Effect of New Care Bundle on Enhancing Nurses' Knowledge, Practice and Self-Efficacy regarding Primary Postpartum Hemorrhage

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Abstract

Background: Postpartum hemorrhage (PPH) is the primary cause of global maternal mortality. The majority of deaths from PPH can be avoided easily with early detection and treatment by using a new care bundle (E-MOTIVE). **Aim** of this study was to evaluate the effect of a new care bundle on enhancing nurses' Knowledge, practice and self-efficacy regarding primary postpartum hemorrhage. **Research design:** A quasi-experimental design (pretest, posttest and follow up) was used. **Setting:** This study was carried out in Al Sharkia Governorate, Egypt, at the Maternity and Childhood Hospital of Zagazig University Hospitals. **Subjects:** A purposive sample of all nurses (125 nurses). **Tools:** A structured interviewing questionnaire, a new primary postpartum hemorrhage care bundle checklist and maternity nurses' self-efficacy questionnaire regarding primary PPH. **Results:** There was a high significant statistical positive correlation between total nurses' knowledge, total practices and their total self-efficacy at pre, post and follow-up. **Conclusion:** Nurses' knowledge, practice and self-efficacy related to early detection and first response to primary PPH were improved after implementation of new care bundle. **Recommendations:** Utilizing anew care bundle by nurses is a crucial in maternity hospitals for early detection and treatment of primary postpartum hemorrhage as it led to lower risk of sever PPhge and maternal death from bleeding.

Keywords: Care bundle, Knowledge, Practice, Primary postpartum hemorrhage & Self-efficacy.

Introduction

Postpartum hemorrhage (PPH) is among the top five factors contributing to maternal death in both high- and low-income nations and the most frequent cause of obstetric bleeding **(Sayed et al., 2023)**. PPH is any blood loss after childbirth that is significant enough to induce hemodynamic instability in the patient, or as over 500 milliliters of blood lost after a vaginal delivery or over 1000 milliliters following a cesarean section. It is frequently categorized into primary PPH which happens within 24 hours of delivery and is the most prevalent kind, and secondary PPH which happens beyond 24 hours after delivery and for a maximum of 6 weeks after that **(Negesa Beyene et al., 2024).**

Even while postpartum hemorrhage is more of an issue in nations with less access to healthcare, it is a major concern in wealthy nations like the US. Postpartum hemorrhage rates in the US raised from 2.7% in 2000 to 4.3% in 2019, according to a study by **Corbetta-Rastelli et al., (2023)**. PPH is one of the main causes of maternal morbidity and mortality in Egypt. Maternal mortality in Egypt was 52.0% per 100,000 live births, with postpartum hemorrhage accounting for 19.7% of all maternal deaths. **(Abd El-Malek et al., 2019).**

The memorial four "T's" are the source of PPH causes; 1) Tone: atony of the uterus; 2) Trauma: cuts to the cervix, vagina, uterus, or perineum; 3) Tissue: placenta, membranes, or clots that are retained after conception; 4) Thrombin: coagulopathy that is either acquired or preexisting. Because of its rising trend, uterine atony accounts for the bulk of PPH cases (75.0%). The inability of the myometrium to contract after birth describes atony as a result of the uterus's excessive distention, which can occur in cases of numerous gestations, large babies, or multiparty **(Mjema et al., 2023)**. Since PPH was thought to be unpredictable, the main goal was to provide prophylaxis to all parturient women who met the PPH risk criteria **(Taha et al., 2023)**.

Prolonged labor, numerous pregnancies, a prior history of PPH, specific medical disorders like high blood pressure and placenta previa, aided vaginal delivery, and general anaesthesia are some of the risk factors for primary PPH **(Al-dardery et al., 2023)**. Since PPH is the leading global cause of maternal death, innovative approaches like care bundles are desperately needed to lower these fatalities. When there are several therapies with established efficacy that may be used in tandem or collectively, they are especially useful **(Da Rocha Gaspar et al., 2023)**. Care bundles are a kind of complex intervention consisting of 3 to 5 evidence-based practices when applied all at once, concurrently, or quickly after one another, can improve the health of patients. The Institute for Healthcare Improvement (IHI) developed

the care bundle concept to enable healthcare providers to more consistently provide the highest quality patient care. It has been demonstrated that Care bundles are successfully used in critical care and sepsis prevention **(Avsar et al., 2022).**

By increasing the coverage of several, efficient interventions at once, a care bundle method may assist optimize care for PPH. Care bundles can be used for PPH treatment, prevention, or a mix of the two, according to studies. A multicountry, cluster-randomized trial conducted more recently discovered that the risk of severe morbidity associated with PPH was decreased when first-line PPH treatment bundles were used in conjunction with early identification of PPH **Seim et al.,(2023) & Gallos et al., (2023).**

WHO-sponsored consensus process resulted in the development of the new care bundle known as E-MOTIVE intervention **(Althabe et al., 2020).** Active implementation techniques, such as clinical training, audit and feedback, refilling a PPH treatment trolley on a regular basis, and designating 'change champions' at each facility, helped to support the intervention. While the E-MOTIVE intervention was included in the PPH treatment category, it should be noted that the treatment bundle may be activated with detection of less than 500 mL of postpartum hemorrhage. Because of this, it might be said to have a preventative component, if not a main focus **(Vogel et al., 2024).**

The conviction in one's own abilities, or self-efficacy, is influenced by four main components to carry out tasks or activities. The most significant of these is mastery experience, since accomplishments bolster self-efficacy beliefs. Vicarious experiences, such watching role models perform a certain skill, increase one's confidence in their own capacity to do the same. Persuasion, whether verbal or social, can help people believe in their own abilities. Self-efficacy will increase if the physiological condition under stress-which is thought to be how one perceives one's own anxiety level is viewed as an energising boost **(Musabwasoni et al., 2020).** On the other hand, self-efficacy may suffer if a recent event causes arousal that is interpreted as anxiety. Arousal might be positively loaded as a typical reaction and regarded as excitement, which will improve performance in the future when supported by debriefing **(Amatullah, 2018).**

In both the management and prevention of PPH, nurses role are essential. In an emergency such as PPH, they are usually the first medical personnel to arrive at the patient's bedside. The ladies could avoid or control primary postpartum hemorrhage if they had access to a qualified medical professional who could provide the required help and backup. Effective PPH prevention, early detection, and treatment depend heavily on nurses.. They must be aware of the conditions risk factors and respond appropriately when they are discovered. In addition to monitoring the patient's condition and helping with bleeding control measures, nurses also play a crucial role in educating the woman and her family and offering support **(Byrne et al., 2022).**

Significance of the study:

Postpartum hemorrhage (PPH) is still the leading cause of maternal mortality, accounting for almost 20.0% of all documented maternal deaths globally. PPH continues to disproportionately impact women in nations with low and moderate incomes. In sub-Saharan Africa and South Asia, maternal PPH mortality account for nearly all of the deaths. Countries are substantially behind schedule in reaching the 2030 maternal mortality ratio (MMR) target for sustainable development, as evidenced by the 2020 worldwide maternal mortality rate estimate of 216 per 100,000 live births. Moreover, over the last five to ten years, the reduction of maternal mortality has stopped, and estimates for the years 2030 and beyond are worrisome. To reverse this trend, decisive action is vitally needed **(WHO, 2023).**

In Egypt, PPH continues to be a major contributor of maternal morbidity and mortality, particularly in rural regions. There still has to be an urgent fix. Nurses have crucial role to prevent and treat postpartum hemorrhage (PPH) as they are often the first and only healthcare providers to arrive at the scene of a hemorrhage, their quick thinking and skill will be vital in reducing the chance of maternal disease or possibly death and blood loss.

