Nurses' Compliance with Standardized Protocol for Reduction of Post-Partum Hemorrhage

Eman Abd-Elhamed Abd-Elaziz[1], Nadia Youssef Abd-Ella[2], Amina Mohamed Rashad El-Nemer[3]

Clinical Instructor, Technical Institute of Nursing, Faculty of Nursing, Mansoura University1, Assistant Professor of Woman's Health and Midwifery Nursing-

Faculty of Nursing- Mansoura University2, Professor of Woman's Health and Midwifery Nursing, Faculty of Nursing, Mansoura University, Egypt3.

Corresponding author: gogo.gebaly4@gmail.com

1.ABSTRACT

Worldwide, postpartum hemorrhage (PPH) remains the most leading cause of maternal death despite its often-preventable nature. Aim: The current study to assess nurses' compliance with standardized protocol for reduction of post-partum hemorrhage. Design: A descriptive cross sectional research design was used to accomplish the aim of the current study at two settings (labor-Delivery Unit and Postpartum Departments of Mansoura University Hospital, Dakahlia Governorate, Egypt. Subjects: All nurses (105) who are working at labor and post-partum units were recruited. Tools: Data were collected using three tools (structured interview schedule, nurses' knowledge about postpartum hemorrhage and post-partum hemorrhage observational checklist). Results: The majority of the studied maternity nurses didn't comply with the examination of placenta after delivery; nearly three-quarters of them didn't comply with late cord clamping and more than half of them didn't comply with controlled cord traction during third stage of labor. More than three-quarters of the studied maternity nurses didn't comply to relieve maternal anxiety and nearly three-quarters of them didn't comply to examine lochia during early post-partum period. This study concluded that about three quarters maternity nurses had a fair level of compliance with standardized protocol for reduction of PPH during third stage of labor while less than two-thirds of maternity nurses have an average level of compliance with the standardized protocol for reduction of PPH during early post-partum period. Thus, it is **recommended** to conducting mandatory periodical training workshops for maternity nurses to update their knowledge and practices regarding PPH prevention and management.

Keywords: Compliance, Post-Partum Hemorrhage, Standardized Protocol.

2.Introduction

Childbirth is the most joyful event in women life. However, birth is also a critical time for the health of the mother and her baby. The problems which may arise if not treated promptly and effectively can lead to ill-health and even death for one or both of them **(Slade, Murphy& Hayden, 2022)**. Every day, approximately 830 women died from preventable causes related to childbirth, or 300 000 mothers annually. Among 830 deaths occurs daily, 250 women are died due to Post-Partum Hemorrhage (PPH) **(Basso, Chan, Duckitt, & Lett, 2022)**.

All over the world, PPH is being designated as the most substantial yet inevitable source of death and maternal illness. In addition, it is the most prevailing 5th maternal mortality cause **(Bazirete, Nzayirambaho, Umubyeyi, Karangwa & Evans, 2022)**. Postpartum hemorrhage is the leading cause of morbidity and mortality in childbirth in both low- and high-income countries. It occurs in approximately 1 to 6% of all deliveries. Internationally, it is the central cause of around 25% of all maternal mortality. PPH is the first direct leading cause of maternal deaths in developing countries **(Escobar et al., 2022)**.

Post-partum hemorrhage (PPH) is defined as a blood loss of 1,000 mL or more or signs and symptoms of hypovolemia within the first 24 hours after delivery and up to 12 weeks postpartum, regardless of method of delivery (vaginal or cesarean)**(Ladfors, Muraca, Zetterqvist, Butwick, & Stephansson, 2022)**. The main causes of PPH are the "4 T's": uterine a tony (Tone, 80%), genital tract laceration (Trauma, 13%), retained placenta or placental tissue (Tissue, 5%), and coagulopathy (Thrombin, 2%). While risk indicators are associated with various socio-demographics, pregnancy complications, and delivery characteristics such as grand multiparty, prolonged labor, prior history of PPH and multiple gestation and anemia is a common aggravating factor **(Irinyenikan, 2023)**. Complications caused by PPH include hypovolemic shock with a resulting increase in maternal deaths. Therefore, prevention, early recognition, and prompt PPH management for each woman remain the cornerstone to avoid maternal morbidity and mortality **(Wormer, Jamil& Bryant, 2022)**.

2.1.Significance of the study

Post-partum hemorrhage (PPH) is a real obstetric emergency. PPH is one of the most alarming and serious emergencies which can be faced by nurse midwives in a critical time in which there is no other professional person present when hemorrhage occurs, the prompt and competent action will be crucial in controlling blood loss and reducing the risk of maternal morbidity or even death **(Akter et al., 2022)**.

