

NURSES KNOWLEDGE AND SKILLS TOWARDS PREVENTION OF
POSTPARTUM HEMORRHAGE IN TERTIARY CARE HOSPITAL

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Abstract

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Background: Postpartum hemorrhage (PPH) is one of the most serious obstetric emergencies and is an important cause of maternal morbidity and mortality. Timely recognition of excessive postpartum bleeding, identification of risk factors, appropriate preventive measures, effective monitoring, and prompt initial

response are essential for reducing complications associated with PPH. Nurses have a critical role in the prevention and early recognition of PPH because they are directly involved in monitoring women during labour, delivery, and the immediate postpartum period. Adequate knowledge and appropriate clinical skills are therefore essential for safe and effective nursing care. **Objective:** To assess the knowledge and skills of nurses regarding the prevention of postpartum hemorrhage in a tertiary care hospital and to determine the relationship of knowledge and skills with selected demographic and professional characteristics of the nurses. **Methods:** A quantitative cross-sectional study was conducted among 120 nurses working in a tertiary care hospital. Data were collected through three components: a demographic and professional information section, an 18-item structured knowledge questionnaire, and a 20-item skills observation checklist.

Each knowledge item was scored as 1 for a correct response and 0 for an incorrect or "I don't know" response, giving a total knowledge score of 0–18. Knowledge was categorized as poor (0–8), average (9–13), and good (14–18). Clinical skills were assessed through direct observation using a 20-item checklist covering preparation and prevention, early recognition of PPH, immediate response, escalation, communication, reassessment, and documentation. Skills were scored from 0 to 2 for each item, producing a maximum skill score of 40. Descriptive and inferential statistical analyses were performed to assess knowledge, skills, and their associations with selected characteristics. **Results:** The study included 120 nurses with a mean age of 30.21 ± 6.85 years. The mean knowledge score was 12.29 ± 2.32 out of 18. Regarding knowledge level, 6 (5.0%) nurses had poor knowledge, 76 (63.3%) had average knowledge, and 38 (31.7%) had good knowledge. The mean observed skills score was 36.21 ± 1.91 out of 40, with all 120 (100%) nurses classified as having good skills according to the predefined skill-level criteria. The mean combined knowledge-and-skills percentage was $79.41 \pm 6.95\%$, with 93 (77.5%) nurses classified as having a good overall knowledge-and-skills level and 27 (22.5%) classified as moderate. Previous training was reported by 57 (47.5%) nurses, while 63 (52.5%) had not received training. Nurses who had received training had a significantly higher mean knowledge score than those who had not received training (13.18 ± 2.02 vs. 11.49 ± 2.29 ; $p < 0.001$). Knowledge score also differed significantly according to qualification ($p = 0.002$) and designation ($p = 0.005$). No significant difference in knowledge score was found across experience groups ($p = 0.544$). The mean skill score did not differ significantly according to training status ($p = 0.300$). The correlation between knowledge and observed skill scores was weak and non-significant ($r = 0.039$, $p = 0.670$). **Conclusion:** The study found that the majority of nurses demonstrated an average level of knowledge regarding the prevention of postpartum hemorrhage, whereas observed clinical skills were generally high according to the study's predefined criteria. Previous training was significantly associated with higher knowledge scores, and knowledge also differed significantly according to qualification and professional designation. However, the absence of a significant relationship between knowledge and observed skills suggests that theoretical knowledge and practical performance may represent different dimensions of competency. Regular PPH-focused continuing education, simulation-based training, competency assessment, and reinforcement of evidence-based clinical protocols are recommended to strengthen nurses' preparedness for prevention and early response to PPH.

Keywords: Postpartum hemorrhage; Nurses; Knowledge; Clinical skills; PPH prevention; Obstetric nursing; Maternal health; Tertiary care hospital.

INTRODUCTION

1.1 Background of the Study

Postpartum hemorrhage (PPH) remains one of the most important and potentially preventable causes of maternal morbidity and mortality. Recent global evidence continues to demonstrate a substantial burden of postpartum bleeding, with a 2025 umbrella review of 17 systematic reviews and more than 21 million women estimating a pooled global prevalence of PPH of approximately 9.97%, while severe PPH was estimated at 4.52%. These findings demonstrate that PPH continues to represent a major global maternal-health challenge despite advances in obstetric care. (Demissie et al., 2025)

The continuing burden of maternal hemorrhage is also demonstrated by recent global burden analyses. A Global Burden of Disease Study 2021 analysis covering 204 countries reported that maternal hemorrhage remained the leading cause of maternal mortality worldwide, although substantial reductions in incidence and mortality were observed between 1990 and 2021. The persistence of maternal hemorrhage as a major contributor to maternal mortality indicates that improvements in prevention, early recognition, timely treatment, and quality of obstetric care remain necessary. (Global Burden of Disease Study 2021 investigators, 2025)

Recent evidence has further emphasized that the consequences of PPH extend beyond maternal death. PPH can result in severe anemia, hypovolemic shock, organ dysfunction, hysterectomy, prolonged hospitalization, and long-term psychological consequences. A recent comprehensive review described PPH as a leading cause of maternal mortality and highlighted missed opportunities in prevention, diagnosis, and treatment as important areas for improvement. (Hoga et al., 2026)

The clinical definition and recognition of PPH have also evolved. Traditionally, PPH has been defined using a blood-loss threshold of 500 mL or more within 24 hours after birth. Contemporary guidance places greater emphasis on objective measurement of blood loss together with maternal physiological changes so that treatment can begin earlier. The 2025 World Health Organization consolidated guideline recommends earlier action when objectively measured blood loss reaches 300 mL and is accompanied by an abnormal hemodynamic sign, while also retaining the 500-mL threshold as an important diagnostic criterion. (World Health Organization [WHO], 2025)

