum hemorrhage, prevention, skills.

Introduction

The immediate postnatal period refers to the time just after childbirth, during which the infant's physiology adapts and the risks to the mother of postpartum hemorrhage and other significant morbidity are highest. The immediate postnatal period covers the first 24 hours from birth. (Almutairi, 2021). The major purposes of postpartum and postnatal care are to maintain and promote the health of the woman and baby and to foster an environment that offers help and support to the extended family and community for a wide range of related health and social needs. (Saad, et al, 2021).

Postpartum hemorrhage (PPH) is defined as blood loss > 500 mL within 24 hours after vaginal delivery or > 1000 mL after cesarean delivery and is a potentially life-threatening condition. Primary PPH appears during the first 24 hours after delivery and secondary PPH occurs for more than 24 hours and up to 12 weeks after delivery (Chen, et al, 2018). The causes of postpartum hemorrhage can be classified as tone, trauma, tissue, and thrombin. Uterine atony is the most common cause of postpartum hemorrhage, causing up to 80% of all cases (Watkins, Elyse & Stem, 2020). Complications of postpartum hemorrhage include hypovolemic shock from massive blood loss, acute renal failure, hepatic failure, and complications of blood transfusion, acute respiratory distress syndrome and death. Late complications such as Sheehan's syndrome (pituitary necrosis) and infertility may also occur (Bienstock, Eke & Hueppchen, 2021).

Active management of the third stage of labor as a prophylactic intervention is composed of administration of an uterotonic, preferably oxytocin, immediately after birth of the baby, controlled cord traction (CCT) to deliver the placenta and massage of the uterine fundus after the placenta is delivered. The administration of an uterotonic to the mother immediately after the birth of the baby is identified as the most important step. Oxytocin is the recommended uterotonic where its efficacy can be assured (Theunissen, Chinery & Pujar, 2018).

Nurses play important role in prevention, early recognition and management of PPH through proper management of third stage and careful observation of the mother in the early postpartum period. Careful observation of the mother in the early postpartum period includes recording pulse and blood pressure every 15 minutes, palpating uterus every 15 min to ensure that it is well contracted, checking temperature every 4 hours, examination of lochia for amount and consistency, regular evacuation of urinary bladder (Cares, 2021).

Significance of the study: Globally, 14 million cases of postpartum hemorrhage occur annually, about 18% of all childbirth deliveries globally are affected by postpartum hemorrhage and severe hemorrhage affects 1-5% percent of all deliveries. PPH is a major cause of maternal mortality especially in developing countries and is the cause of 25% of maternal deaths worldwide. (Fukami, et al, 2019) It is accountable for one-third of all pregnancy-related mortalities in Africa, Asia, and roughly 140,000 mortalities per year in Egypt (Elgzar, Ibrahim & Elkhateeb, 2020). In Egypt, the maternal mortality ratio stood at 45 deaths per 100,000 live births in 2013 according to the World Health Organization (WHO) (Vlassoff, Abdalla & Gor., 2016). At Mansoura university hospitals, the most

common causes of deaths were hypertensive disorders with pregnancy (29.5%) followed by post-partum hemorrhage (21.3%) and 16.4% were due to indirect causes (El-Gilany, et al, 2017). Therefore, the study conducted to assess nurses' knowledge and skills toward PPH.

Aim of the Study

To assess the nurses' knowledge and skills toward postpartum hemorrhage prevention.

Research questions of the study

- 1- What is the nurses' knowledge toward postpartum hemorrhage prevention?
- 2- What are the nurses' skills toward postpartum hemorrhage prevention?

Subject and Methods

Research design

A descriptive research design was used to conduct the study.

Setting

The study was conducted in postpartum unit at the obstetrics and gynecology department at Mansoura university hospital at Dakahlia Governorate -Egypt.

Subject: A convenience sample of maternity nurses (70), who working at the previously mentioned setting.

Tools for data collection

Three tools were used for data collection in the present study

Tool (1): Structured interviewing questionnaire: The questionnaire was developed by the researcher. It consists of seven questions and used to assess the nurses general demographic characteristic data such as age, marital status, level of education, job description, years of experience, previous training programs about pregnancy, labor and postpartum hemorrhage prevention.

Tool (2): Knowledge assessment sheet: used to assess maternity nurses' knowledge toward postpartum hemorrhage prevention. The structured sheet was designed by the researcher after reviewing the relevant literature and written in a simple Arabic language to collect data, which cover the aim of the study and consist of two parts.