Knowledgeable and committed maternity nurse with the standard protocol for prevention of PPH in Egypt can play an important role in management and prevention of PPH. Postpartum hemorrhage is the nursing concern because they play a multidisciplinary role as a care giver for early detection, screening and referring patients with early PPH to minimize maternal and fetal morbidity and mortality **(Dawood et al., 2021)**. Limited documentation about the actual practice of nurses regarding prevention, management and reduction of PPH **(Obermeyer, Mielke, & Lederhos, 2022)**.Thus this study will be conducted to assess nurses' compliance with standardized protocol for reduction of post-partum hemorrhage.

2.2.Aim of the study

The aim of this study is to assess nurses' compliance with standardized protocol for reduction of post-partum hemorrhage.

2.3.Research Questions

1. Are nurses working at labor and post-partum units compliant with the standardized protocol for reduction of post-partum hemorrhage?

3. Subjects and method

3.1. Research design:

A descriptive cross sectional research design was used to accomplish the aim of this study; this design fits the current study because it allows observation of subjects without manipulation of the studied variables.

3.2 Setting study:

This study was conducted at two settings; (labor-delivery unit and post-partum departments of Mansoura University Hospital), Mansoura city, Daqahliya governorate, Egypt.

3.3. Subjects of the study:

A convenient sample was recruited to select the current study subject. The study subject included all nurses (105) who are working at labor and post-partum units of Mansoura University Hospital. Data were collected from the beginning of October 2021 to the end of March 2022. During the period from October 2021 to the end of December 2021, the researcher observed the care given for parturient women by maternity nurses who working at labor and delivery unit (No=40).The researcher observed 37 nurses while 3 of them refused to participate in the study, thus, excluded from the total sample. Likewise, the care given for postnatal women were observed during the period from the beginning of January 2021 to the end of Mars 2022; the researcher observed 54 nurses working at postpartum (No=65) units while 8 of them refuse to participate and 3 of them are absent during the period of study and excluded from total sample.

3.4.Tools of Data Collection:

Three tools were used to collect necessary data as follow;

Tool (A): Structured Interview Schedule

This tool was developed by the researcher after passing through an extensive and relevant review of literature. The tool consisted of two main parts: The first part to asses socio-demographic data and general characteristics of the nurses as age, marital status, level of education, working setting, employment position, years of experience and daily working hours. The second part concerned with assessment of PPH training programs as the number of PPH training programs, time elapsed since the last training program and the agency provided those programs.

Tool (II): Nurses' Knowledge about postpartum hemorrhage:
A self-administered questionnaire was adapted from **(Elhabashy & Hafez, 2019)** and modified by researcher to assess nurses' knowledge about PPH. It entailed a total of 30 closed questions; the first 10 general questions about PPH; the second 10 questions discussed nurses' role during third stage of labor; and the last 10 questions discussed nurses' role during early postpartum period.

Scoring system: Nurses' response ranged from correct (1) & incorrect (0) answers. The total score was 30. Nurses' level of knowledge ranked as good knowledge >75% (>23) & Average knowledge 60-75% (18-23) & Poor knowledge <60 (<18).

Tool (III): Post-Partum Hemorrhage Observational Checklist:

An observational checklist was adopted by the researcher from **Dorji (2016)** to assess nurses' compliance with standardized protocol for reduction of primary postpartum hemorrhage. It included items grouped into two main sections as follow: Nurse's compliance during third stage of

labor (8 items) and nurse's compliance during early postpartum period (13items). Nurses' compliance with each item of the standardized protocol was scored as: completely done (3); incompletely done (2) and not done (1).

Scoring system: The total score ranged between 21 and 63 and nurses' compliance with guidelines for reduction of primary postpartum hemorrhage was ranked as follows; poor compliance for a total of less than 35, fair compliance for total score of 35 to less than 49 and good for total score of 49 or more.

3.5 Validity of tools:

Before conducting the current study, the content validity of the study tools were assessed and reviewed by a panel of three experts (Prof. Hanan Elsayed, Assist. Prof. Ahlam gouda, Assist. prof. marwa Ibrahim Hamdy) in the field of women's health & midwifery nursing for its clarity, content and sequence of its items, relevance, application, comprehensive, and understanding. Accordingly the expertise's suggestions & modifications were done. These modifications included modifying of some words and statements in the questionnaire to be easily understood.

3.6 Reliability of tools:

The Cronbach's alpha value (internal consistency) of the knowledge regarding PPH was 0.895, the third stage of labor practice score was 0.903, and of the early post-partum period practice was 0.902.

3.7 Field work:

The research process was carried out through two phases; preparatory and operating phases as follow;

Preparatory Phase:

This phase included reviewing the national and international relevant literature and theoretical knowledge about the various aspect of the study using articles, books, journals to develop data collection tool which developed by the researcher. First, the questionnaire was prepared in English, translated into Arabic language and reviewed by bilingual Arabic expertise. Then, the tool was validated as previously mentioned.