Operational definitions:

Primary postpartum hemorrhage (PPPH) is characterized by blood loss of more than 500 milliliters throughout the third stage of labor or in the first twenty-four hours after giving birth. It splits into two basic categories. More than 1000 milliliters of blood are lost in a major PPH, and 500 to 1000 milliliters are lost in a mild PPH.

Self-efficacy: It is the trust that a nurse has in their ability to complete a task or reach an objective. It has an impact on an individual's performance, behavior, motivation, and social environment.

New care bundle refers to **"E-MOTIVE"** bundle: is an assortment of distinct, evidence-based interventions that are granted to all qualified individuals either concurrently or quickly after one another, together with collaboration, communication, and cooperation. It enhances PPH detection and first response coordination.

Aim of the study was to evaluate the effect of a new care bundle on enhancing nurses' Knowledge, practice and self-efficacy regarding primary postpartum haemorrhage.

Research Hypothesis:
H1: Nurses' knowledge scores regarding primary post-partum hemorrhage will increase after attending educational sessions about new care bundle.
H2: After attending educational sessions about a new care bundle, nurses' primary postpartum hemorrhage practices will improve.
H3: Nurses' self-efficacy score regarding primary post-partum hemorrhage will increase after obtaining educational sessions about new care bundle.

Subjects and Methods:
The study's objective was achieved by a four phases that comprised technical, administrative, operational, and statistical phases.
(A)Technical phase: It involves the research design, study's setting, a sample and data collecting tools.
Research design: The study was conducted using a quasi-experimental design that included pre-post and follow-up.
Setting: The study was carried out in the Maternity and Childhood hospital's labor and postpartum department at Zagazig University Hospitals in the Al Sharkia Governorate of Egypt. This hospital is organized through five floors, comprising the first floor's reception area, the second floor's prenatal and postpartum rooms, the third floor's pregnant women with high risks ward, the fourth floor's labor ward, and the fifth floor's operation ward. It provides both inpatient and outpatient obstetrical treatments. This hospital was selected because it serves as the main educational hospital of Al Sharkia governorate in Egypt, the location of most delivering women deliver and receives healthcare services, and the referral facility for all of Al Sharkia's cities.
Subjects and sample: Purposive sample of all nurses (125) who offer direct care to women during delivery and immediate post-partum.
Tools of data collection: In order to fulfill the present study's goal, the researchers utilized the next three tools based on relevant modern literature.
Tool I: A structured interviewing questionnaire: It split into the next two parts:
Part (I): Demographic data: Six demographic questions were asked such as age, professional qualification, job position…etc.
Part (II): Maternity nurses' knowledge questionnaire regarding primary PPhge: It was used to assess nurses' knowledge of PPhge. There are 89 questions covering the eight main parts of the PPhge, such as definition, risk factors, preventive, etc. It was created by the researchers from medical and nursing review as **Forbes et al., (2023).**

Scoring system for knowledge part: Part II in tool I contained of 89 questions were scored as follows score; the yes, no, and don't know response formats were used to evaluate the PPhge knowledge items. A positive response received one point, but "don't know" or no response received zero points. The overall knowledge scores for each maternity nurse were totaled and reported as a percentage of the total corrected knowledge to calculate the knowledge score percent. The total score of the questionnaire was 89 points. Thus, based on statistical analysis, the overall knowledge score percentage has been divided into the following three categories:
Good if score: $\geq 75.0\%$ (67-89 points)
Average if score: 50.0% - <75.0% (45-66 points).
Poor if score: < 50.0%   (0-44 points)
Tool II: A new primary postpartum haemorrhage care bundle (E-MOTIVE) checklist (Observational checklist): It depended on evidence from the 2012 and 2017 WHO guidelines, which came about as a result of the WHO Technical Consultation on PPH Bundle Development **(Althabe et al., 2020).** It has thirty practice questions divided into six major parts, which are outlined below:
Part I: (E)   Early Detection of postpartum hemorrhage: It consisted of seven procedures that the maternity nurse must perform in order detect PPhge such as using a calibrated drape and evaluation of the related problems encountered on admission to the labor and delivery room…etc.
Part Two: (M) Massage of uterus: One practice was that the maternity nurse had to massage the uterus for one minute or until it contracted.
Part Three: (O) Oxytocic Drugs: One practice is the administration of uterotonic drugs, such as oxytocin.
Part four: (T) Tranexamic Acid: It only involves in one practice. 1.1g of intravenous tranexamic acid, either injected or dissolved in 200 ml of crystalloid, given by the maternity nurse during a 10-minute period.
Part five: (IV) IV Fluids: It included one practice (Ensure IV access)
Part Six: (E) Examination and Escalation: the maternity nurse performed 19 practices as emptying the bladder, inserting Foley catheter….etc.
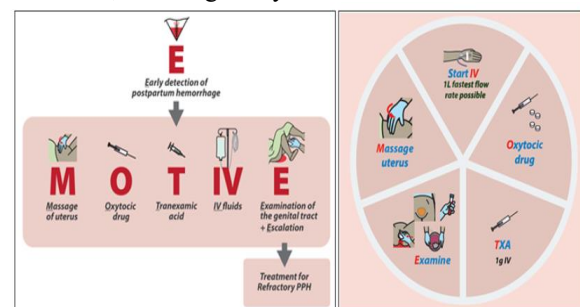

Figure (1): The E-MOTIVE care bundle intervention

Source: Bohren, et al. (2021): Formative research to design an implementation strategy for a postpartum hemorrhage initial response treatment bundle (E-MOTIVE): study protocol. Reproductive Health; 18(149):1-16.

Scoring system for tool II: The thirty items on the scale were scored outlined below: "Not done" scored zero, "incompletely done" received one point and "completely done" received two points. The scale had a total score of 60 points. A percentage score was created by adding up all of these scores. It was divided into two groups:

▪ Satisfactory practices if score ≥ 80.0%   (48-60 points)
▪ Unsatisfactory practices if score from <80.0%. (0-47 points)

Tool III: Maternity Nurses' self-efficacy questionnaire regarding primary PPH: It adopted from **Musabwasoni et al., (2020)**. It was carried out to assess nurses' self-efficacy while implementing the new primary postpartum hemorrhage care bundle (E-MOTIVE). The maternity nurse was asked to circle the number that most closely matched her response to show how confident she was in her ability to manage PPhge by the researchers.

Scoring system for tool III: The questionnaire comprised 21 items, with respondents grading each one on an 11-point Likert-type scale from 0 (not confident at all) to 10 (very confident). A score of 50 indicates a respondent's level of confidence at 50.0%, while a score of 100 indicates a score of 100.0%. The total scores ranged from 0 to 210) with higher scores indicating higher levels of self-efficacy. The results were added together and converted into a percentage score, which was then divided into three groups:

High self-efficacy if score ≥ 70.0%   (147-210 **points)**

Moderate self-efficacy if score 40.0% - <70.0% (84-146 **points)**

Low self-efficacy if score < 40.0% (0 -84 **points).**

(B) Administrative phase: To obtain the data collecting permission, the competent authorities in the study setting obtained a formal letter from Zagazig University's Faculty of Nursing, confirming formal permission.

(C) Operational phase: It consisted of preparatory phase, pilot study, validity and reliability, fieldwork and ethical consideration.

Preparatory phase: To get an in-depth theoretical comprehension of the different facets of the study, the researchers reviewed at both recent and older literature that was pertinent to the research problem. The researchers reviewed books, journals, textbooks, newspapers, magazines, and internet resources from scientific publications in order to do this. This aided

in the confirmation of the data sets to be gathered and the tool selection.