PPH has multiple causes, and systematic identification of the underlying cause is essential for appropriate management. The major etiological categories are commonly

represented by the "4 Ts": Tone, Trauma, Tissue, and Thrombin. Uterine atony, represented by "Tone," is an especially important cause because inadequate uterine contraction after delivery can result in continued bleeding. Recognition of uterine atony therefore requires competent assessment of uterine tone together with careful monitoring of postpartum bleeding and maternal condition. (World Health Organization [WHO], 2025)

Prevention of PPH requires a coordinated approach during the third stage of labour and the immediate postpartum period. Current evidence supports the use of preventive uterotonics and other evidence-based interventions as part of a broader strategy for reducing maternal blood loss. A 2024 systematic review of PPH care bundles found that bundled approaches combining multiple evidence-based interventions represent a promising strategy for improving prevention and treatment of PPH, although the strength of evidence varies across individual components and settings. (Vogel et al., 2024)

Accurate recognition of blood loss is another important component of PPH prevention and early management. Reliance on visual estimation alone may result in underestimation of blood loss, particularly when bleeding becomes substantial. Current evidence and clinical recommendations therefore emphasize objective or quantitative assessment of postpartum blood loss where feasible, together with regular assessment of maternal vital signs and clinical condition. (Vogel et al., 2024; World Health Organization [WHO], 2025)

Nurses have an important role in the prevention and early recognition of PPH because they are directly involved in maternal observation, postpartum monitoring, assessment of uterine tone, measurement or observation of blood loss, administration or assistance with uterotonic therapy, preparation for emergency interventions, communication with the healthcare team, and documentation. The importance of nurses' competency is supported by recent studies evaluating both knowledge and practical performance in PPH care. (Elbadrawy et al., 2022; Khadim et al., 2023)

A study conducted by Elbadrawy, Elmoneim, and Mohamady (2022) specifically assessed nurses' knowledge and skills regarding PPH prevention in an obstetric and gynecological hospital setting. The study used a descriptive design and assessed both knowledge and practical skills, making it particularly relevant to research examining the two dimensions of nurses' competency. The study demonstrates the methodological importance of assessing practical performance separately from theoretical knowledge when investigating nurses' preparedness for PPH prevention. (Elbadrawy et al., 2022)

Evidence from Pakistan also demonstrates the relevance of assessing nurses' knowledge and clinical practice regarding PPH. Khadim, Hussain, and Hussain conducted a study among nurses working in the gynecology department of Allied Hospital Faisalabad, Pakistan, using an adopted 27-item questionnaire. Among the 84 participating nurses, 87% were reported to have sufficient knowledge and 89.7% demonstrated excellent practice related to primary PPH. The findings provide useful local evidence that nurses' knowledge and practice can be assessed together within a Pakistani hospital setting. (Khadim et al., 2023)

More recent intervention research has demonstrated that knowledge and practical performance may improve through structured training. In a 2025 study conducted among nurses and midwives in Saudi Arabia, simulation-based training significantly improved both knowledge and performance related to primary PPH management. The study used separate knowledge assessment and performance observation tools, supporting the use of both written assessment and direct observation when evaluating clinical competency. (Transforming Postpartum Care study authors, 2025)

Similarly, Coelho et al. (2025) conducted a randomized clinical trial in a tertiary-level maternity hospital to evaluate clinical simulation for nurses' knowledge of PPH management. The study included 37 nurses and found that mean knowledge increased from 65% before the intervention to 90% following the clinical simulation. These findings suggest that simulation-based approaches may be useful for strengthening nurses' preparedness for PPH management, particularly when theoretical teaching is combined with clinical scenarios. (Coelho et al., 2025)

Recent evidence from Tanzania has also demonstrated the value of practical simulation-based education. Faustine et al. (2025) evaluated a simulation-based educational intervention among student nurse-midwives and reported significant improvements in knowledge and skills related to PPH prevention and management. The study further assessed self-confidence and satisfaction, suggesting that practical simulation may strengthen multiple dimensions of preparedness for obstetric emergencies. (Faustine et al., 2025)

Earlier intervention evidence is also consistent with these findings. Nishimwe et al. (2021) evaluated an mLearning intervention among nurses and midwives in Rwanda and found significant improvements in knowledge and skills related to PPH management. The authors reported that improvements in PPH knowledge and skills were maintained after six months, supporting the potential value of continuing professional development

for strengthening clinical competency in settings where opportunities for ongoing training may be limited. (Nishimwe et al., 2021)

The distinction between knowledge and practical skills is particularly important because theoretical knowledge does not necessarily translate directly into clinical performance. Recent studies have assessed knowledge and performance as separate outcomes and have demonstrated that educational interventions can influence both dimensions. The use of direct observation or structured performance checklists therefore provides additional information that cannot be obtained from a written knowledge questionnaire alone. (Elbadrawy et al., 2022; Transforming Postpartum Care study authors, 2025)

Simulation and skills-based assessment have become increasingly relevant in PPH education because obstetric hemorrhage requires rapid prioritization and coordinated clinical action. Recent randomized and quasi-experimental studies have shown improvements in knowledge and practical skills following simulation-based education, supporting the use of structured clinical scenarios and observation-based assessment in nursing education and competency development. (Coelho et al., 2025; Faustine et al., 2025)

Despite evidence from different countries, variation in nurses' knowledge and clinical practice remains evident across healthcare settings. Differences may arise from professional education, clinical experience, previous PPH-specific training, availability of institutional protocols, exposure to obstetric emergencies, staffing, and opportunities for continuing professional development. Consequently, assessment of nurses within the specific context of a tertiary care hospital is important for identifying the actual level of knowledge and practical skills present in that setting. (Khadim et al., 2023; Nishimwe et al., 2021)