Part I: consists of seventeen questions in the form of multiple-choice questions (MCQ) to assess the maternity nurses' knowledge regarding postpartum hemorrhage as definition, classification, causes, risk factors, signs and symptoms, complications and management.

Part II: consists of eighteen questions in the form of multiple choice questions (MCQ) to assess the maternity nurses' knowledge regarding preventive measures of postpartum hemorrhage as nursing role during antenatal period, delivery room measures to prevent postpartum hemorrhage, medications used, nursing role

during postpartum period (medication used, vital signs, uterine firmness, urine output, estimation of blood loss and hematoma management).

Scoring system for knowledge

Total scores of items were (105). Each question was given a score ranging from 1 to 3, with (3) for complete correct answer, (2) for incomplete correct answer and (1) don't know answer. These scores were summed and were converted into percent score. The nurses' knowledge were classified into 3 categories:

- Good knowledge if total score >75% (if the total score between 79- 105).
- Average knowledge if total score from 50 - 75% (if the total score between 52- 78).
- Poor knowledge if total score < 50% (if the total score between 1- 51).

Tool (3)- Nurses' observational checklist: An observational checklist was adopted from (Elhabashy & Hafez, 2019) with reliability of 0.703 that used to assess maternity nurses' skills for prevention of the primary postpartum hemorrhage during early postpartum period , which consists of fourteen items as vital signs assessment, uterine massage, fundal level assessment, urine output, early ambulation, intake & output, lochia assessment, breastfeeding initiation, perineum assessment, notification and early ambulation.

Scoring system for skills

Total scores of items were (28). Each item was evaluated as "done" was scored as two point and "not done" was scored as one point. Scores were summed up and were converted into a percentage and classified into 3 categories:

- Adequate if total score \leq 70%. (if the total score between 20-28).
- Inadequate if total score < 70%. (if the total score between 1- 19).

Validity

Validity was tested through a jury of three experts in maternity and newborn health nursing, who reviewed the content of tools. Opinions elicited regarding the format, layout, consistency, accuracy and relevancy of the tools to measure the content validity of the tool.

Reliability

Cronbach's Alpha will be used to determine the internal reliability of the tool. Knowledge questionnaire is 0.922.

Ethical considerations

The research approval was obtained from the Ethics of Scientific Research Committee - Faculty of Nursing - Helwan University. The researcher was clarified the thorough information about the study and their involvement before completing the informed consent form. Explaining the aim and nature of the

study, as well as the opportunity of withdrawing at any time, are all ethical concerns. The information was kept secret and wasn't accessed by anyone else without the participants' agreement. Ethics, values, culture and beliefs was respected.

Pilot study

A pilot study was carried out on 10% of the nurses (7 nurses) to test the applicability, feasibility clarity of questions and time needed to complete the study tools. The pilot has also served to estimate the time needed for each subject to fill in the questionnaire. According to the results of the pilot, no corrections and omissions of items were performed, so the nurses were included in the study sample.

Fieldwork

- Actual field work was conducted and data were collected through six months, started from beginning of September 2020 to the end of March 2021 after getting official permission.
- The researcher was introduced to the maternity nursing staff and the approval of nurses was obtained orally after explaining the aim of the study and try to establish trustful relationship.
- Questionnaire was completed with an individual interview with each nurse involved in providing direct women care early postpartum period at the break time to assess their knowledge about postpartum hemorrhage. The average time needed to complete the questionnaire ranged between 20-30 minutes.
- The researcher observed nurses' skills during the early postpartum period to assess skills using the observational checklist (tool III), observation during early postpartum period start from admission of woman to postpartum department.
- Collection of data covered a period of 5 months, started from beginning of November 2020 to end of March 2021, two days weekly, from 9a.m. to 12p.m. average 1-2 sheets/day.

Statistical design

Data collected from the studied sample was revised, coded and entered using Personal Computer (PC). Computerized data entry and statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) version 24. Data were presented using descriptive statistics in the form of frequencies, percentages. Chi-square test (X^2) Standard deviation and mean was used for comparisons between qualitative variables.