Pilot study was conducted on 12 maternity nurses who represent 10.0% of the sample and were not included. Assessing the forms' clarity, applicability, and suitability for data collection, as well as their item configurations and time requirements, was the primary goal of the pilot study.

Content validity and reliability: An expert panel including three obstetrics and gynecologic nursing professionals from Zagazig University's nursing faculty and one physician specialist with expertise in obstetrics and gynecologic medicine evaluated the comprehensiveness of the three tools and the new care package. The suitability and readability of the contributions were assessed as well. The group of experts evaluated the validity of the tools in terms of both their contents and appearance. A few sentences and a few elements were changed, together with other minor but required modifications. Cronbach's alpha is used to assess the study tools' reliability. Its values were 0.787 for knowledge, 0.854 for E-MOTIVE checklist (Observational checklist) and 0.919 for maternity nurse's self-efficacy questionnaire regarding primary PPhge.

Field work: Three days a week, from 10 AM to 6 PM, on Saturday, Monday, and Wednesday, the researchers were present in the study setting. The duration of data collection was six months, starting from the first of January, 2024 and ending at the end of June, 2024. Consequently, every nurse's agreement to participate was obtained. Four phases of the study's execution were involved: assessment, planning, implementation and evaluation**.**

Assessment phase: It comprised gathering baseline data prior to the intervention. First, the manager of the previous setting and each maternity nurse were given an introduction by the researchers, who also gave a brief explanation of the study's goals. After that, each maternity nurse was asked to complete the structured interviewing questionnaire (tool I) which was intended to gather the nurse's demographic information and to assess maternity nurses' knowledge of PPhge. Tool I took between 10 minutes to complete from each nurse. Using tool II to assess the first response of the nurse toward primary postpartum haemorrhage, completing this assessment required a varied amount of time. After that, the researchers utilized tool III. The maternity nurses were given the pretest (part II in tool I, tool II and tool III) once the intervention was put into action, the post-test and follow-up utilized same questionnaires.

Planning and Implementation phase: The researchers created a booklet for self-learning and its contents was validated then distributed to nurses to be used as a guide for self-learning for enhancing their

knowledge, practice and self-efficacy regarding primary postpartum hemorrhage. Verbal agreement was taken from each nurse. The researchers made few adjustment of **Althabe et al., (2020)** new PPhge care bundle (E-MOTIVE) program in light of the needs found in the pilot study and pretest assessment, as well as the scientific basis. Additionally, at this phase, the researchers and maternity nurses decided on the session plan and timing.

General objective of this study was to evaluate the effect of a new care bundle on enhancing nurses' practice and self-efficacy regarding primary postpartum hemorrhage.

Specific objectives: After completing of a new care bundle program, the maternity nurse will be able to:

- Define primary postpartum hemorrhage.
- List causes of primary postpartum hemorrhage.
- Determine the primary postpartum hemorrhage risk factors.
- Determine types of primary postpartum hemorrhage.
- Identify symptoms of primary postpartum hemorrhage.
- Recognize diagnosis of primary postpartum hemorrhage.
- Perform preventive measures used for primary postpartum hemorrhage.
- Practice E-MOTIVE bundle care in managing primary postpartum hemorrhage.
- Identify complications of primary postpartum hemorrhage.

There were two main parts used in a new care bundle program:

The theoretical part: Reviewed the basic information on primary postpartum hemorrhage including its definition, causes, and risk factors…etc. This theoretical part was addressed in session one and two.

The practical part: Discussed the practical skills a nurse needs to manage primary postpartum hemorrhage. This practical portion was discussed in sessions; three, four, and five.

The new postpartum hemorrhage care bundle (E-MOTIVE) sessions were as follows:

Session (1): Definition, risk factors, causes, types of primary postpartum hemorrhage and signs and symptoms were discussed in the first session.

Session (2): It covered theoretical part of diagnosis, preventive measures and complications of primary postpartum hemorrhage.

Session (3): The researchers educated maternity nurses about part one in (E-MOTIVE) program (early detection of postpartum hemorrhage). It included seven steps as using a calibrated drape, evaluation of the related problems encountered on admission to the labor and delivery room, assessment of woman vital signs…etc.

- **Session (4):** The researchers educated maternity nurses about massaging the uterus correctly (part two and three in (E-MOTIVE) program) and administrating uterotonic medications as oxytocin. The researchers utilized uterine massage doll facilitating uterine massage training.
- **Session (5):** The maternity nurses trained about part four, five and six part in (E-MOTIVE) program.

The maternity nurses were divided up into 10 nurses in small groups by the researchers. New Care bundle (E-MOTIVE) program was given to each group in five interactive sessions in three days by a week. New Care bundle (E-MOTIVE) program sessions for nurses were provided through lectures and group discussions with the use of audio-visual aids and doll for uterine massage. The first meeting started with an overview of the study, including its purpose and importance. Each group had a five sessions. It was separated into theoretical portion which was covered in two sessions and the practical portion covered in three sessions. Time in session 1 and 2 lasting 15 minute but it was 45 minute to complete the remaining sessions. There were a total nearly of 12 groups in the research. During each session, the theoretical and practical portions were explained via a PowerPoint presentation, followed by discussion, demonstrations, and re-demonstrations. Using suitable methods, such as videos, films, and pictures, also helped the program.

Throughout each session, the researchers spoke clearly and simply. The researchers described and emphasized the most important ideas at the conclusion of each session. Before each session started, the researchers asked the maternity nurse to emphasize questions related to the previous session's participants to make sure they recalled the instructions and to emphasize any knowledge that had been forgotten or was unclear. The booklet describing PPhge and E-MOTIVE care was delivered to each nurse in the hope to stimulate her curiosity, engage her, motivate at-home review, and promote practice and learning. The researchers watched each nurse closely to make sure that the E-MOTIVE practices were followed exactly.

Evaluation phase:

The researchers administered the post-test to the nurses immediately after the new care bundle sessions (Tool I (second part)). The E-MOTIVE checklist, which the nurses complete during the labor and early postpartum period, is observed by the researchers. Each overt observation required varying amounts of time for the researchers to complete (Tool II and III). Data collection for the pre-test started first and it continued for 2 months, posttest and follow up also took 2 months for data collection.
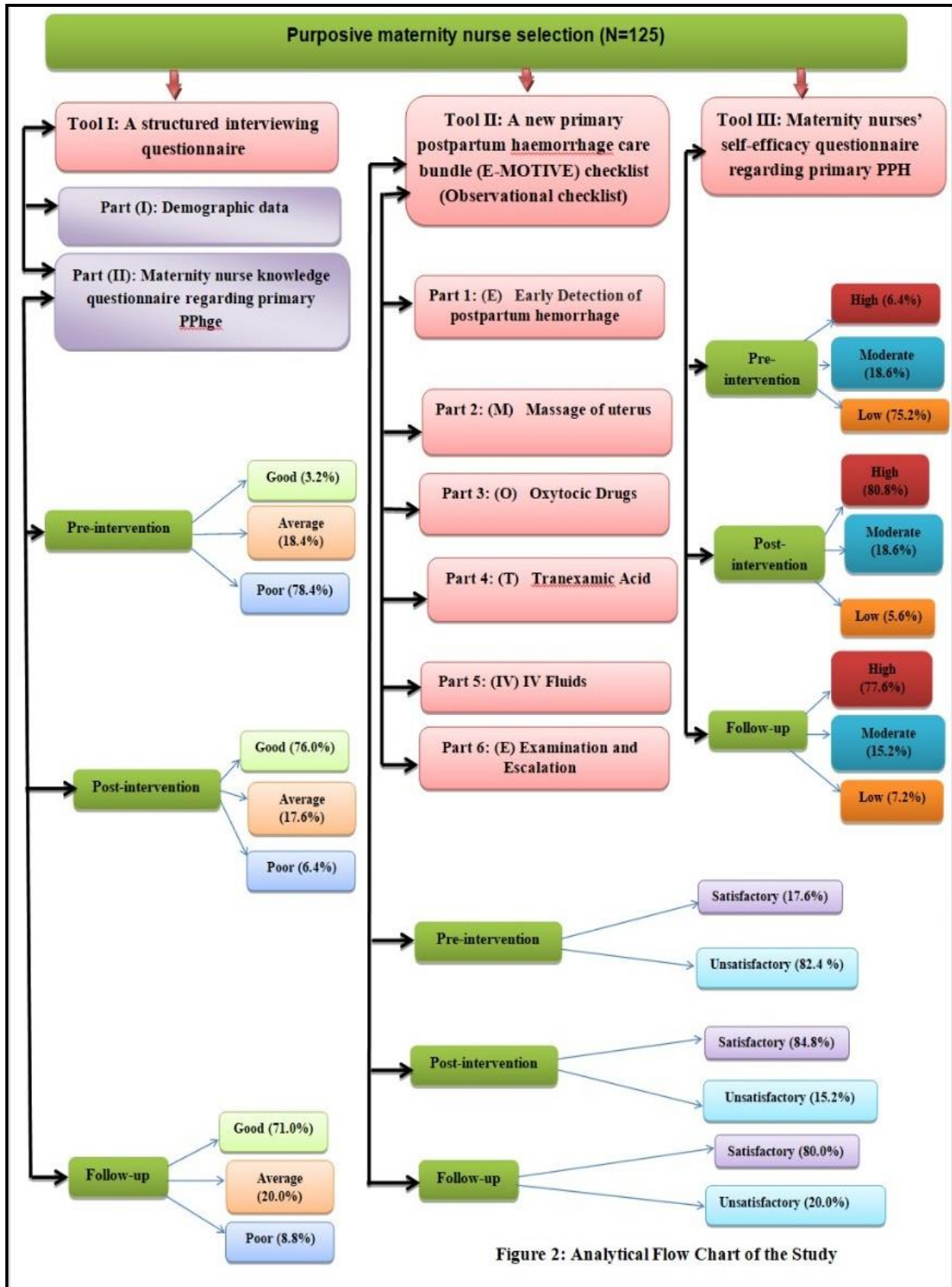
Figure 2: Analytical Flow Chart of the Study

Ethical consideration:

The research for the current study was approved by the Zagazig University Faculty of Nursing Research Ethics Committee (REC) in accordance with the ethical code (ID/ZU.Nur.REC:108). Then ethical considerations were made. To earn each nurse's confidence and trust, the goal of the research was explained before any of the tools utilized. A nurse was told that the information gathered would be kept private when they orally agreed to take part in the study. Nurses were informed of their ability to leave the research whenever they wanted and without giving a reason.

(D) Statistical analysis:

Using an IBM-compatible computer, the Statistical Package for Social Science (SPSS) version 25 for Windows was used to arrange, tabulate, and statistically analyze the acquired data. Using an IBM-compatible computer, the Statistical Package for Social Science (SPSS) version 25 for Windows was used to arrange, tabulate, and statistically analyze the acquired data. Test of significance, independent samples, and paired t test were used to compare quantitative variables. One Way ANOVA Test is used for more than two categories, while T test (t) is used to compare the means of two categories. The correlation between the variables under study was examined using the correlation coefficient test (r). Cronbach's Alpha was used to assess the study instruments' reliability. When $p < 0.05$, a level value was considered significant, and when $p < 0.01$, a highly significant level value was taken into account. When $p \geq 0.05$, no statistically significant difference was taken into account.

Results:

Table (1): Distribution of the studied nurses according to their demographic characteristics (n=125)

	No.	%
Age (Years)		
20-<25	43	34.4
25-<30	34	27.2
30-<35	16	12.8
≥35	32	25.6
Range	**20-43**	
Mean ± SD	**28.17 ± 6.39**	
Professional qualification		
Nursing school diploma	40	32.0
Technical institute	50	40.0
Bachelor of nursing	35	28.0
Job position		
Staff nurse	90	72.0
Head nurse	35	28.0
Years of experience		
Less than 5 years	72	57.6
5 -10 years	40	32.0
More than 10 years	13	10.4
Previous program received about PPhge		
Yes	32	25.6
No	93	74.4
If yes, what's your source of information? (n=32)		
Training	14	43.7
Printed media	0	0.0
Electron media	18	56.3

Table (2): Mean distribution of the studied nurses according to their knowledge about primary postpartum hemorrhage throughout study phases (n=125):

Items	Time			p-value		
	Pre-intervention	Post-intervention	Follow-up	Pre/post intervention	Pre/ Follow-up	Post/ Follow-up
	Mean ± SD	Mean ± SD	Mean ± SD			
Definition of Primary PPhge	0.26±0.44	0.91±0.28	0.87±0.33	t=14.14 P=0.000**	t=11.31 P=0.000**	t=1.017 P=0.310
Definition of secondary PPhge	0.18±0.38	0.91±0.28	0.88±0.32	t=18.21 P=0.000**	t=13.02 P=0.000**	t=0.827 P=0.409
Types of PPhge	1.21±0.42	1.95±0.21	1.92±0.27	t=17.56 P=0.000**	t=10.00 P=0.000**	t=1.032 P=0.303
Causes	9.82±1.35	17.17±2.36	16.78±2.15	t=34.85 P=0.000**	t=35.72 P=0.000**	t=1.371 P=0.172
Signs and symptoms	2.89±1.04	6.21±0.82	6.08±0.80	t=30.37 P=0.000**	t=29.67 P=0.000**	t=1.238 P=0.217
Diagnosis	7.68±2.15	11.04±2.40	10.71±2.69	t=12.60 P=0.000**	t=11.04 P=0.000**	t=1.015 P=0.311
Complications	3.66±1.06	6.15±1.25	5.94±1.30	t=18.20 P=0.000**	t=16.24 P=0.000**	t=1.281 P=0.201
Prevention	5.20±2.27	10.53±2.29	10.15±2.62	t=20.17 P=0.000**	t=17.81 P=0.000**	t=1.207 P=0.228
Management	10.34±1.42	19.06±3.13	18.66±3.16	t=30.69 P=0.000**	t=28.45 P=0.000**	t=1.004 P=0.316
Total knowledge score	41.24±6.98	73.92±10.90	71.48±11.4	t=32.69 P=0.000**	t=29.27 P=0.000**	t=1.350 P=0.178