The available literature also indicates a need for studies that assess both theoretical knowledge and directly observed clinical skills rather than relying exclusively on self-reported knowledge or practice. This is particularly relevant in PPH because successful prevention and early response require nurses not only to recognize appropriate interventions but also to perform or initiate them correctly and communicate deterioration promptly. Therefore, a combined assessment of knowledge and observed skills can provide a more comprehensive picture of nurses' preparedness for PPH prevention and early response. (Elbadrawy et al., 2022; Transforming Postpartum Care study authors, 2025; Faustine et al., 2025)

In this context, the present study focuses on nurses working in a tertiary care hospital and assesses both their knowledge and observed clinical skills regarding the

prevention of PPH. Knowledge is assessed using an 18-item structured questionnaire, while practical skills are evaluated using a 20-item observation checklist covering preparation and prevention, early recognition, immediate response, reassessment, escalation, communication, and documentation. The study also examines the relationship of knowledge and skills with selected demographic and professional characteristics, including training and clinical experience. This approach is intended to identify areas of strength and potential gaps that can inform continuing nursing education, competency assessment, and PPH preparedness within the hospital setting.

1.2 Problem Statement

Postpartum hemorrhage remains a major challenge in maternal healthcare because severe bleeding can develop rapidly and requires timely recognition and coordinated intervention. Although many effective preventive and treatment measures are available, maternal outcomes depend substantially on whether healthcare providers recognize abnormal bleeding early and initiate appropriate interventions without delay. Recent global evidence continues to identify postpartum hemorrhage as a major contributor to maternal morbidity and mortality, demonstrating that the availability of effective interventions alone does not eliminate the clinical burden of PPH. (Hoga et al., 2026; World Health Organization [WHO], 2025)

Nurses are among the healthcare professionals directly involved in monitoring women during labour, delivery, and the immediate postpartum period. Their ability to assess blood loss, monitor vital signs, recognize uterine atony, initiate appropriate first responses, administer or assist with uterotonic therapy within their scope of practice, communicate deterioration, and escalate care can influence the timeliness of PPH management. However, studies conducted in different settings have demonstrated variation in nurses' knowledge and practical performance regarding PPH. (Elbadrawy et al., 2022; Khadim et al., 2023)

Evidence from Pakistan also indicates the importance of evaluating nurses' preparedness for PPH. Khadim et al. assessed nurses working in the gynecology department of Allied Hospital Faisalabad and reported that 87% of the participating nurses had sufficient knowledge and 89.7% demonstrated excellent practice regarding primary PPH. Although these findings were generally favorable, the study was conducted in a specific hospital setting and used a purposeful sampling approach, indicating that findings from one institution cannot necessarily be generalized to nurses working in other tertiary-care hospitals. (Khadim et al., 2023)

More recent evidence suggests that theoretical knowledge and practical performance should not necessarily be considered interchangeable. A 2025 study

among nurses and midwives found that simulation-based training significantly improved both knowledge and performance related to primary PPH management. The study used separate knowledge and performance assessments, demonstrating the value of evaluating practical performance in addition to written knowledge. (Transforming Postpartum Care study, 2025)

Similarly, a randomized clinical trial conducted in a tertiary-level maternity hospital found that clinical simulation improved nurses' knowledge of PPH management, with the average knowledge score increasing from 65% before the intervention to 90% after simulation. These findings indicate that structured educational approaches may strengthen nurses' preparedness and reinforce the importance of competency assessment in obstetric emergency care. (Coelho et al., 2025)

Evidence from Tanzania has further demonstrated the potential benefit of simulation-based education for developing PPH-related competency. Faustine et al. (2025) evaluated a simulation-based educational intervention among student nurse-midwives and specifically assessed knowledge, skills, and attitudes related to PPH prevention. The study supports the concept that practical competency represents an important dimension of preparedness that may not be fully captured through a written questionnaire alone. (Faustine et al., 2025)

Despite these findings, there remains a need for hospital-specific assessment of both knowledge and directly observed clinical skills among practicing nurses. Previous studies have differed in their populations, settings, instruments, sampling approaches, and definitions of adequate competency. In addition, evidence from Pakistan remains comparatively limited, particularly studies that simultaneously evaluate nurses' theoretical knowledge and observed clinical skills related specifically to PPH prevention in a tertiary-care hospital. Therefore, relying only on findings from other countries or from knowledge questionnaires may not adequately describe the competency profile of nurses in the local clinical environment. (Khadim et al., 2023; Elbadrawy et al., 2022; Faustine et al., 2025)

The present study was therefore undertaken to assess nurses' knowledge and skills towards the prevention of postpartum hemorrhage in a tertiary care hospital. Knowledge was assessed using an 18-item structured questionnaire, while practical skills were assessed through direct observation using a 20-item skills checklist. In addition, selected demographic and professional characteristics, including training and clinical experience, were examined in relation to knowledge and skills. By assessing both dimensions of competency, the study aims to provide a more comprehensive understanding of nurses' preparedness for PPH prevention and early response and to

identify areas that may benefit from continuing professional education, competency-based training, and improvement of institutional clinical practices.