Significance of the results

- Highly significant at p-value < 0.01.
- Statistically significant was considered at p-value < 0.05
- Non-significant at p-value \geq 0.05

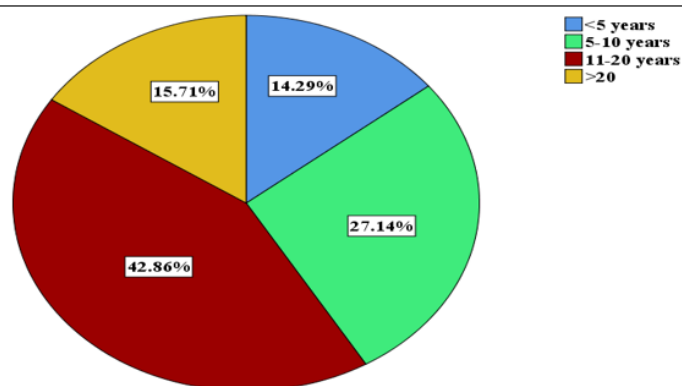
Results

Part I: Demographic characteristics of the maternity nurses

Table (1): Distribution of the studied maternity nurses according to their demographic characteristics (n=70)

Characteristics	n	%
Age (Years)		
< 30	28	40.0
30 – 40	31	44.3
> 40	11	15.7
Mean \pm SD	32.6 \pm 7.9	
Marital Status		
Single	24	34.3
Married	42	60.0
Divorced	3	4.3
Widow	1	1.4
Educational Level		
Nursing diploma education	34	48.6
Technical nursing education	27	38.6
Bachelor in nursing	9	12.8
Job position		
Nurse	67	95.7
Supervisor	3	4.3
Attending workshops on pregnancy and labor		
Yes	23	32.9
No	47	67.1
Attending workshops on PPH prevention		
Yes	18	25.7
No	52	74.3

Table (1) showed the distribution of the studied maternity nurses according to their characteristics, the above table revealed that, about (44.3%) were in the age group of 30-40 years with mean \pm SD 32.6 \pm 7.9. Also nearly two third (60.0%) were married, about (48.6%) of nurses had nursing diploma education and the majority (95.7%) had a nurse job position. In addition, more than two third (67.1%) were not attended previous Training workshops on pregnancy and labor, more than two third (74.3%) were not attended previous training workshops about postpartum hemorrhage.



Figure(1) Distribution of the studied nurses according to their experience years

Figure (1) shows that more than one-third (42.9%) had 11-20 years of experience in maternity nursing.

Part II: Maternity nurses' knowledge toward postpartum hemorrhage

Table (2): Distribution of the studied maternity nurses according to their knowledge toward postpartum hemorrhage (n=70)

Items	Complete Correct Answer		Incomplete Correct Answer		Don't Know	
	n	%	n	%	n	%
Definition of PPH	5	7.1	39	55.7	26	37.2
Definition of Primary PPH	8	11.4	37	52.9	25	35.7
Definition of Secondary PPH	9	12.9	33	47.1	28	40.0
Postpartum hemorrhage classification	14	20.0	19	27.1	37	52.9
Risk factors of postpartum hemorrhage	11	15.7	33	47.2	26	37.1
Antenatal risk factors of PPH	12	17.1	36	51.5	22	31.4
Intrapartum risk factors of PPH	15	21.4	24	34.3	31	44.3
Causes of PPH	23	32.8	26	37.2	21	30.0
The most common cause of PPH	14	20.0	23	32.9	33	47.1
Causes of uterine atony	9	12.9	31	44.2	30	42.9
Complications of PPH	17	24.3	36	52.9	16	22.8
Signs and symptoms of blood loss	11	15.7	24	34.3	35	50.0
Symptoms of uterine atony	10	14.3	35	50.0	25	35.7
Symptoms of vaginal laceration	12	17.1	30	42.9	28	40.0
PPH management	12	17.1	37	52.9	21	30.0

Management of hypovolemia	12	17.1	37	52.9	21	30.0
Nurse role for PPH management	16	22.9	37	52.9	17	24.2

Table (2) revealed that, about 55.7%, 52.9%, 47.1% and 47.1%, 51.4%, 37.1%, 44.3, 52.9%, 50.0%, 42.9%, 52.9%, 52.9%, 52.9%, 60% of the studied nurses answered incompletely correct answer regarding definition of PPH, primary, secondary PPH definition, risk factors of PPH and antenatal risk factors, causes, most common cause of PPH and uterine atony causes, complications , symptoms of uterine atony and symptoms of vaginal laceration, PPH management, management of hypovolemia and nurse role for PPH management respectively.

In addition, 52.9% of the nurses had complete correct answer about the classification of postpartum hemorrhage. Also 44%, 47.1%, 50.0% had do not know answer about intrapartum risk factors of PPH, the most common cause of PPH, signs and symptoms of blood loss respectively.