t: Paired t test.   *P= p-value.*
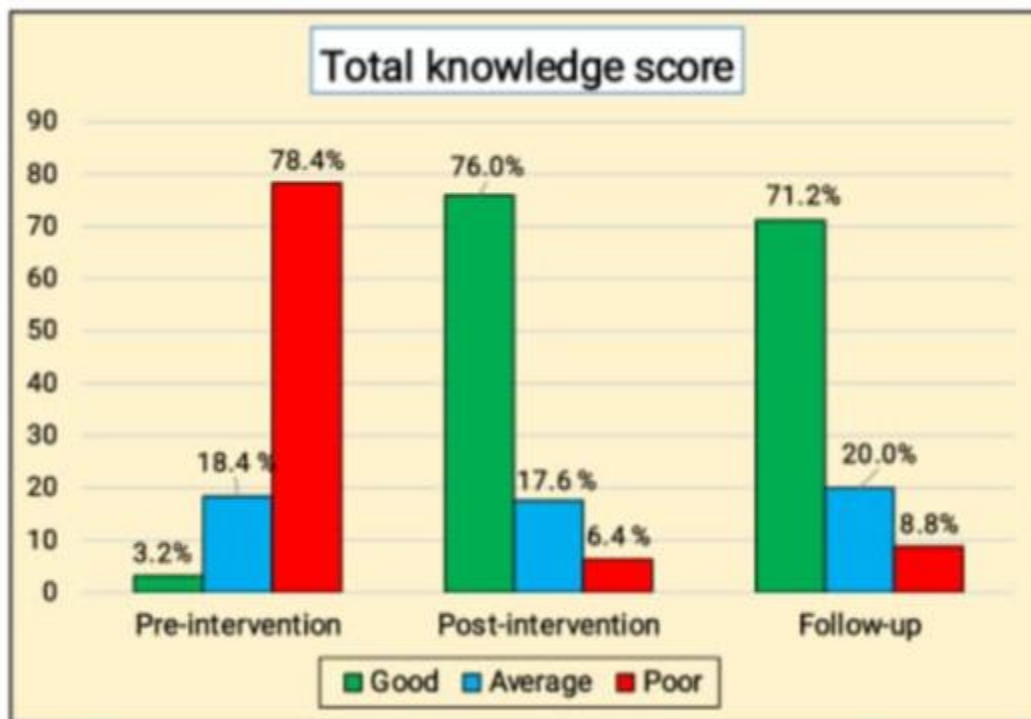*No significant at p >0.05.*   ***Highly significant at p ‹ 0.01.*

Figure (3): Percentage distribution of total nurses' knowledge regarding primary postpartum hemorrhage throughout study phases (n=125)

Table (3): Mean distribution of the studied nurses according to their practices regarding new primary postpartum hemorrhage care bundle throughout the study phases (n=125)

Items	Time			p-value		
	Pre-intervention	Post-intervention	Follow-up	Pre/post p intervention	Pre/ Follow-up	Post/ Follow-up
	Mean ± SD	Mean ± SD	Mean ± SD			
Early detection of postpartum hemorrhage	5.08±3.27	12.77±1.88	12.52±1.93	t=27.35 P=0.000**	t=27.47 P=0.000**	t=1.028 P=0.305
Massage of uterus	0.46±0.66	1.82±0.38	1.74±0.44	t=21.11 P=0.000**	t=18.62 P=0.000**	t=1.682 P=0.094
Oxytocic Drugs	2.00±0.00	2.00±0.00	2.00±0.00	t=0.000 P=1.000	t=0.000 P=1.000	t=0.000 P=1.000
Tranexamic Acid	0.48±0.69	1.66±0.64	1.59±0.64	t=14.68 P=0.000**	t=14.09 P=0.000**	t=0.879 P=0.380
IV Fluids	1.63±0.72	1.98±0.17	1.96±0.19	t=5.374 P=0.000**	t=4.761 P=0.000**	t=1.009 P=0.314
Examination and Escalation	16.36±7.43	34.37±6.08	33.49±6.68	t=26.33 P=0.000**	t=23.83 P=0.000**	t=1.072 P=0.285
Total practices score	**26.00±11.5**	**54.62±8.50**	**53.30±9.40**	t=28.51 P=0.000**	t=26.94 P=0.000**	t=1.164 P=0.246

t: Paired t test.   *P= p-value.*   *No significant at p >0.05.*   ***Highly significant at p ‹ 0.01.*
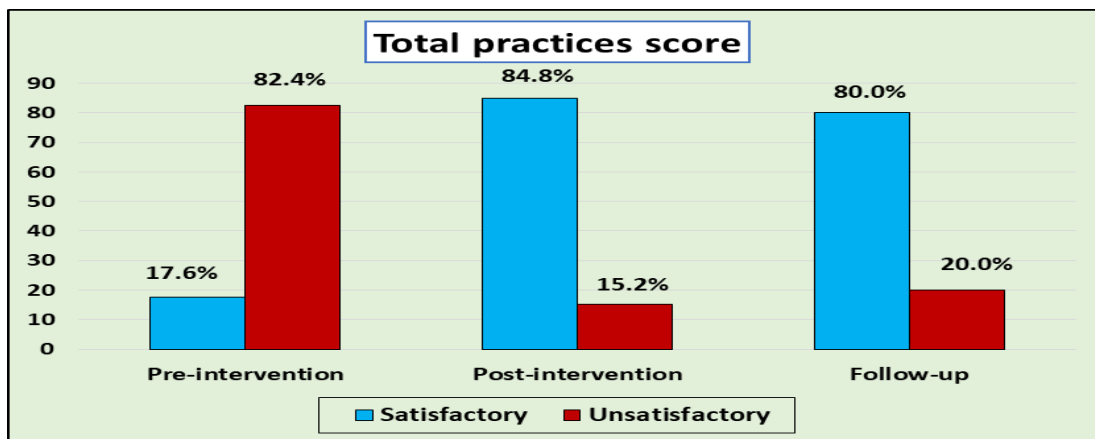

Figure (4): Percentage distribution of total nurses' practices regarding primary postpartum hemorrhage throughout the study phases (n=125)
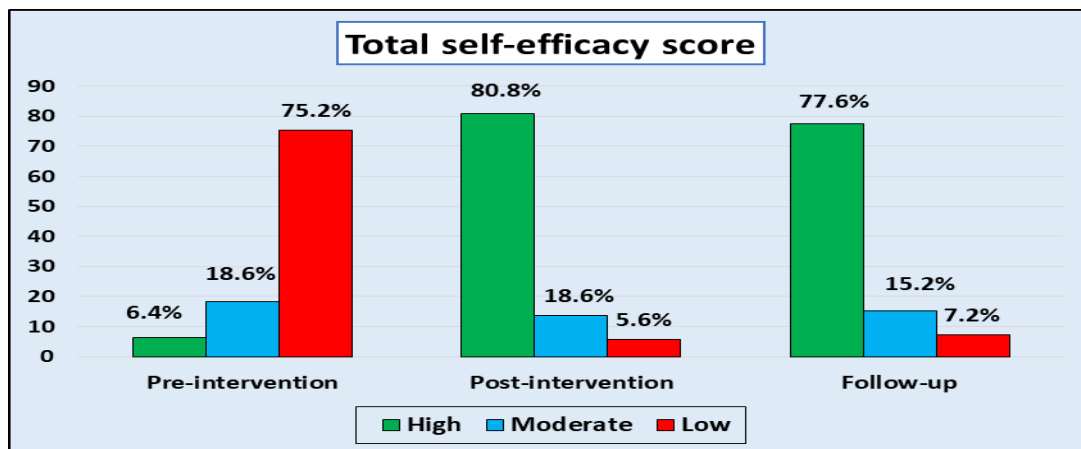

Figure (5): Percentage distribution of total nurses' self-efficacy regarding primary postpartum hemorrhage throughout the study phases (n=125)

Table (4): Relation between nurses' demographic characteristics and their total knowledge score regarding primary postpartum hemorrhage throughout the study phases (n=125)