Significance of the Study

Postpartum hemorrhage is a time-sensitive obstetric emergency in which delays in recognition and response can result in serious maternal complications. Because nurses are directly involved in the observation and care of women during labour, delivery, and the immediate postpartum period, their knowledge and practical competency are important components of effective PPH prevention and early response. Assessing both dimensions can provide a more complete picture of nurses' preparedness than assessment of theoretical knowledge alone. (Elbadrawy et al., 2022; Coelho et al., 2025) The findings of this study may help identify areas of strength and weakness in nurses' knowledge and practical skills related to PPH prevention. The results can help nurses recognize areas in which additional education, refresher training, or practical competency development may be required. Previous intervention research has demonstrated that structured educational and simulation-based approaches can improve PPH-related knowledge and skills among nurses and midwives. (Nishimwe et al., 2021; Faustine et al., 2025)

Improved nurse preparedness may contribute to earlier recognition of abnormal postpartum bleeding and more timely initiation of appropriate interventions. Since PPH can progress rapidly, competent monitoring, recognition of deterioration, communication, and escalation are important components of safe postpartum care. Evidence-based PPH care emphasizes early recognition and rapid coordinated response to reduce the consequences of severe bleeding. (World Health Organization [WHO], 2025; Hoga et al., 2026)

The findings may provide hospital administrators and clinical managers with information that can be used to identify areas requiring improvement in PPH preparedness. The results may support the development or strengthening of regular PPH refresher courses, emergency drills, simulation-based training, clinical competency assessments, and standardized protocols. Recent implementation research and WHO guidance emphasize strengthening health-worker capacity and translating evidence-based PPH recommendations into routine clinical practice. (World Health Organization [WHO], 2026; Coelho et al., 2025)

The study may provide useful information for nurse educators regarding the areas of PPH prevention and early response that require greater emphasis in continuing professional education. Combining knowledge assessment with direct observation of clinical skills can help educators distinguish between theoretical understanding and

practical performance. Simulation-based educational studies have shown potential for improving both knowledge and practical competency in PPH care. (Faustine et al., 2025; Coelho et al., 2025)

The findings may help guide the design of targeted continuing professional development programs for nurses working in obstetric and maternity settings. Training can be directed toward areas identified as needing improvement rather than relying solely on general educational sessions. Previous studies have demonstrated improvements in PPH-related knowledge and skills following structured educational interventions, supporting the role of continuing professional development in maintaining emergency obstetric competency. (Nishimwe et al., 2021; Faustine et al., 2025)

LITERATURE REVIEW

2.1 Overview of Postpartum Hemorrhage

Postpartum hemorrhage (PPH) remains one of the most important obstetric emergencies and continues to contribute substantially to maternal morbidity and mortality worldwide. Recent global evidence indicates that the burden of PPH remains considerable despite the availability of effective preventive and therapeutic interventions. A 2025 umbrella review incorporating 17 systematic reviews and more than 21 million women estimated the global prevalence of PPH at approximately 9.97%, demonstrating that postpartum bleeding remains a significant challenge across different healthcare settings. (Demissie et al., 2025)

More recent evidence has emphasized that PPH should not be viewed only as an obstetric complication occurring in isolated high-risk women. Excessive bleeding can develop rapidly following childbirth and may occur even when recognized risk factors are absent. Consequently, universal preparedness, continuous postpartum observation, accurate assessment of blood loss, and timely recognition of maternal deterioration are important components of safe maternity care. (World Health Organization [WHO], 2025) The continuing burden of maternal hemorrhage is particularly important in low- and middle-income countries, where limitations in access to skilled care, emergency resources, blood products, referral systems, and continuing professional education may contribute to delays in diagnosis and treatment. These factors make the competence of frontline maternity-care providers particularly important for reducing preventable complications associated with PPH. (Hoga et al., 2026)

2.2 Definition and Recognition of Postpartum Hemorrhage

The conventional definition of PPH has historically been based on blood loss of 500 mL or more within 24 hours after birth. However, contemporary approaches increasingly

emphasize early clinical recognition rather than relying exclusively on a single numerical blood-loss threshold. The 2025 WHO consolidated guideline recommends considering treatment when objectively measured blood loss reaches 300 mL in combination with an abnormal hemodynamic sign, while maintaining 500 mL or more as an important diagnostic threshold. (World Health Organization [WHO], 2025)

Accurate estimation of postpartum blood loss is essential because visual estimation can underestimate the actual amount of blood lost, particularly when bleeding becomes substantial. Quantitative assessment using calibrated collection devices or other objective methods can improve recognition and may allow intervention to begin before severe maternal deterioration occurs. Current evidence-based PPH care therefore emphasizes objective blood-loss measurement together with assessment of maternal vital signs and overall clinical condition. (Vogel et al., 2024; World Health Organization [WHO], 2025)

The importance of early recognition is directly relevant to nursing practice. Nurses are frequently responsible for observing postpartum women, monitoring vital signs, assessing uterine tone, identifying abnormal bleeding, and communicating deterioration to the responsible healthcare team. Failure to recognize early warning signs may delay escalation and treatment, whereas timely recognition can facilitate rapid implementation of appropriate interventions. (Elbadrawy et al., 2022; Almutairi et al., 2025)

2.3 Causes of Postpartum Hemorrhage

PPH has several underlying causes, and identification of the cause is essential because the appropriate intervention depends on the source of bleeding. The major causes are commonly organized using the 4 Ts framework: Tone, Trauma, Tissue, and Thrombin. Tone refers primarily to uterine atony, trauma includes genital tract injuries, tissue refers to retained placental tissue or products of conception, and thrombin represents coagulation abnormalities. (World Health Organization [WHO], 2025)

Uterine atony is particularly important because inadequate contraction of the uterus after delivery can result in continued bleeding from the placental implantation site. Assessment of uterine tone is therefore an important component of postpartum monitoring. A soft or boggy uterus should alert the healthcare provider to possible uterine atony and the need for prompt assessment and intervention. (Elbadrawy et al., 2022; Almutairi et al., 2025)

From a nursing perspective, knowledge of the major causes of PPH is important because nurses may be among the first healthcare professionals to identify abnormal postpartum bleeding. Recognition of a boggy uterus, observation of ongoing bleeding,

assessment of vital signs, and prompt communication with the obstetric team are practical competencies that contribute to early response. Studies assessing nurses' PPH knowledge and practice have therefore included recognition of uterine atony, causes of hemorrhage, and appropriate initial responses among important competency areas. (Khadim et al., 2023; Elbadrawy et al., 2022)