Table (3): Distribution of the studied maternity nurses according to their knowledge toward prevention of postpartum hemorrhage (no=70)

Items	Complete Correct Answer		Incomplete Correct Answer		Don't Know	
	n	%	n	%	n	%
Prevention of PPH during antepartum period	11	15.7	29	41.4	30	42.9
Active management of the third stage of labor	11	15.7	29	41.4	30	42.9
Nurse role during third stage of delivery	11	15.7	22	31.4	37	52.9
Principles of uterotonic drugs Oxytocin route to prevent PPH	9	12.8	27	38.6	34	48.6
	8	11.4	27	38.6	35	50.0
The safest uterotonic drugs to prevent PPH	8	11.4	29	41.4	33	47.2
Precautions when using methergine	9	12.9	36	51.4	25	35.7
Nursing role for uterine massage	17	24.3	31	44.3	22	31.4
Delivery room measures to prevent PPH	6	8.6	32	45.7	32	45.7
	11	15.7	29	41.4	30	42.9
Episiotomy timing to prevent tear	11	15.7	24	34.3	35	50.0
Vital signs assessment after birth	11	15.7	24	34.3	35	50.0
Nurse role to prevent bladder distension	13	18.6	24	34.3	33	47.1
Nurse role for lochia assessment	27	38.6	24	34.3	19	27.1
	27	38.6	24	34.3	19	27.1
Initiation of breastfeeding	27	38.6	24	34.3	19	27.1
Estimation of blood loss	9	12.9	29	41.4	32	45.7
Nurse role for uterine firmness assessment	10	14.2	30	42.9	30	42.9
Vaginal hematoma management	15	21.4	27	38.6	28	40.0

Nurse role for genital hygiene	12	17.2	29	41.4	29	41.4
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Table (3) revealed that, about 42.9%, 42.9%, 52.9%, 46.6%, 50.0%, 47.1%, 42.9%, 50.0%, 47.1%, 45.7%, 42.9%, 40.0%, 41.4% of the studied maternity nurses had don't know answer regarding prevention of PPH during antepartum period, active management of the third stage of labor and nurse role during third stage of delivery, principles of uterotonic drugs, oxytocin route to prevent PPH, the safest uterotonic agent to prevent PPH and precautions when using methergine, episiotomy timing to prevent tear, vital signs assessment after birth, nurse role to prevent bladder distension, estimation of blood loss, uterine firmness assessment, vaginal hematoma management and nurse role for genital hygiene respectively.

Also about 51.4%, 44.3%, 45.7% had incomplete correct answer about precautions when using methergine, nursing role for uterine massage, delivery room measures to prevent PPH respectively. In addition, more than one-third 38.6%, 38.6% answered completely and correctly regarding nurse role for lochia assessment, initiation of breastfeeding.

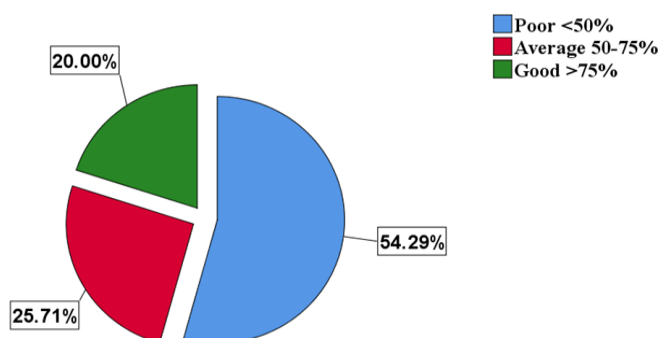


Figure (2) Distribution of the studied maternity nurses according to their total knowledge toward postpartum hemorrhage prevention

Figure (2) shows that more than half of the nurses (54.3%) had poor total score of knowledge toward postpartum hemorrhage prevention.