Demographic characteristics		Total knowledge score at pre - intervention	P-Value	Total knowledge score at post -intervention	P-Value	Total knowledge score at follow - up	P-Value
Age (Years)	20-<25	41.95±7.80	F=0.400 P=0.753	73.53±11.6	F=0.331 P=0.803	72.19±11.7	F=0.694 P=0.557
	25-<30	40.67± 6.17		75.1± 9.31		73.85± 8.89	
	30-<35	40.00± 5.51		74.75± 11.1		72.13± 12.8	
	≥35	41.50± 7.4		72.72± 11.6		69.6± 13.8	
Professional qualification	Nursing school diploma	38.7±3.63	F=15.21 P=.000**	71.45±13.0	F=5.290 P=.006**	68.03±14.8	F=7.099 P=.001**
	Technical institute	39.8±4.97		72.52±11.0		71.20±11.0	
	Bachelor of nursing	46.1±9.57		78.80±5.30		77.66±4.74	
Job position	Staff nurse	39.18±4.45	t=5.950 P=.000**	72.09±11.94	t=3.145 P=.000**	70.0±12.90	t=3.147 P=.000**
	Head nurse	46.51±9.28		78.69±5.25		77.11±5.49	
Years of experience	< 5 years	38.6±3.51	F=33.34 P=.000**	73.71±11.5	F=0.277 P=0.759	72.29±11.3	F=0.254 P=0.776
	5 -10 years	42.1±6.19		73.65±10.7		71.00±12.9	
	> 10 years	52.4±11.3		76.08±7.92		73.38±10.9	
Attending previous program about PPhge	Yes	49.90±8.29	t=11.86 P=.000**	78.47±5.45	t=2.802 P=.006**	77.00±5.68	t=2.876 P=.005**

t: Independent-samples t-test.   *F= One Way ANOVA Test.*
No significant at p > 0.05.   ***highly significant at p ‹ 0.01.*

Table (5): Relation between nurses' demographic characteristics and their total practices score regarding primary postpartum hemorrhage throughout the study phases (n=125)

Demographic characteristics		Total practices score at pre - intervention	P-Value	Total practices score at post -intervention	P-Value	Total practices score at follow - up	P-Value
Age (Years)	20-<25	26.69±11.0	F=0.248 P=0.862	54.7±8.81	F=0.185 P=0.906	54.16±9.27	F=0.487 P=0.692
	25-<30	24.55±10.3		55.2±7.54		53.20±9.46	
	30-<35	26.68±13.5		54.7±8.33		54.37±8.26	
	≥35	26.28±12.7		53.7±9.41		51.71±10.2	
Professional qualification	Nursing school diploma	21.50±8.35	F=13.11 P=.000**	52.92±10.2	F=3.346 P=0.038*	51.17±10.4	F=3.979 P=0.021*
	Technical institute	24.34±10.5		53.86±9.56		52.48±10.4	
	Bachelor of nursing	33.54±12.7		57.65±1.78		56.91±4.27	
Job position	Staff nurse	22.70±9.29	t=5.749 P=.000**	53.44±9.72	t=2.540 P=0.012*	52.15±10.3	t=2.24 P=0.028*
	Head nurse	34.51±12.5		57.65±1.83		56.25±5.66	
Years of experience	< 5 years	21.81±6.38	F=18.83 P=.000**	54.44±9.01	F=0.232 P=0.794	53.65±9.52	F=0.208 P=0.812
	5 -10 years	29.30±14.30		54.45±8.38		53.15±9.30	
	> 10 years	39.07±12.31		56.15±5.97		51.84±9.59	
Attending previous program about PPhge	Yes	40.15±11.8	t=11.50 P=.000**	58.09±1.69	t=2.745 P=.007**	56.56±5.96	t=2.312 P=0.022*
	No	21.1±6.30		53.43±9.53		52.18±10.1	

t: Independent-samples t-test.   *F= One Way ANOVA Test.*
No significant at p > 0.05.   **Significant at p ‹ 0.05.*   ***highly significant at p ‹ 0.01.*

Table (6): Correlation between total knowledge, total practices and total self-efficacy among the studied nurses throughout the study phases (n=125)

Variables		Total knowledge score			Total practices score		
		Pre-intervention	Post-intervention	Follow-up	Pre-intervention	Post-intervention	Follow-up
Total practices score	r	0.795	0.758	0.743			
	p	0.000**	0.000**	0.000**			
Total self-efficacy score	r	0.608	0.846	0.831	0.455	0.811	0.774
	p	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**

*r= coefficient correlation test.   p= p-value   **highly significant at p ‹ 0.01*

According to **table (1),** the average mean age of the nurses was 28.17 ± 6.39 years. In terms of the nurses' education, 40.0% of them had graduated from a technical institute of nursing. Staff nurses made up 72.0%. More than half (57.6%) of them had fewer than five years of experience. About three quarters (74.4%) of them had not received any programs on PPhge.

The mean knowledge scores of nurses about primary postpartum hemorrhage varied statistically significantly across the intervention phases, as shown in **Table (2)** (P = 0.00). The results indicated that the pre intervention phase's overall mean knowledge score was 41.24±6.98, whereas the post intervention and follow-up phases' scores were 73.92±10.90 and 71.48±11.4, respectively.

As can be seen in **Figure (3),** 78.4% of nurses had poor knowledge in pre intervention. However, at the post intervention and follow-up, respectively, 76.0% and 71.2% of them possessed a good degree of knowledge.

Table (3): Reveals a statistically significant difference (P = 0.000) between the overall mean scores of nurses' practices for the pre and post intervention phases of a new primary postpartum hemorrhage care bundle (E-MOTIVE).

Figure (4): Displays that, 84.8% &80.0% of nurses' practices were rated as satisfactory related to primary postpartum hemorrhage at post intervention and follow up phases contrasted to 17.6% in pre intervention.

Figure (5): Shows that 75.2% of the studied nurses had low self-efficacy in pre-intervention. However, the vast majority of them (80.8% and 77.6% respectively) had high self-efficacy at post and follow up intervention phases.

Table (4): Shows that there was a highly statistically significant correlation between the pre-intervention total knowledge of nurses and their demographic parameters as professional qualification, job position, years of experience and attending previous program received about PPhge (P < 0.01). However, at (P > 0.05), there is no statistically significant relationship with their age. In addition, the results reveal that, there was highly statistically significant relation

between total nurses' knowledge at post-intervention and their professional qualification, job position and attending previous program received about PPhge (P < 0.01). However, no statistically significant relationship was found between their years of experience and age (P > 0.05). Additionally, the findings show that there was a highly statistically significant relationship between the overall knowledge of nurses at follow-up and their jop position, professional qualification, and attending previous program received about PPhge (P < 0.01).

According to **table (5),** there was a very significant statistical relationship between the pre-intervention total practices of nurses and their demographic attributes, such as years of experience, job position, professional qualification, and attending previous program received about PPhge at (P < 0.01). However, at (P > 0.05), there is no statistically significant correlation with their age. Furthermore, the findings indicate a highly significant statistical correlation between the total practices of nurses at the post-intervention and their attending previous program received about PPhge at (P < 0.01). Additionally, a statistically significant correlation was found between their professional qualification and job position (P < 0.05). Additionally, the findings show a significant correlation between the total nurses' practices at follow-up and their job position, professional qualification, and attending previous program received about PPhge (P < 0.05). On the other hand, there is no statistically significant correlation between their years of experience and age (P>0.05).

Table (6): Demonstrates the strong statistically significant positive correlation found between the total knowledge of nurses and their overall practices at the pre-, post-, and follow-up at (r= 0.795, 0.758 and 0.743, respectively). Additionally, there was a strong statistically significant positive correlation at pre-, post-, and follow-up between the total knowledge of nurses and their overall self-efficacy at (r= 0.608, 0.846 and 0.831, respectively). Furthermore, there was a strong statistically significant positive correlation at pre-, post-, and follow-up between the total practices of nurses and

their overall self-efficacy at (r= 0.455, 0.811 and 0.774, respectively).