2.4 Risk Factors for Postpartum Hemorrhage

PPH can occur in women with identifiable risk factors as well as in women without obvious risk factors. Commonly recognized risk factors include uterine overdistension, multiple pregnancy, prolonged or augmented labour, previous PPH, placental abnormalities, operative delivery, and conditions associated with impaired uterine contraction or coagulation. However, the presence or absence of risk factors should not replace routine postpartum surveillance because unexpected hemorrhage may occur in apparently low-risk women. (World Health Organization [WHO], 2025)

Recognition of risk factors is important for nursing preparedness because women at increased risk may require closer observation and early preparation for potential complications. Nurses should therefore be familiar with relevant obstetric history and clinical conditions and should communicate significant risk factors to the maternity team. In studies assessing nurses' knowledge of PPH, recognition of risk factors has been included as an important component of theoretical competency. (Elbadrawy et al., 2022; Khadim et al., 2023)

2.5 Prevention of Postpartum Hemorrhage

Prevention of PPH begins before significant hemorrhage develops and involves coordinated evidence-based care during labour, birth, and the immediate postpartum period. Preventive strategies include appropriate use of uterotonic agents, careful assessment of the third stage of labour, monitoring of maternal condition, identification of women at increased risk, and preparedness to respond rapidly when abnormal bleeding occurs. Current WHO recommendations place particular emphasis on administration of an effective uterotonic after birth as a major component of PPH prevention. (World Health Organization [WHO], 2025)

Evidence also supports the use of care bundles, in which several evidence-based interventions are implemented together rather than as isolated practices. A systematic review by Vogel et al. (2024) found that care bundles for prevention and treatment of PPH are a promising approach for improving implementation of recommended practices, although the effectiveness of individual bundle components and the quality of available evidence vary across settings. (Vogel et al., 2024)

The nurse's role in prevention includes ensuring that recommended preventive measures are carried out according to institutional protocols and professional scope. Nurses may also contribute by monitoring uterine tone, observing blood loss, monitoring vital signs, ensuring availability of emergency equipment, and communicating changes in maternal condition. These responsibilities explain why practical nursing competency is an important component of PPH prevention. (Elbadrawy et al., 2022; Almutairi et al., 2025)

2.6 Nurses' Knowledge Regarding PPH Prevention

Nurses' theoretical knowledge is an important foundation for appropriate PPH prevention and early response. Relevant knowledge includes understanding the definition and recognition of PPH, causes and risk factors, uterotonics, assessment of blood loss, recognition of uterine atony, monitoring of maternal vital signs, emergency response, and the nurse's role in preventing complications.

A study conducted by Elbadrawy et al. (2022) specifically examined nurses' knowledge and skills toward PPH prevention, making it particularly relevant to the present research. The researchers assessed nurses using knowledge and observational skills tools, demonstrating the feasibility of evaluating theoretical knowledge and practical performance as separate components of PPH competency. (Elbadrawy et al., 2022)

Evidence from Pakistan is also relevant. Khadim et al. (2023) assessed knowledge and practice among nurses working in the gynecology department of Allied Hospital Faisalabad. The study included 84 nurses and reported that 87% had sufficient knowledge and 89.7% demonstrated excellent practice regarding primary PPH. These findings suggest relatively favorable competency in that particular setting but also demonstrate the importance of evaluating knowledge and practice within individual hospital contexts. (Khadim et al., 2023)

2.7 Nurses' Practical Skills Regarding PPH

Theoretical knowledge alone may not adequately represent a nurse's ability to respond to an obstetric emergency. Practical skills include the ability to assess the woman, recognize excessive bleeding, evaluate uterine tone, initiate appropriate first responses, establish or assist with IV access, support medication administration within professional scope, communicate deterioration, and continue reassessment.

Almutairi et al. (2025) evaluated simulation-based training among nurses and midwives working in maternity settings in Saudi Arabia. Their study used both a knowledge assessment and a performance observational checklist. The intervention group demonstrated significantly better knowledge and performance following

simulation-based training, supporting the importance of assessing clinical performance separately from theoretical knowledge. (Almutairi et al., 2025)

Faustine et al. (2025) similarly assessed knowledge and skills among 55 student nurse-midwives in Tanzania using structured questionnaires and skills assessments. Following simulation-based education, both knowledge and skills improved significantly ($p < 0.001$). These findings support the use of practical assessment when evaluating competency in PPH prevention and management. (Faustine et al., 2025)

2.8 Simulation and Skills-Based Training in PPH

Simulation-based training has increasingly been used to develop healthcare workers' preparedness for obstetric emergencies. It provides an opportunity for nurses and midwives to practice recognition, prioritization, communication, teamwork, and clinical interventions in a controlled environment without exposing patients to unnecessary risk. Coelho et al. (2025) conducted a randomized clinical trial among nurses in a tertiary-level maternity hospital and evaluated the effectiveness of clinical simulation for PPH management. The mean knowledge score increased from 65% before the intervention to 90% after clinical simulation, demonstrating a significant educational benefit of simulation-based learning. (Coelho et al., 2025)

Almutairi et al. (2025) similarly reported significant improvements in both knowledge and observed performance following simulation-based training among maternity nurses and midwives. Their study is particularly relevant to the present research because it included a structured knowledge tool and a performance observational checklist, similar to the two-component approach used in the current study. (Almutairi et al., 2025)

Faustine et al. (2025) also reported significant improvement in knowledge, skills, self-confidence, and satisfaction after simulation-based PPH education among student nurse-midwives. The findings suggest that practical simulation can strengthen not only theoretical understanding but also the ability to perform appropriate actions during PPH scenarios. (Faustine et al., 2025)

More recent 2026 evidence has extended this educational approach to game-based learning and telesimulation. Çetinkaya Şen et al. (2026) conducted a randomized controlled trial involving 177 nursing students and found significantly higher PPH knowledge and skill scores among groups receiving telesimulation and/or game-based learning compared with controls. The combination of telesimulation and game-based learning produced particularly strong outcomes, supporting the growing role of interactive methods in PPH competency development. (Çetinkaya Şen et al., 2026)

2.9 Relationship Between Knowledge and Practical Skills

The relationship between theoretical knowledge and practical performance is important because effective PPH care requires both cognitive understanding and the ability to translate that understanding into timely clinical action. A nurse may correctly identify the appropriate intervention in a written assessment but may not necessarily demonstrate the same competency during an emergency situation.