Part (III): Distribution of the Studied Maternity Nurses' according to their skills toward Postpartum hemorrhage Prevention in early postpartum period

Table (4): Distribution of the studied maternity nurses according to their skills to prevent early postpartum hemorrhage (no=70)

Items	Done		Not done	
	n	%	n	%
Record pulse and blood pressure every 15 minutes and document.	8	11.4	62	88.6
Check temperature every 4 hours	18	25.7	52	74.3
Uterine massage every 15 minutes	11	15.7	59	84.3
Putting mother in a comfortable position after	37	52.9	33	47.1

delivery with avoidance of supine position				
Assessment of fundal level, consistency, position and shape every 15 minutes after delivery	14	20.0	56	80.0
Examine lochia for amount and consistency	29	41.4	41	58.6
Encourage mother to evacuate urinary bladder regularly	26	37.1	44	62.9
Intake and output chart	32	45.7	38	54.3
Immediate initiation of breast feeding after delivery	48	68.6	22	31.4
Administration of prophylactic antibiotic prescribed by physician as infection control policy	24	34.3	46	65.7
Relieve anxiety by explaining her condition and management	34	48.6	36	51.4
Encourage mother for early ambulation	34	48.6	36	51.4
Assess the perineum, care for the episiotomy if present	30	42.9	40	57.1
Observations notified to the physician	43	61.4	27	38.6

Table (4) revealed that about 88.6%, 74.3%, 84.3%, 80%, 58.6%, 62.9%, , 54.3%, 65.7%, 57.1% of the studied maternity nurses had not done skills regarding pulse and blood pressure recording, temperature assessment, uterine massage, Assessment of fundal level, Examine lochia, evacuate urinary bladder, intake and output chart, antibiotic administration and Assess the perineum, care for the episiotomy respectively.

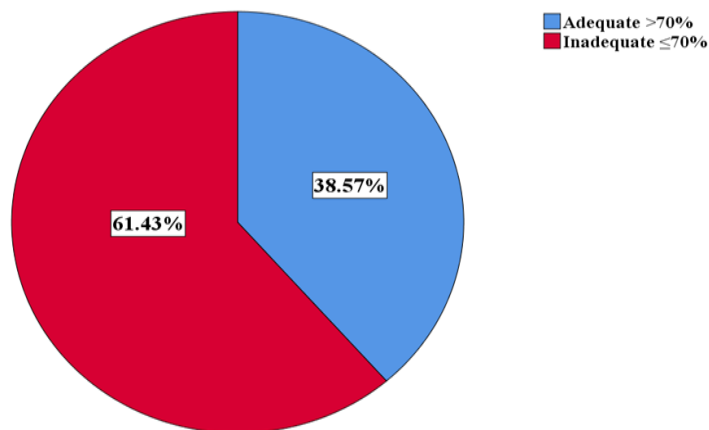


Figure (3) distribution of the studied maternity nurses according to the total skills toward prevention of early postpartum hemorrhage

Figure (3) shows that nearly two third of the nurses (61.43%) had inadequate total score of skills toward postpartum hemorrhage prevention.

Part (V): Relation between the studied maternity nurse's total knowledge and their demographic characteristics

Table (5): Relation between total nurse's knowledge toward postpartum hemorrhage prevention and their demographic characteristics (n=70)

Demographic characteristics	Studied Nurses Total knowledge						X ²	P
	Poor Knowledge (n=38)		Average Knowledge (n=18)		Good Knowledge (n=14)			
Items	n	%	n	%	n	%		
Educational Level								
Nursing diploma education	1	16.7	10	22.2	5	26.3	31.144	<0.001**
Technical nursing education	5	83.3	35	77.8	1	5.3		
Bachelor in nursing	0	0.0	0	0.0	13	68.4		
Job position								
Nurse	6	100.0	45	100.0	13	68.4	12.537	0.002**
Supervisor	0	0.0	0	0.0	6	31.6		

(*) Statistically significant at $p < 0.05$, (**) High statistically significant at $p < 0.01$

Table (5) illustrated that, there were statistically significant relation between level of education, job description of the studied maternity nurses and their total level of knowledge toward postpartum hemorrhage prevention.

Part (VI): Relation between total maternity nurse's skills toward postpartum hemorrhage prevention and their demographic characteristics

Table (6): Relation between the total nurse's skills toward postpartum hemorrhage prevention and their demographic characteristics (n=70)

Demographic characteristics	Studied Nurses Total skills						X ²	P
	Poor skills (n=38)		Average skills (n=18)		Good skills (n=14)			
Items	n	%	n	%	n	%		
Educational Level								
Nursing diploma education	21	55.3	9	50.0	4	28.6	42.03	<0.001**
Technical nursing education	16	42.1	9	50.0	2	14.3		
Bachelor in nursing	1	2.6	0	0.0	8	57.1		
Job description								
Nurse	38	100.0	18	100.0	11	78.6	16.811	<0.001**
Supervisor	0	0.0	0	0.0	3	21.4		
Years of experience								
< 5	3	7.9	3	16.7	4	28.6	19.102	.004**
5 – 10	11	28.9	6	33.3	2	14.3		
11 – 20	16	42.1	7	38.9	7	50.0		
> 20	8	21.1	2	11.1	1	7.1		

(*) Statistically significant at $p < 0.05$, (**) High statistically significant at $p < 0.01$

Table (6) illustrated that a statistically significant relation between the level of education, job description, years of experience in maternity nursing and the total nurse's skills toward postpartum hemorrhage prevention.