Discussion

Most maternal fatalities may have been avoided if woman had gotten the proper medical care during their pregnancy and labor. Early diagnosis which takes into account risk factors is crucial for proper treatment **(Zenebe et al., 2023).** It is critical to act both quickly and gradually in PPhge cases. Frequent late diagnosis of PPH is a barrier to effective management; but, making the right decisions to identify the illness and take appropriate action is even more important **(Alonso-Burgos et al., 2024).** Therefore, this study conducted to evaluate the effect of a new care bundle on enhancing nurses' Knowledge, practice and self-efficacy regarding primary postpartum haemorrhage.

The results of the current study show that the average age of the nurses was 28.17 ± 6.39 years. In terms of the nurses' educational background, almost one-third of them were graduates of the Technical Institute of Nursing. Approximately two thirds of them were registered nurses. Over half of them have worked for more than five years based on years of experience. Approximately three quarters of them had not received any programs for PPhge, based on prior programs regarding PPhge. This aligns with the findings of **Metwally et al., (2021)** study, which reported that the study's sample of nurses was 27.86±5.16 years old on average. Among them, staff nurses made up more than two thirds. In their Egyptian study, most of them lacked main PPH preventive training programs as well. According to **Abd-Elgany et al., (2019),** the mean age of Egyptian nurses was found to be 29.45±9.67. Of these, staff nurses made up more than two thirds. Furthermore, three quarters of them lacked primary PPH preventive training.

The results of the current study of maternity nurses' general knowledge of primary PPH revealed that the majority of them lacked sufficient knowledge in the preprogram stage. Nonetheless, most of them were well-versed in the post- and follow-up program stages. The current study's findings match with those of **Mahmoud et al., (2024)** who demonstrated a statistically significant increase in the knowledge of the study group at the program's post-tests.

Furthermore, the current study's findings aligned with those of the **Musabwasoni et al., (2020)** study, subsequently proved that proved that participants' knowledge increased after post-educational mentorship. The current study's improvement in knowledge post-intervention may be attributed to the maternity nurses' ease of learning and their desire to update and refresh their understanding of PPH. It may

also be because nurses were given a written booklet to use as a continuing reference, which aided in their knowledge acquisition.

In addition, **Khalf et al., (2020)** found a highly significant improvement in overall knowledge and practical abilities when contrasted pretest with the immediate and eight-week post intervention groups. Furthermore, the majority of the sample under investigation expressed satisfaction with the new knowledge provided in the sessions in their Egyptian research.

The current study also demonstrated that, in comparison to preintervention, nurses' practices scores improved in regards to prevention of primary PPH following the introduction of the new Primary Postpartum Haemorrhage Care Bundle (E-MOTIVE) intervention. This proved that nurses' performance evaluations on primary PPH prevention and management improved as a result of the E-MOTIVE care bundle. It is in line with a research conducted at Mansoura University Hospitals in the Dakahlia Governorate, Egypt by **Mahmoud et al., (2024)** and demonstrated that following PPH education session, there were significant statistical differences in the ways that maternity The actions of nurses related to PPH prevention had improved. Similar to this, **Metwally et al., (2021)** found that the nurses' performance in relation to preparation tasks, massage of the uterus, examination of the placenta and prompt postpartum treatment changed significantly after the intervention. Compared to before intervention, nearly half of them had competent practice to prevent primary postpartum haemorrhage throughout labor and the first postpartum period. Additionally, in accordance with **Dawood et al., (2021)** results, which showed that the examined sample's overall practical skills had significantly improved between the pre- and post-intervention periods.

Additionally, **Abd El-hamid et al., (2021)** found that, in their study at Tanta University, there was a highly significant difference between the study group and the control group in the mean total score of students' performance immediately and one month after the implementation of training program. In addition to helping to reduce maternal morbidity and mortality in line with Egypt's Vision 2030, the agreement between the results of this study and those of other studies may be concerning given the positive and effective educational sessions that empower and enhance maternity nurses' knowledge as a basis for upgrading their knowledge which can be reflected later on their performance.

With regard to the overall self-efficacy score of nurses in this study, over two thirds of the nurses under study had low self-efficacy perceptions before to the new bundle care implementation. Nonetheless,

following the implementation of bundle care, the majority of them had great confidence in their own effectiveness. This result is in line with a research by **Demirel et al., (2020)** which was carried out at a Turkish state university's midwifery department. There was a notable distinction between the study subjects' pre- and post-program self-efficacy scores, with the students showing higher levels of self-efficacy following the program.

Results of the present study also showed that, there were statistically significant relations between nurses' level of knowledge about primary PPH prevention and their experience years and previous training courses about primary PPH post intervention. This is consistent with a research by **Abd-Elgany et al., (2019),** which discovered a substantial correlation between years of experience and knowledge level. The degree of knowledge regarding primary PPH prevention rises with increasing years of professional qualification and experience, and vice versa.

The current study discovered a highly important statistically favorable correlation between the nurses' overall practices during the pre, post, and follow-up phases and their overall knowledge. Additionally, there was a statistically significant positive correlation between nurses' overall self-efficacy and their total knowledge in the pre, post, and follow-up stages. Furthermore, there was a substantial positive statistically significant correlation between all of the nurses' practices and their general self-efficacy at pre, post, and follow-up. This finding was corroborated by **Abd-Elaziz et al., (2024)** study, which showed a positive and substantial correlation between maternity nurses' overall knowledge level and their adherence to protocol in the early postpartum period. The present conclusion corroborates the research done by **Zagloul et al., (2022),** which shown a strong positive link between the knowledge levels of internship students and their overall practice level.

Further research by **Abd El-hamid et al., (2021)** revealed a significant positive correlation between the study group's total self-efficacy score and its total knowledge score regarding the prevention and management of PPH as well as between the study group's students' total self-confidence score and their total knowledge score immediately following the training program's implementation. This is also in agreement with results of the **Metwally et al., (2021)** study, which showed a favorable association between the performance, attitude, and knowledge scores of nurses.

Conclusion:
The new care bundle (E-MOTIVE) intervention significantly enhanced the knowledge, practice, and self-efficacy of maternity nurses about primary PPH when compared to pre-intervention.

Recommendations:
- Suggest new care bundle as a nurse intervention strategy for primary PPH.
- Advice bundle care to be an essential component of the overall treatment of early PPH.
- Applied more research about anew PPhge care bundle with a longer time frame and a focus on more hospitals in other areas.