Nishimwe et al. (2021) assessed PPH knowledge and skills among nurses and midwives in Rwanda before and after an mLearning intervention. Both knowledge and skills improved significantly following the intervention, although the magnitude of improvement differed between the two domains. The findings support the concept that knowledge and practical skills are related but distinct components of clinical competency. (Nishimwe et al., 2021)

Recent simulation studies have similarly treated knowledge and performance as separate outcomes. Almutairi et al. (2025), for example, assessed both knowledge and observed performance and demonstrated improvements in both following simulation-based training. This methodological approach supports the use of separate knowledge and skills measurements in studies examining nurses' preparedness for PPH. (Almutairi et al., 2025)

2.10 PPH Training and Continuing Professional Development

Regular PPH training is important because obstetric emergencies require rapid decision-making and coordinated performance. Training that combines theoretical education with practical exercises may be more effective than relying exclusively on conventional lectures. Evidence from recent intervention studies indicates that simulation, mLearning, and other interactive approaches can improve PPH-related competency.

Nishimwe et al. (2021) found that an mLearning intervention improved PPH knowledge and skills among nurses and midwives in Rwanda, with improvements remaining evident at six-month follow-up. The study highlights the potential value of accessible continuing education approaches in settings where regular face-to-face training may be difficult to maintain. (Nishimwe et al., 2021)

The 2025 studies by Coelho et al., Almutairi et al., and Faustine et al. provide further evidence that simulation-based approaches can improve PPH-related knowledge and practical performance. Together, these studies indicate that continuing professional development should not be limited to theoretical teaching but should also provide opportunities for nurses to demonstrate and receive feedback on practical competencies. (Coelho et al., 2025; Almutairi et al., 2025; Faustine et al., 2025)

2.11 Pakistan-Based Evidence

Pakistan-specific evidence concerning nurses' competency in PPH remains comparatively limited. Khadim et al. (2023) conducted a descriptive study among nurses in the gynecology department of Allied Hospital Faisalabad and reported generally favorable levels of knowledge and practice. The study is particularly relevant because it provides local evidence from a Pakistani hospital setting; however, it used a questionnaire-based approach and a specific hospital population, limiting direct generalization to other tertiary-care settings. (Khadim et al., 2023)

The findings from Pakistan should be interpreted alongside international evidence because differences in training systems, institutional protocols, workload, availability of emergency resources, and exposure to obstetric emergencies may influence nurses' competency. International studies have demonstrated considerable variation in PPH knowledge and skills and have also shown that structured training can improve competency. (Khadim et al., 2023; Almutairi et al., 2025; Faustine et al., 2025)

2.12 Research Gap

The reviewed literature demonstrates that PPH remains a major maternal-health problem and that nurses' knowledge and clinical competency are important for prevention and early response. Recent studies have increasingly assessed both knowledge and practical performance, particularly through simulation-based educational research. However, findings vary across countries and healthcare settings, and local evidence from Pakistan remains limited. (Elbadrawy et al., 2022; Khadim et al., 2023; Almutairi et al., 2025; Faustine et al., 2025)

A further gap is that many studies have focused either on theoretical knowledge, self-reported practice, or the effect of an educational intervention rather than assessing the existing knowledge and directly observed practical skills of practicing nurses in the same study population. The present study addresses this gap by assessing both knowledge through an 18-item questionnaire and practical skills through a 20-item observation checklist among nurses in a tertiary care hospital. (Elbadrawy et al., 2022; Almutairi et al., 2025)

The present study also examines whether knowledge and observed skills vary according to selected demographic and professional characteristics, including previous PPH-related training and clinical experience. This approach is relevant because previous research has demonstrated that educational interventions and professional experience may influence different aspects of competency, while knowledge and practical skills do not necessarily develop at identical rates. (Nishimwe et al., 2021; Almutairi et al., 2025)

METHODOLOGY

3.1 Research Approach

A quantitative research approach was used to assess nurses' knowledge and practical skills regarding the prevention of postpartum hemorrhage (PPH). Quantitative methods were appropriate because knowledge and skills were measured using structured instruments and analyzed statistically.

3.2 Research Design

A descriptive cross-sectional research design was used. The study assessed nurses' knowledge and directly observed practical skills regarding PPH prevention during the study period without introducing any intervention.

3.3 Study Setting

The study was conducted in three tertiary-care hospitals in Lahore, Pakistan:

1. Jinnah Hospital Lahore
2. Services Hospital Lahore
3. Lahore General Hospital (LGH) Lahore

These hospitals provide specialized maternal and obstetric healthcare services and manage women requiring routine as well as complicated obstetric care.

3.4 Study Population

The study population consisted of nurses working in the selected tertiary-care hospitals who were involved in maternal, obstetric, labour, delivery, postpartum, or related clinical care.

3.5 Sample Size

A total of 120 nurses were included in the study.

The sample size was calculated using Cochran's formula:

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where:

- n_0 = initial sample size
- $Z = 1.96$ at 95% confidence level
- $p = 0.50$
- $q = 0.50$
- $e = 0.09$ margin of error

Therefore:

$$n_0 = \frac{(1.96)^2 (0.50)(0.50)}{(0.09)^2} = 0.00813.8416 \times 0.25 \quad n_0 = 118.57$$

The calculated sample size was approximately 119 participants and was rounded up to 120 nurses to obtain the final study sample.