Pilot study: The pilot study was carried out on 10% (10 maternity nurses) of the total sample to test the applicability, feasibility, the clarity of the designed checklist. The tools were tested to confirm that the questions were suitable, easily understood, cover the aim of the study and carry the same meaning that they designed for it. The results of pilot study indicated that statements of the questionnaire were clear and relevant; a few statements are changed to be easily understood by participants. The pilot sample was included in the study.

Operating phase:

The actual field work of the research took about six months started at the beginning of October 2021 to the end of March 2022 to gather the data required for research work. Before data collection the researcher introduced an official letters from Faculty of Nursing- Mansoura University to the director and the head of Obstetrics and Gynecology Departments of Mansoura University Hospital to obtain an official permission to conduct the study after clarifying its aim. The researcher attends to the study setting four days per week (Sunday-Monday -Tuesday- Thursday) from 9am to 3 pm. During data collection procedure; firstly, the researcher introduced herself to each nurse, took her oral consent to share in the study after explaining its aim.

Then, through an individual interview with each nurse the first and second study tool (structured interview schedule, nurses' knowledge about postpartum hemorrhage) were completed by nurses who are providing direct care to women during labour and early post-partum period to assess their knowledge about post-partum hemorrhage with guidance by researcher throughout the interview period. The average time needed to complete the questionnaire ranged between 20-30 minutes.

After that, the researcher observed the care provided by the nurses during the third stage of labour to assess their compliance with standardized protocol using the third tool (post-partum hemorrhage observational checklist).The average time needed to complete observation during third stage of labour ranged between 15-30 minutes according to duration of third stage of labour. Likewise, the researcher observed the care provided by the nurses during early post-partum period to assess their compliance with standardized protocol (2 hours after delivery) start after admission of parturient women to post-partum department.

3.8. Ethical consideration:

Ethical approval was obtained from the Research Ethics Committee at the Faculty of Nursing, Mansoura University. An informed consent was obtained from each nurse involved in the study & after clarification the nature objective of the study. The participants were reassured about the anonymity, privacy, safety and confidentiality of the collected information throughout the whole

study. The participants were informed about their rights to refuse participation or withdraw from the study at any time. The results were be used as a component of the necessary research for master study as well as for publication and education.

3.9. Statistical analysis

All statistical analyses were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). Continuous data were normally distributed and were expressed in mean ±standard deviation (SD). Categorical data were expressed in number and percentage. Chi-square test was used for comparison of variables with categorical data. The reliability (internal consistency) test for the questionnaires used in the study was calculated. Statistical significance was set at $p<0.05$.

3.10. Limitations of the study:

The current study had two limitations; the first one, nurses work overload interferes with the completion of the questionnaire, this requires extra effort and time for data collection. The second one is that most of nurses don't perform some of basic procedures related to the management of third stage of labor as placental examination) because of excessive work overload.

4.Results

Table1. presents frequency distribution of maternity nurses according to their general characteristics, in which, about three quarters (75.8%) of maternity nurses were aged between 20: 40 years with M±SD 31.5 ±8.9. About 79.1% were married and more than half (56%) of them had average education (diploma).

Table2. presents number and percent distribution of maternity nurses according to their PPH training programs. Data revealed that more than half of nurses (53.8%) had attended PPH training programs via Mansoura University Hospitals. As regard the time elapsed on training program only 32.7% of nurses had attended their training program during the last year while 67.3% of them had their program over one year ago.

Figure 1. i1llustrates that 51.6 % of the studied maternity nurses had average knowledge about postpartum hemorrhage while, 34.1% of them had good knowledge and only 14.3% of them had poor knowledge.

Table3. shows maternity nurses' compliance with the standardized protocol for reduction of PPH during the third stage of labor. The majority (93.3%) of maternity nurses didn't comply with the examination of placenta after delivery, while more than the half (56.7%) of them were incompletely comply to the examination of the utero vaginal canal and perineum. Meanwhile, an equal proportions (96.7%) of nurses were completely comply to compare the name of oxytocin with women' sheet and giving oxytocin according to physician prescription, respectively.

Table 4. shows maternity nurses' compliance with standardized protocol for reduction of PPH during early post-partum period. About 78.2 % , 70.9% , 65.5% & 60% of maternity nurses didn't comply to relieve maternal anxiety, examination of lochia, maternal position after delivery & uterine assessment after delivery, respectively.

Figure 2. shows that 75% of the maternity nurses who have good knowledge level had good third stage of labor practice score while 50% of the maternity nurses with poor knowledge had poor practice.

Figure 3 shows that most of the maternity nurses with good early post-partum period practice score had fair knowledge level (80%) while most of the maternity nurses with poor early post-partum period practice score had poor knowledge level (83.3%).