Part (VII): Relation between the total nurse's knowledge and their total skills toward postpartum hemorrhage prevention

Table (7): Relation between the total level of knowledge of the studied maternity nurses and their total level of skills toward postpartum hemorrhage prevention.

Items	Total knowledge						R	P
	Poor Knowledge (n=38)		Average Knowledge (n=18)		Good Knowledge (n=14)			
	n	%	n	%	n	%		
Total skills								
Inadequate skills (n=43)	26	60.5	13	30.2	4	9.3	0.689	<0.001**
Adequate skills (n=27)	12	44.4	5	18.5	10	37.0		

(*) Statistically significant at $p < 0.05$, (**) High statistically significant at $p < 0.01$

Table (7) illustrated that the maternity nurses had high significant relation between the total nurses knowledge and their total skills toward postpartum hemorrhage prevention.

Discussion

Regarding demographic characteristics the findings of the present study revealed that more than one third were in the age group of 30-40 years. The finding of the present study agree with (Ramadhani, Liu & Lembuka, 2020) which titled "Knowledge and barriers on correct use of modified guidelines for active management of third stage of labor: a cross sectional survey of nurse-midwives at three referral hospitals in Dar es Salaam, Tanzania" who showed more than one third were in the age group of 30-40 years.

In addition, the finding disagrees with (Thamer & Jasim, 2022), which titled "Assessment of Nurses-midwives' Knowledge of Nursing Measures for the Use of Utero-tonic Drugs in Al_Kut city hospitals" who reported that more than nearly half were less than 25 years. From the researcher point of view may be due to long working years of the nurses. Regarding level of education, the present study showed that nearly half of the studied nurses had a nursing diploma and more than one-third of nurses had technical nursing education. The finding of the present study agree with (Ali & Bahaaldeen, 2019), which titled "Effectiveness of an Education Program on Nurse-midwives' Practices Related to Postpartum Hemorrhage at Delivery Room of Maternity Hospitals in Baghdad City" who reported that more than one-half of the nurses had nursing diploma. The finding of the present study disagree with (Dawood, et al, 2021) which titled "Effect of Guideline on Improving Nurses' Practices for Patients with Early Postpartum

Hemorrhage” who reported that more than half of the nurses had technical institute of nursing.

Regarding working experience the finding of the present study revealed nearly half of studied nurses had working experience between 11 - 20 years. The finding of the present study agree with (Suplee, Bingham & Kleppel, 2017), which titled “Nurses' knowledge and teaching of possible postpartum complications” who showed that the majority of nurses had greater than 10 years of experience. In addition, the finding of the present study disagree with (Nishimwe et al., 2021), which titled “The effect of an mLearning application on nurses’ and midwives’ knowledge and skills for the management of postpartum hemorrhage and neonatal resuscitation” who reported that more than half of the nurses had of experience less than 5 years. From the researcher point of view that due to low new recruitments.

Regarding nursing position, the majority of the nurses had a nurse position, the finding of the present study agree with (Ibrahim & Abdel-Menim, 2016) which titled “Improving maternity nurses’ performance regarding prevention and control of postpartum hemorrhage” who revealed that most of nurses were working as staff nurses. Also, the finding of the present study disagree with (Abd Elhakm & Elbana, 2018), which titled “Effect of simulation based training on maternity nurses’ performance and self-confidence regarding primary postpartum hemorrhage management” who showed more than half of them were working as staff nurses.

Regarding the attendance of training courses about pregnancy, labor and prevention of postpartum hemorrhage, the present study showed that more than two- thirds of the nurses’ had not attended any previous training. the finding of the present study agree with (El-hamid, et al, 2020) which titled “ Effect of High Fidelity Simulation Based Training Program on Nursing Students’ Performance, Self-efficacy and Confidence regarding Prevention of Postpartum Hemorrhage” who reported that the most of the nurses hadn’t training programs on PPH.