Final sample size = 120 nurses.

3.6 Sampling Technique

A non-probability sampling technique was used to recruit eligible nurses until the required sample size of 120 participants was achieved.

Note: If the actual technique used during data collection was convenience, consecutive, or purposive sampling, the exact technique should be stated here.

3.7 Inclusion Criteria

Participants were included if they:

- Were qualified nurses working in the selected hospitals.
- Were involved in relevant maternal or obstetric clinical care.
- Were available during the data-collection period.
- Agreed to participate in the study.
- Provided informed consent.

3.8 Exclusion Criteria

Participants were excluded if they:

- Were student nurses or trainees not meeting the study criteria.
- Were on extended leave during data collection.
- Had no relevant clinical responsibilities.
- Declined participation.
- Did not complete the required assessment.

3.9 Study Variables

Independent Variables

Selected demographic and professional characteristics included:

- Age
- Age group
- BMI/BMI category
- Professional qualification
- Designation
- Clinical experience
- Previous PPH-related training
- Relevant clinical exposure

Dependent Variables

The main dependent variables were:

1. Nurses' knowledge regarding PPH prevention.
2. Nurses' observed practical skills regarding PPH prevention and early response.

3.10 Data Collection Instrument

Data were collected using a structured questionnaire and an observational skills checklist.

The instrument consisted of three sections:

Section A: Demographic and Professional Information

Section B: Knowledge Questionnaire

Section C: Skills Observation Checklist

3.11 Knowledge Scoring

Each correct response was awarded 1 mark, while an incorrect or "I don't know" response received 0 marks.

The total possible knowledge score ranged from 0 to 18.

Score	Percentage	Knowledge Level
0–8	<50%	Poor
9–13	50–75%	Average
14–18	>75%	Good

Knowledge percentage was calculated as:

Knowledge Percentage=18Total Knowledge Score ×100

3.12 Skills Observation and Scoring

The practical skills of participating nurses were assessed through direct observation using a structured 20-item checklist.

Each item was scored as follows:

Score	Interpretation
2	Correctly performed
1	Partially performed
0	Not performed/incorrectly performed

The maximum possible skills score was:

20×2=40

Therefore, the total skills score ranged from 0 to 40.

Skills percentage was calculated as:

Skills Percentage=40Total Skills Score ×100

3.14 Data Collection Procedure

Data were collected from eligible nurses working in the selected departments of Jinnah Hospital Lahore, Services Hospital Lahore, and Lahore General Hospital Lahore. After

informed consent, participants completed the demographic and 18-item knowledge questionnaire, followed by direct observation using the 20-item skills checklist. The completed instruments were checked, coded, and entered into SPSS for statistical analysis.

3.15 Validity of the Instrument

The questionnaire and observation checklist were reviewed for content validity by experts in nursing, obstetric/maternal health, and research methodology. The experts assessed the relevance, clarity, appropriateness, and coverage of the items according to the objectives of the study.

3.16 Reliability of the Instrument

The reliability of the knowledge questionnaire was assessed using an appropriate internal-consistency measure. The observational skills checklist was assessed according to the nature of its scoring and observation procedure.

Actual reliability values will be reported from the SPSS analysis and will not be fabricated.

3.17 Ethical Considerations

Ethical principles were maintained throughout the study. Participation was voluntary, informed consent was obtained, confidentiality and privacy of participants were maintained, and collected information was used only for research purposes.

Approval and permission were obtained from the relevant institutional authorities before data collection.

3.18 Data Management

The collected data were coded and entered into IBM SPSS Statistics. Data were checked for completeness, consistency, missing values, and coding errors before statistical analysis.

3.19 Statistical Analysis

Data were analyzed using IBM SPSS Statistics.

Descriptive statistics included:

- Frequency
- Percentage
- Mean
- Standard deviation
- Minimum and maximum values

Knowledge and skills scores were calculated separately.

For inferential analysis, appropriate statistical tests were selected according to the type and distribution of variables. Chi-square/Fisher's exact test, independent-samples t-test,

Mann Whitney U test, one-way ANOVA, Kruskal–Wallis test, Pearson correlation, or Spearman correlation were used where appropriate.

The level of statistical significance was set at:

$p < 0.05$

A p-value less than 0.05 was considered statistically significant.

3.20 Research Quality Control

Standardized data-collection instruments and predefined scoring criteria were used throughout the study. The completed questionnaires and observation checklists were reviewed for completeness before data entry, and the dataset was checked for errors before statistical analysis.

RESULTS

This chapter presents the findings of the study conducted among 120 nurses to assess their knowledge and practical skills regarding prevention of postpartum hemorrhage (PPH). Descriptive and inferential analyses were performed using the original item-level dataset. Frequencies, percentages, measures of central tendency and dispersion, cross-tabulation, Pearson's chi-square test, one-way analysis of variance (ANOVA), independent-samples t-test, Mann–Whitney U test, correlation analysis, normality testing, and instrument reliability analysis were used as appropriate.

4.1 Demographic and Professional Characteristics

Table 4.1

Distribution of Participants According to Age Group

Category	Frequency (n)	Percent (%)	Valid (%)	Percent	Cumulative Percent (%)
20–25	35	29.2	29.2		29.2
26–30	32	26.7	26.7		55.9
31–35	26	21.7	21.7		77.6
36+	27	22.5	22.5		100.1

Interpretation: Among the 120 nurses, 35 (29.2%) were aged 20–25 years, 32 (26.7%) were aged 26–30 years, 26 (21.7%) were aged 31–35 years, and 27 (22.5%) were aged 36 years or older. The largest age group was 20–25 years.