Table (1): General Characteristics of the Studied Maternity Nurses

General characteristics	No.	%
Age (Years)		
< 20	10	11.0
20 – 40	69	75.8
> 40	12	13.2
Mean ±SD	31.5 ±8.9	
Marital condition		
Married	72	79.1
Unmarried	19	20.9
Educational level		
Diploma	51	56.0
Technical and bachelor	40	44.0

Employment position		
Staff nurse	83	91.2
Head nurse	8	8.8
Place of work		
Labor and delivery unit	32	35.2
Postpartum unit	59	64.8
Years of experience		
< 15	47	51.6
15 – 25	38	41.8
26 – 35	6	6.6
Mean ±SD	16.3 ±5.7	
Daily working hours		
Less than 8 hours	18	19.8
More than 8 hours	73	80.2
Mean ±SD	10.1 ±1.3	

Table 2. Frequency Distribution of Maternity Nurses according to their PPH Training Programs (No=91).

Variables	No.	%
Having PPH training programs		
Yes	49	53.8
No	42	46.2
The time elapsed since last training program (n=49)		
Less than one year	16	32.7
More than one year	33	67.3
The agency provided the program (n=49)		
Mansoura University Hospitals	49	100.0

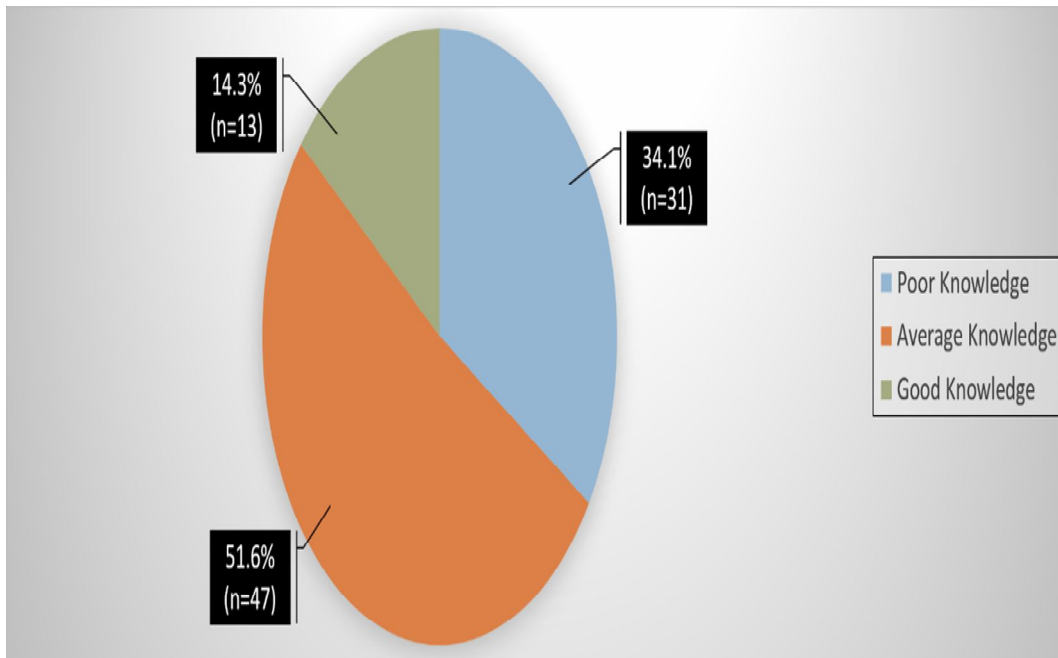**Figure 1. Total knowledge score of the studied Maternity Nurses (No=91)**.

Table3. Maternity Nurses' Compliance with the Standardized Protocol for Reduction of PPH during the Third Stage of Labor (*No=32).

Variables	Not Done		Incompletely Done		Done	
	No.	%	No.	%	No.	%
Comparing name of oxytocin with women' sheet	0	0.0	1	3.3	29	96,7
Giving oxytocin according to physician prescription	0	0.0	1	3.3	29	96,7
Late cord clamping	21	70.0	8	26.7	1	3.3
Early cord clamping	9	30.0	0	0.0	21	70.0
Controlled cord traction	16	53.3	14	46.7	0	0.0
Avoidance of fundal pressure	10	33.3	2	6.7	18	60.0
Examination of placenta	28	93.3	2	6.7	0	0.0
Examination of utero vaginal canal and perineum for injuries	12	40.0	17	56.7	1	3.3

*No=32-2 head nurse didn't participate in practical work =30

Table 4. Maternity Nurses' Compliance with Standardized Protocol for Reduction of PPH during Early Post-Partum Period (*No=59).