In addition, the finding of the present study disagree with (Al-Rabeei, Al-jaradi & Dallak, 2020) which titled “Competences of Midwives in Prevention and Management of Postpartum Hemorrhage at Public Hospitals, Sana'a City” who reported that about more than half of nurses had training courses. From the researcher point of view that due to lack of training courses from the hospital.

As regards nurses knowledge about postpartum hemorrhage, the present study reveals that more than half of the study nurses had incomplete correct answer regarding definition of PPH and that similar to with (Elkholy, et al, 2017), which titled “Assessment of Nurse's Practical Skills Regarding avoidance of Postpartum Hemorrhage”who revealed that more than one third of the study nurses had incomplete correct answers about PPH definition. The finding disagree with (Wallen, 2019) that titled “Increasing Nursing Competence and Confidence During Obstetric Emergencies through Simulation” who revealed that the majority of the study nurses had correct answers about PPH definition and classification.

As regards nurses knowledge about postpartum hemorrhage, the present study reveals that more than one third had correct answer regarding causes of PPH and uterine atony causes and this similar to (Cares, 2021) that titled "Implementation and Evaluation of the Quantification of Blood Loss and Postpartum Hemorrhage Education" who reported that more than half had correct answer about causes of PPH. The finding disagree with (Al-Rabeei& Dallak, 2020) which titled "Competences of Midwives in Prevention and Management of Postpartum Hemorrhage at Public Hospitals, Sana'a City" who reported that the majority of the nurses had correct answer about causes of uterine atony.

As regards nurses knowledge about postpartum hemorrhage, the present study reveals that more than half had incomplete correct answer regarding complications and symptoms of uterine atony and that is similar to (Abd Elhakm & Elbana, 2018) which titled "Effect of simulation based training on maternity nurses' performance and self-confidence regarding primary postpartum hemorrhage management" who reported that more than half had incomplete correct answer about the complications and signs of PPH.

In relation to nurses' knowledge about postpartum hemorrhage prevention, the present study reveals that more than one third of the study nurses had incomplete correct answer regarding Prevention of PPH during antepartum period, active management of the third stage of labor and nurse role during third stage of delivery. The finding is in accordance with (Hashem, El-Kholy & Abo-Hatab, 2022) which titled "Improving Maternity Nurses' Performance Regarding Prevention and Control of Postpartum Hemorrhage" who showed that nearly half of the nurses had incomplete correct answer regarding Prevention of PPH during antepartum period, active management of the third stage of labor and nurse role during third stage of delivery.

In relation to nurses' knowledge about PPH, the present study reveals that less than one third had correct answer regarding vital signs assessment after birth and nurse role to prevent bladder distension and lochia assessment. The finding agree with (Mohammad , 2020) titled "Nurse Midwives Knowledge Regarding Nursing Management of Post-Partum Hemorrhage at in Iraq" who reported that less than one third had correct answer regarding vital signs assessment after birth and lochia assessment.

As regards nurses' knowledge about postpartum hemorrhage, the present study reveals that the more than half of the nurses had poor knowledge about postpartum hemorrhage. The finding matched with (Abd Elhakm & Elbana, 2018) titled "Effect of simulation based training on maternity nurses' performance and self-confidence regarding primary postpartum hemorrhage management" that showed more than two third of the nurses had poor total score of knowledge to prevent PPH. The finding disagree with (Scholar, 2021) titled "PROBLEM STATEMENT: "A Study to evaluate the effectiveness of structured teaching programme on knowledge regarding postpartum Haemorrhage and its Management among Staff Nurses in selected Hospital Rohru" who had average knowledge about postpartum hemorrhage.

Regarding nursing skills to prevent postpartum hemorrhage, the present study found that more than three quarters of the nurses did not perform some practices as Record pulse and blood pressure every 15 minutes, uterine massage every 15 minutes. The finding agree with (Nuriy & Ahmed, 2018) which titled "Nurse/Midwives' practices during labor and delivery in Maternity Teaching Hospital in Erbil City" who showed that the majority did not check the mother's vital signs. From the researcher point of view that due to pressure of the work.

Concerning assessment of fundal level every 15 minute after delivery, the majority of the study nurses did not perform assessment, which agrees with the result of (Ali & Ghafel, 2022) study who found that the majority of the nurses did not perform fundal assessment. The finding disagree with the result of (Yaekob , et al, 2015) study, which titled " Assessment of knowledge, attitude, and practice of midwives on active management of third stage of labour at selected health centers of Addis Ababa" who found that was done with the majority of study subjects. From the researcher point of view that due to lack of regular training courses and sessions by the Egyptian Ministry of health and other health authorities.