References
- **Abd El-hamid, S.M., Ahmed, M.H. , Abo-zaid, E.H., & El-adham, A.F. (2021):** Effect of High Fidelity Simulation Based Training Program on Nursing Students' Performance, Self-efficacy and Confidence regarding Prevention of Postpartum Hemorrhage. Tanta Scientific Nursing Journal; 23(4): 233-267.
- **Abd El-Malek, A.S., Taha, R.R., Abd El-Azeem, A.G., & Mahmoud, S.M. (2019):** Factors associated with postpartum hemorrhage maternal morbidity and mortality in Minia city hospitals a cross-sectional epidemiological survey. MJMR; 30(1) : 114-118.
- **Abd-Elaziz, E.A., Abd-Ella, N.Y., & El-Nemer, A.M.R. (2024):** Nurses' Compliance with Standardized Protocol for Reduction of Postpartum Hemorrhage. Mansoura Nursing Journal (MNJ); 11(1):1-13.
- **Abd-Elgany, L.K., Zahran, K.M., & Ahmed, N.A. (2019):** Assessment of Nurses Knowledge about Preventive and Therapeutic Measures of Postpartum Hemorrhage. Assiut Scientific Nursing Journal; 7 (18): 22-31.
- **Al-dardery, N.M., Abdelwahab, O.A., & Abouzid, M. (2023):** Efficacy and safety of tranexamic acid in prevention of postpartum hemorrhage: a systematic review and meta-analysis of 18,649 patients. BMC Pregnancy Childbirth; 23(817):2-16.
- **Alonso-Burgos, A., Díaz-Lorenzo, I., & Muñoz-Saá, L., (2024):** Primary and secondary postpartum haemorrhage: a review for a rationale endovascular approach. CVIR Endovasc; 13;7(1):17.
- **Althabe, F., Therrien, M.N.S., & Pingray, V., (2020):** Postpartum hemorrhage care bundles to improve adherence to guidelines: A WHO technical consultation. Int J Gynaecol Obstet ; 148(3):290-299. doi: 10.1002/ijgo.13028.
- **Amatullah, A. F. (2018):** Using interprofessional simulation-based training to improve management of obstetric emergencies: A systematic review. Clinical Simulation in Nursing; 14, 45-53. https://doi.org/10.1016/j.ecns.2017.10.014.

- **Avsar, P., Patton, D., & Sayeh, A., (2022):** The Impact of Care Bundles on the Incidence of Surgical Site Infections: A Systematic Review. Adv Skin Wound Care; 35(7): 386-393. doi: 10.1097/01.ASW.0000831080.51977.0b. PMID: 35723958.

- **Bohren, M.A., Lorencatto, F., & Coomarasamy, A. (2021):** Formative research to design an implementation strategy for a postpartum hemorrhage initial response treatment bundle (E-MOTIVE): study protocol. Reproductive Health; 18(149):1-16.

- **Corbetta-Rastelli, C.M., Friedman, A.M., & Sobhani, N.C., (2023):** Postpartum hemorrhage trends and outcomes in the United States, 2000-2019. Obstet Gynecol; 141(1):152-161. doi:10.1097/AOG.0000000000004972.

- **Da Rocha Gaspar, M.D., Antunes Rinaldi, E.C., Guetter Mello, R., et al. (2023):** Impact of evidence-based bundles on ventilator-associated pneumonia prevention: A systematic review. J Infect DevCtries. 28; 17(2):194-201. doi: 10.3855/jidc.12202. PMID: 36897895.

- **Dawood, A. M., Abou Shabana, K.R., Soliman, S.M., & El Sharkawy, A.T. (2021):** Effect of Brochure Concerning to Early Postpartum Hemorrhage on Enhancing Nurses' Knowledge and Practices. Medico Legal Update; 21(2):151-156. https://doi.org/10.37506/mlu.v21i2.2662.

- **Demirel, G., Evcili, F., Kaya, N., & Doganer A. (2020):** The effect of episiotomy repair simulation on the anxiety and self-efficacy levels of midwifery students. Journal of Midwifery and Reproductive Health; 8(1): 2050-7.

- **Forbes, G., Akter, S., & Miller, S. (2023):** Factors influencing postpartum haemorrhage detection and management and the implementation of a new postpartum haemorrhage care bundle (E-MOTIVE) in Kenya, Nigeria, and South Africa. Implementation Science; 18 :(1):1-23. https://doi.org/10.1186/s13012-022-01253-0.

- **Gallos, I., Devall, A., Martin, J., et al. (2023):** Randomized Trial of Early Detection and Treatment of Postpartum Hemorrhage. N Engl J Med; 6; 389(1):11-21. doi: 10.1056/NEJMoa2303966. Epub 2023 May 9. PMID: 37158447.

- **Khalf, D.M., Mohmed, H.A., & Abdelwahab, A.H.(2020) :** Early Identification of Risk Factors for Primary Postpartum Hemorrhage at Admission. Minia Scientific Nursing Journal; 8: (1):90-95.

- **Mahmoud, S.M., Hassan, S., & Abd-Ella, N.Y. (2024):** Effect of Educational Sessions about Prevention of Postpartum Hemorrhage on Maternity Nurses' Skills, Mansoura Nursing Journal (MNJ); 11(1):429- 437.

- **Metwally, H.M.S., Desoky, M.M.A., & Shahin, M.A. (2021):** Developing Competences for Maternity Nurses during Labor and Immediate Postpartum Period Regarding Prevention of Postpartum Hemorrhage. Egyptian Journal of Health Care; 12(4): 618-634.

- **Mjema, R.N., Kikula, A.I., & August, F., (2023):** Postpartum Hemorrhage: Incidence, Causes and Maternal Outcomes at Muhimbili National Hospital, Tanzania—A Retrospective Descriptive Hospital-Based Study. Open Journal of Obstetrics and Gynecology; 13(7): 1244-1258.

- **Musabwasoni, M.G.S., Nzayirambaho, M., Babenko-Mould, Y., & Ngabonzima, A. (2020):** Assessing the impact of mentorship on nurses' and midwives' knowledge and self-efficacy in managing postpartum hemorrhage. ElectronicThesis and Dissertation Repository. 6488. International Journal of Nursing Education Scholarship; 17(1):1-89.

- **Negesa Beyene, B., Jara Boneya, D., Gelchu & Adola, S., (2024):** Factors associated with postpartum hemorrhage in selected Southern Oromia hospitals, Ethiopia, 2021: an unmatched casecontrol study. Frontiers in Global Women's Health; 14(5):1-7.

- **Sayed, S.M., Bakry, A.M., &Ashraf Samir Faheem, A.S. (2023):** The Relation between serum calcium levels and Atonic Postpartum Hemorrhage. Egyptian Journal of Medical Research (EJMR);4(4):50-62.

- **Seim, A.R., Alassoum, Z., & Souley, I., (2023):** The effects of a peripartum strategy to prevent and treat primary postpartum haemorrhage at health facilities in Niger: a longitudinal, 72-month study. Lancet Glob Health; 11(2):287-295. doi: 10.1016/S2214-109X(22)00518-6. PMID: 36669809.

- **Taha, A.A., Shady, N.W., & Sallam, H.F. (2023):** Carbetocin Versus Oxytocin And Ergometrine for Prevention of Postpartum Hemorrhage in Women With Twin Pregnancy Undergoing Elective Cesarean Delivery: A Randomized Controlled Trial. Evidence Based Women s Health Journal; 13(3):264-271.

- **Vogel, J.P., Nguyen, P.Y., & Ramson, J., (2024):** Effectiveness of care bundles for prevention and treatment of postpartum hemorrhage: a systematic review. Am J Obstet Gynecol; 231(1):67-91. doi: 10.1016/j.ajog.2024.01.012.

- **WHO (2023):** Announces the first meeting of the postpartum haemorrhage (PPH) bundle Guideline Development Subgroup. World Health Organization Available at: https://iris.who.int/bitstream/handle/10665/375231/9789240085398-eng.pdf?sequence=1. Accessed at 28 /3/2024.

- **Zagloul, M.G., Hassan, S.H., Sheha, E.A.A., & Hassan, H.E. (2022):** Postnatal Evidence Based Nursing Practice: Effect of an Educational Guideline on Internship Student's Knowledge and Skills. Egyptian Journal of Health Care, 13(2), 437-447.

- **Zenebe, G.A., Zenebe, W.A., Ewunie, T.M., & Dires, S. (2023):** Primary postpartum hemorrhage and associated factors among delivering women in Gedeo Zone, Southern Ethiopia. Front Med (Lausanne); 14(10): 1096501.