Variables	Not Done		Incompletely done		Done	
	No.	%	No.	%	No.	%
Assessment of vital signs (pulse and blood pressure)	2	3.6	53	96.4	0	0.0
Maternal position after delivery	36	65.5	18	32.7	1	1.8
Uterine assessment after delivery	33	60.0	22	40.0	0	0.0
Uterine massage after delivery	12	21.8	34	61.8	9	16.4
Examination of lochia	39	70.9	16	29.1	0	0.0
Evacuation of urinary bladder after delivery	14	25.5	28	50.9	13	23.6
Assessment of temperature /4 hours	0	0.0	46	83.6	9	16.4
Intake and output chart /2 hours	4	7.3	12	21.8	39	70.9
Initiation of breast feeding as soon as possible	2	3.6	9	16.4	44	80.0
Administration of prophylactic antibiotic as prescribed	0	0.0	0	0.0	55	100.0
Managing maternal anxiety	43	78.2	12	21.8	0	0.0
Encouraging early ambulation	6	10.9	0	0.0	49	89.1
Keeping patient's records	0	0.0	0	0.0	55	100.0

Figure 2. Association between Maternity Nurses' Total Knowledge Score and their Compliance with Standardized Protocol for Reduction of PPH during Third Stage of Labor (No=30).
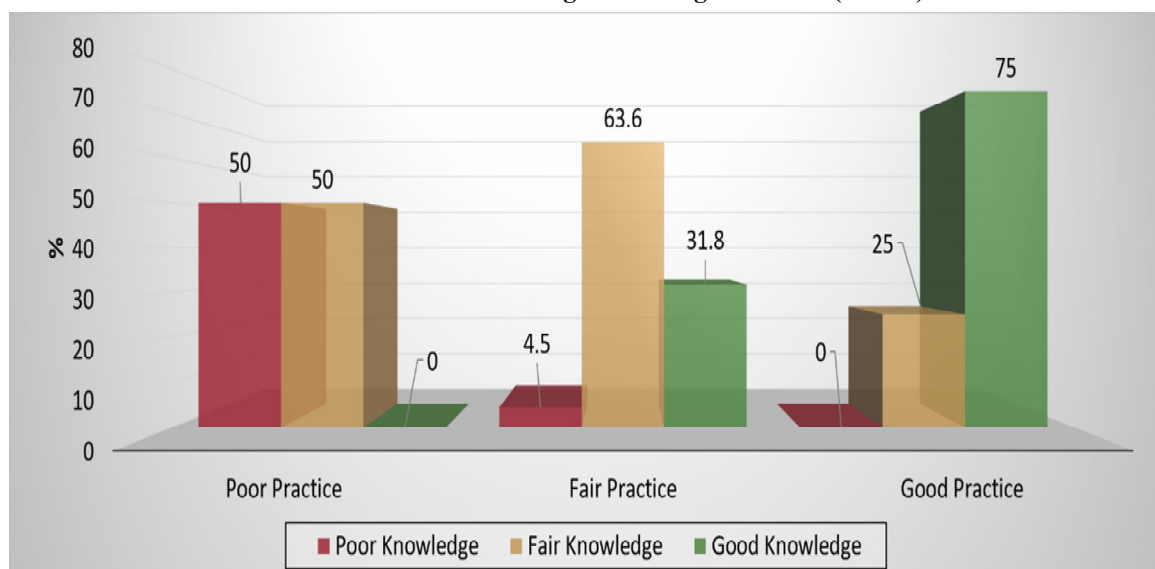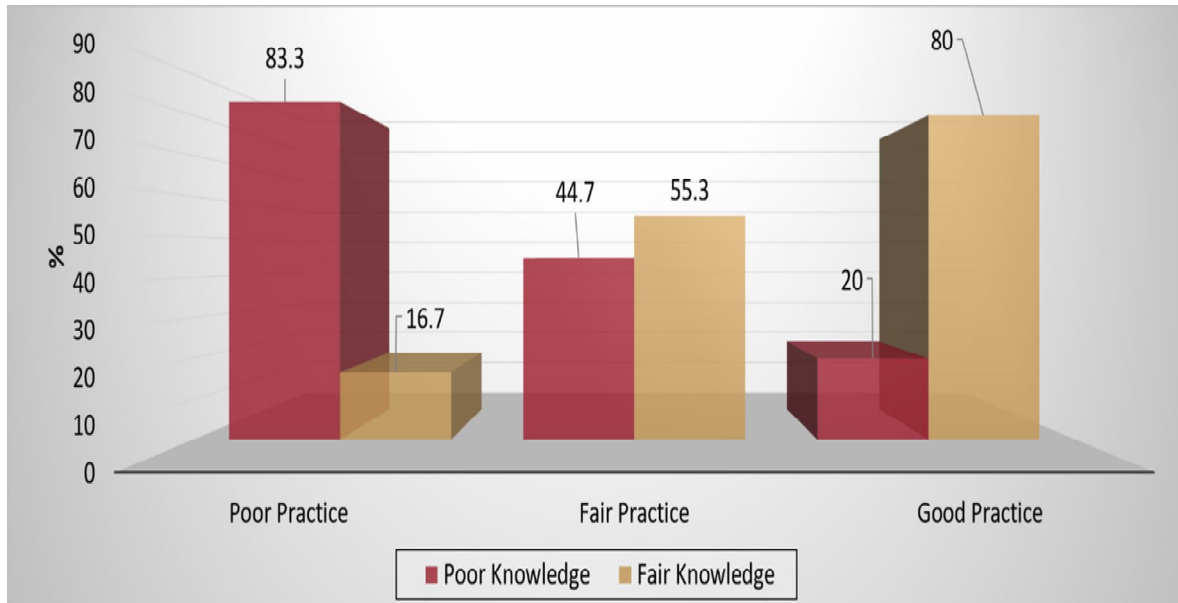
Figure 3. Association between Maternity Nurses' Total Knowledge Level and their Compliance with Standardized Protocol for Reduction of PPH during Early Post-Partum Period (n=55)