Concerning examination of lochia for amount and consistency in the early postpartum period, the current study showed that examination was not done by more than one-third of the study nurses and that is similar to the findings of (Muthoni, Kabue & Ambani, 2021), who found that the most of study nurses did not examine lochia for amount and consistency in early postpartum period. The findings is not agree with the study of (Elfaki, 2015) which found that examination of lochia for amount and consistency in early postpartum period were done by the majority of the nurses from the researcher point of view may be related to increased number of cases according to number of nurses.

Regarding putting postpartum woman in comfortable position, the present study subjects showed that more than half of the study nurses put postpartum woman in comfortable position. The finding disagree with (Bulndi, et al, 2017) study titled "Knowledge and Management of Post-Partum Hemorrhage Among Skilled Birth Attendants in Primary Health Centers of Jos North LGA, Plateau State" who found that the majority of the present study subjects did not put postpartum woman in comfortable position.

Unfortunately, more than half of the present study subjects did not perform perineal care and is similar to (Elkholy, et al, 2017) which titled "Assessment of Nurse's Practical Skills Regarding avoidance of Postpartum Hemorrhage" who reported that majority of the study nurses did not perform perineal care. Regarding Administration of prophylactic antibiotic according to infection control policy, Observations notified to the physician, the present study nurses showed that more than two third of the nurses didn't perform and that disagree with (Elhabashy & Hafez, 2019) titled "Nurses' compliance with guidelines for the reduction of postpartum hemorrhage which reported that practices were done by all nurses.

In relation to bladder emptying, nearly two thirds of the study nurse didn't help the mother to evacuate the bladder and that disagree with (Eldien & Ahmed 2019) titled "Effect of the Intervention Design of Nursing Practices on the Monitoring

and Management of Postpartum Hemorrhage” who reported that more than two third of the nurses help emptying the bladder.

The present study clarified that nearly two third of the nurses had obtained inadequate total score of the skills to prevent postpartum hemorrhage and that similar to (Angelina, Kibusi & Mwampagatwa, 2019), which titled “Factors influencing nurses' knowledge and skills in the prevention and management of postpartum haemorrhage” that reported that nearly two third of the total score were inadequate. From the researcher point of view may be lack of guidelines to act upon about prevention of PPH.

The result of the present study disagree with (Elkholy, et al, 2017) study titled "Assessment of Nurse's Practical Skills Regarding avoidance of Postpartum Hemorrhage" study, which indicated that the majority of study subjects had obtained average total score of skills. From the researcher point of view that due the inadequate training about prevention of PPH. The finding of the present study is in accordance with (Angelina, Kibusi & Mwampagatwa, 2019), which titled “Factors influencing nurses' knowledge and skills in the prevention and management of postpartum hemorrhage” study who showed that there was significant association between professional qualification and level of knowledge.

Regarding relation of studied' nurses skills and demographic characteristics the present study showed significant relation between studied nurses demographic characteristics and skills. The findings of the present study agree with (El-Khawaga, Ahmed & Elwelely, 2019) titled “Effect of Implementation of a Teaching Program about Immediate Postpartum Care on Nurses’ Knowledge and Practice” who reported that there was also a positive statistically significant correlation between nurses’ total performance score and their educational level. The finding of the current study indicated that positive statistical significant difference was found between the total nurses' knowledge and their total skills to prevent postpartum hemorrhage. The current finding is similar to the results of (Oluwaseun, 2015) study who found that there was positive significant relationship between knowledge and skills

Conclusion

The present study concluded that more than half of the nurses had poor total knowledge score toward prevention of postpartum hemorrhage, nearly two third of the nurses had inadequate total skills score to prevent postpartum hemorrhage. A statistically high significant relation between the total knowledge of the studied maternity nurses and their total skills toward postpartum hemorrhage prevention ($p < 0.01$). therefore, the result of the current study answer the research question.

Recommendation

Based on findings of the current study, the researcher recommends the following:

- Educational programs toward prevention of postpartum hemorrhage are recommended for the nurses working at obstetrics and Gynecology department.

- Periodic participation of nurses in training programs about PPH to improve their knowledge and skills.

Further recommendation

- Instructional booklet toward prevention of postpartum hemorrhage are recommended for laboring women at postpartum unit.

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