5. Discussion

According to total knowledge score of the studied sample, the present study revealed that more than half of nurses had a fair total knowledge score. This study finding is in agreement with **Scholar, (2021)** conducted a study named "PROBLEM STATEMENT: "A Study to evaluate the effectiveness of structured teaching programme on knowledge regarding postpartum Hemorrhage and its Management among Staff Nurses in selected Hospital Rohru" and revealed that more than half of nurses had average knowledge. This accordance may be related to the subjects of two studies have the same educational level.

The study finding is in contrast with **Dawood et al ., (2021)** conducted an Egyptian study at Ain Shams University entitled "Effect of Guideline on Improving Nurses' Practices for Patients with Early Postpartum Hemorrhage" and studied that three quarters of nurses had a poor total knowledge score. This may be attributed to the universities or nursing schools were lacking sufficient resources, including human resources (faculty and staff).

Concerning maternity nurses' compliance with the standardized protocol for reduction of PPH during the third stage of labor, the findings of current study revealed that most of studied nurses are compliant with comparing name of oxytocin with women' sheet, this result is supported by **Elhabashy & Hafez, (2019)** conducted an Egyptian study about " Nurses' compliance with guidelines for the reduction of postpartum hemorrhage" and found that nurses were completely complaint with comparing name of oxytocic's with woman's sheet to ensure correct name.

The present study revealed that nearly most of the nurses giving oxytocin according to physician prescription, this result is supported by **Muyanga & Joho (2022)** conducted a study named "Knowledge and skills on active management of third stage of labor for prevention of post-partum hemorrhage among health care providers in Lake Zone, Tanzania: a cross sectional study" and found that most of nurses had a correct performance regarding it. This result isn't in accordance with **Osman et al., (2023)** found that about two thirds of nurses were not compliant with administration of uterotonic drugs. This difference may be attributed to different hospital policies concerning uterotonic agent administration.

The findings of current study revealed that about three quarters of maternity nurses didn't apply delayed cord clamping (cc), this result is contrary to the result of **Isacson et al., (2022)** conducted study named "Umbilical cord clamping and management of the third stage of labor: A telephone-survey describing Swedish midwives' clinical practice" showed that all of midwives perform it. From the researcher's point of view this might be due to poor or absence of in service training regarding AMTSL.

As regards to early cord clamping, the current study results revealed that less than three quarters of maternity nurses perform it, this result

is contrary to the result of **Erickson et al., (2019)** conducted study about "Physiologic childbirth and active management of the third stage of labor: A latent class model of risk for postpartum hemorrhage" studied that less than One quarter of nurse midwives perform it. This difference may be owed to that the studied nurses have neglected updating their knowledge and not implemented the recommendations of the American College of Obstetricians and Gynecologists (ACOG) 2017which recommend a delay in umbilical cord clamping in vigorous term and preterm infants for at least 1 minute after birth and this has the benefit of increasing iron stores and decreasing anemia.

The results of current study revealed that more than half of nurses didn't comply with controlled cord traction, this result is concurrent with **Hashem, (2022)** mentioned that more than three quarters of studied intern nursing students didn't perform it. The researcher owing this to the fact that most of controlled cord traction was done by physician not by nurses. This result isn't in accordance with **Abdelwahed & Farahat (2022)** conducted an Egyptian study at Port Said city about "Effect of Nursing Care Protocol on Nurses' Performance during Third Stage of Labor" and reported that about two thirds of nurses perform it. From the researcher's point of view this may be attributed to lack of regular training courses and session about AMTSL.

The finding of present study showed that less than two thirds of maternity nurses are compliant with avoidance of fundal pressure, near to our result, **Elhabashy& Hafez, (2019)** studied that about two-thirds of nurses were completely complaint with avoidance of fundal pressure to assist the delivery of the placenta. These similarities may be related to the subject of two studies have the same number of experience years.

In relation to examination of placenta, the present study shows that the majority of nurses didn't comply with it, this result is near to the result of **Abdelgadir et al., (2022)** studied that about two thirds of nurses had unsatisfactory level of practice. From the researcher point of view, this incompliance may be related to that most of placenta examination was done by the doctor. On the other hand, this result is contrary to the result of **Muyanga & Joho, (2022)** studied that about two thirds of studied nurses do it correctly. The researcher attributes that placental examination was mostly done by physicians who are not a part of our sample. Meanwhile other studies included both nurses and physicians.

The finding of current study showed that more than half of nurses incompletely compliant with examination of utero vaginal canal and perineum for injuries, this result is near to **Hashem, (2022)** revealed that less than three quarters of nurses had unsatisfactory score regarding birth canal examination. The disparity between the previous research and this one could be related to variances in the number of years that nurses had worked in a labor and delivery ward. These findings clarities the lack of regular training courses and sessions by the Egyptian Ministry of health and other health authorities, these findings highlight the need to improve the content of the nursing curriculum together with continued training courses which yield well trained and educated nurses about avoidance of postpartum hemorrhage.

This is not in the same line with **Abdelgadir et al., (2022)** studied that about three quarters of studied nurses perform Perineal, utero vaginal assessment correctly. The current research finding could be due to the fact that nurses' lack of experience in third-stage labor management, which can make implementing the necessary protocol of care for the third stage of labor difficult, and nurses may fail to follow the standardized guidelines for doing protocol of care. In addition, training sessions were successful in improving the practice of maternity nurses.

As regards to nurses compliance with the standardized protocol for reduction of PPH during the third stage of labor, the present study shows that about three quarters of nurses had a fair level of compliance, this result is in the same line with **Ghosh, & Roy, (2022)** stated that more than two thirds of nurses had unsatisfactory performance. Meanwhile, this result is contradictory to the result of **Farahat et al., (2022)** conducted an Egyptian study at Port Said University entitled "Effectiveness of Placental Stage of Labor Care Protocol on Performance of Maternity Nurses" stated that more than two thirds of nurses had unsatisfactory performance.

In relation to nurses' compliance with standardized protocol for reduction of PPH, the present study revealed that most of maternity nurses incompletely compliant with assessment of vital signs (pulse and blood pressure), this result is in accordance with **Elbahlowan et al., (2022)** conducted an Egyptian study at Menoufia University entitled "Maternity Nurses' Knowledge, Practice, and Self-Efficacy in Managing Primary Postpartum Hemorrhage" stated that majority of studied nurses incorrectly asses pulse and blood pressure. The current research finding may be

attributed to nurses' work overload, where they are assigned to a large number of mothers and long working hours. On the other hands, this result is contrary to the result of **Sayed& El Saman, (2019)** studied that majority of nurses are compliant with monitoring of vital signs.

As regards to maternal position after delivery the results of current study shows that about two thirds of nurses were not compliant with Putting mother in a comfortable position after delivery with avoidance of supine position ,this result is supported by the result of **Abdelgadir et al., (2022)** stated that less than three quarters of nurses didn't perform it. This may be related to pressure of the work and increased number of cases according to number of nurses, shortage of staff and lack of knowledge about importance of avoiding supine position.

As regards to uterine assessment after delivery, the current study findings revealed that about two thirds of maternity nurses didn't perform it, this result is in accordance with **Elbahlowan et al ., (2022)** revealed that the majority of nurses incorrectly done it. This accordance may be related to long working hours, work overload and nurses ignorance about PPH nursing management.

In relation to uterine massage, the present study shows that about two thirds of nurses incompletely compliant with it, this result is near to the result of **Abdelwahed & Farahat (2022)** revealed that about half of nurses didn't perform uterine massage. From the researcher's point of view this result may be owed to sample size and years of experience of two studies participants are the same. On the other hands this result is contradictory to the result of **Muyanga & Joho (2022)**, stated that most of nurses have agood compliance regarding uterine massage. This could be attributed to the fact that uterine massage in the current study was done only in case of uterine atony as it is first choice in management of uterine atony.

Our results revealed that less than three quarters of maternity nurses didn't comply with examination of lochia, this result is near to the result of **Elbahlowan et al., (2022)** studied that more than half of nurses didn't perform examination of lochia. Contrary to our results, **Ali & Ghafel., (2022)** reported that the majority of nurses examine lochia. This difference may be due to nurses' work over load, long working hours more than 8 hours or they might relay on physicians to examine lochia and their ignorance about their role.

According to evacuation of urinary bladder after delivery , the findings of current study showed that more than half of maternity nurses incompletely comply with it, this result is in agreement with **Zimba, (2020)** reported that most of nurses incorrectly done it. This result is in contrast with **Sayed& El Saman, (2019)** studied that about three quarters of studied nurses midwives are compliant with emptying bladder. From the researcher's point of view, this difference may be related to work over load and long working hours of current study.

As regards to assessment of temperature /4 hours , the finding of current study revealed that the majority of nurses incompletely compliant with it, this result is agreed with **Ali , Ghafel., (2022)** studied that most of nurses poorly compliant with assessment of temperature during the fourth stage of labour. This difference may be related to studied nurses follow hospital policy which stated that body temperature is measured every 12 hours.

Concerning Intake and Output (I&O) chart /2 hours, the results of current study revealed that less than three quarters of maternity nurses are compliant with it, this result is supported by **Elbahlowan et al ., (2022)** found that all nurses were doing it. Meanwhile, this result is not in accordance with **Nishimwe et al ., (2021)** found that about two thirds of nurses didn't maintain strict I& O. This difference may be related to different hospital policies.

The results of current study revealed that more than three quarters of nurses are compliant with the initiation of breast feeding as soon as possible, this result is in agreement with the result of **Ali, (2022)** studied that about majority of studied nurses help laboring women for early breast feeding. As regards to administration of prophylactic antibiotic as prescribed, the findings of current study revealed that all nurses are compliant with it, this result is contrary to the result of **Zimba,(2020)** showed that more than three quarters of midwives didn't perform it.

The results of present study shows that more than three quarters of maternity nurses didn't comply with managing maternal anxiety, this result isn't in the same line with **Abdelwahed & Farahat (2022)** stated that majority of nurses had satisfactory practice regarding providing emotional support. This difference in current study can be owed to long working hours and studied nurses didn't have time to do this task or may be related to nurses' ignorance about the importance of emotional support as a part of patient's care.

The present study findings revealed that the majority of nurses were compliant with encouraging early ambulation, which is in contrast with **Elhabashy&Hafez, (2019)** studied that all nurses didn't perform it. This difference may be related to the current study nurses follow hospital policy that encourages early ambulation.

Concerning nurses' compliance with keeping patient's records, the present study shows that all nurses are compliant with it, which is in accordance with **Abdelwahed & Farahat (2022)** stated that about two thirds of nurses had a satisfactory level of practice with patient documentation. This result is contrary to the result of **Nishimwe et al ., (2021)** studied that only more than half of nurses were compliant with evaluation and documentation of patient records.

The finding of current study showed that about three quarters of maternity nurses had a fair score of compliance during the third stage of labor, this result is in contrast with **Farahat et al., (2022)** reported that more than two thirds of the studied nurses had an unsatisfactory level of knowledge and practices regarding caring of women during the placental stage of labor. This may be owed to difference in sample size and sampling technique.

As regards to maternity nurses' compliance with the standardized protocol for reduction of PPH during early post-partum period, the present study revealed that two thirds of nurses had a fair practice while about one third of them had a poor practice, this result is consistent with **El-Khawaga et al., (2019)** conducted an Egyptian study named "Effect of Implementation of a Teaching Program about Immediate Postpartum Care on Nurses' Knowledge and Practice", and revealed that more than one third of nurses had satisfactory practice regarding immediate postpartum care of the mother. Contrary to the result of **Ghosh & Roy, (2022), Zagloul et al., (2022)** stated that majority of staff nurses practice score was poor. The researcher owing this to the lack of guidelines and inadequate training about prevention of PPH.

As regards to association between maternity nurses' total knowledge level and their compliance with standardized protocol for reduction of PPH during third stage of labor, the present study shows that three quarters of the maternity nurses who have good knowledge level had good third stage of labor practice score which is in the same line with, **Farahat et al., (2022)** stated that there was a highly positive association between studied nurse's total knowledge, practice. That can be explained by the fact that nurses' educational level, job training,

and level of knowledge had a major impact on their level of practice.

Regarding association between maternity nurses' total knowledge level and their compliance with standardized protocol for reduction of PPH during early post-partum period, the present study showed that there is a positive significant relationship, this result is in agreement with **Zagloul et al., (2022)** found that there was a highly positive relationship between increased levels of internship students 'knowledge with increasing their total practice level

6. Conclusion

The current study findings concluded that, more than half of maternity nurses have an average level of knowledge about post-partum hemorrhage and about one third of them have a poor knowledge. As regards to nurses' compliance with standardized protocol for reduction of PPH, about three quarters, nearly two thirds of maternity nurses have fair level of practice during third stage of labor and early post-partum period, respectively.

There was a statistical significant difference between maternity nurses' knowledge level and their practice level during third stage of labor and early post-partum period**,** means that**,** maternity nurses who had good PPH knowledge were betterly complied with the standardized protocol for reduction of PPH.

7.Recommendations

In the light of current study findings, the following recommendations were suggested:

- Conducting mandatory periodical training workshops for maternity nurses to update their knowledge and practices regarding PPH prevention and management.

- Establishing standard guideline for PPH management to be implemented in different health care setting the different settings to maintain and provide high quality of health care regarding third and fourth stage of labor.

- Designing simple booklets and handouts with updated knowledge and practices about management of labor and PPH.

Further researches studies to

- Assess factors hindering maternity nurses' compliance with standardized protocol for reduction of PPH.

- Assess the effect of applying PPH training programs on maternity nurses' knowledge and practices related to PPH management.

8.Acknowledgment

9.Conflict of interest

The authors observe that there is no dispute with respect to this research.

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