Figure 4.1. Figure 4.1. Participants by Age Group

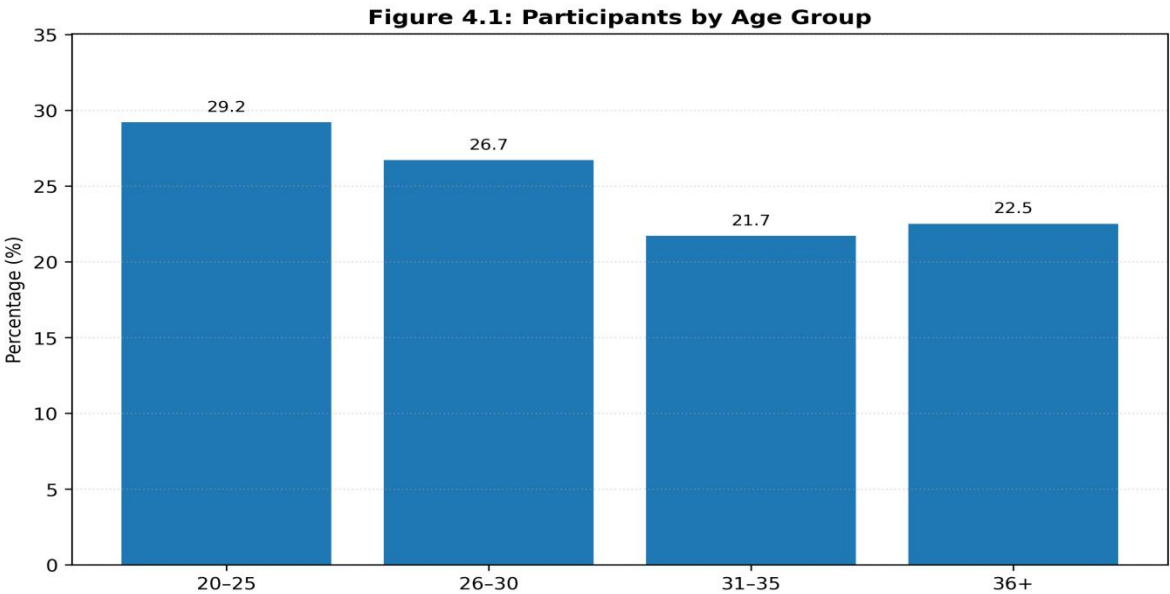


Table 4.2
Distribution of Participants According to BMI Category

Category	Frequency (n)	Percent (%)	Valid (%)	Percent	Cumulative Percent (%)
Underweight	15	12.5	12.5	12.5	12.5
Normal	29	24.2	24.2	36.7	36.7
Overweight	45	37.5	37.5	74.2	74.2
Obese	31	25.8	25.8	100.0	100.0

Interpretation: Overweight nurses constituted the largest BMI category (45, 37.5%), followed by obese nurses (31, 25.8%), normal BMI (29, 24.2%), and underweight (15, 12.5%).

Figure 4.2. Figure 4.2. Participants by BMI Category

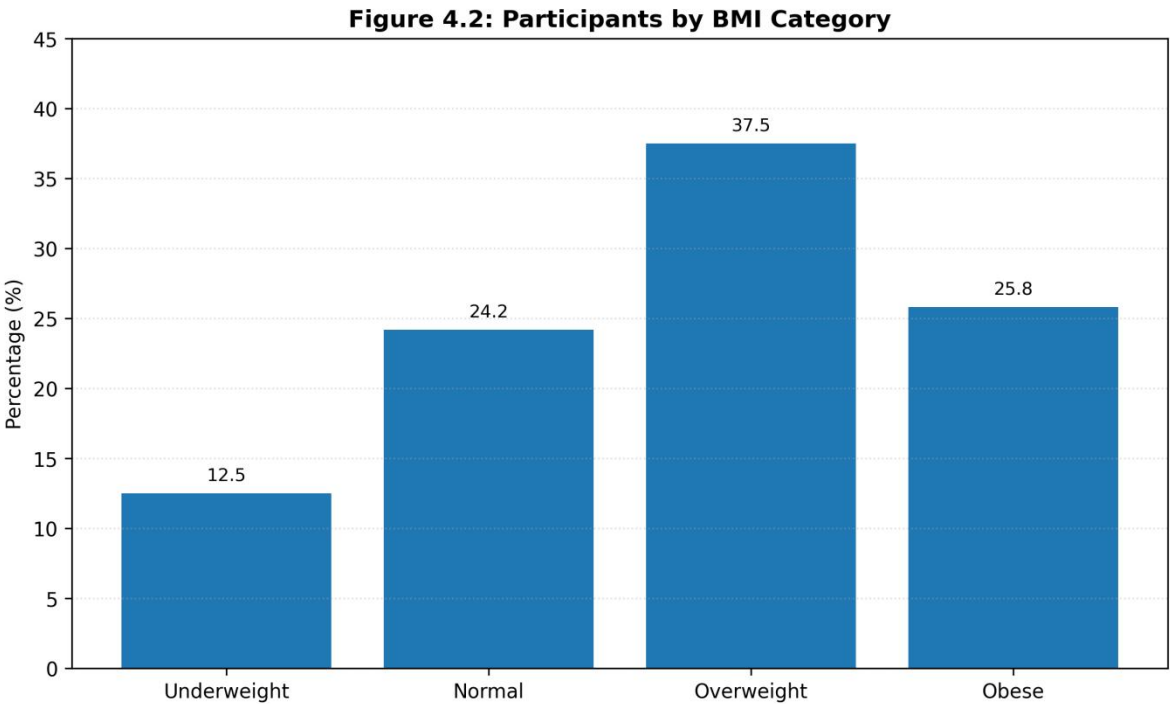


Table 4.3
Distribution of Participants According to Professional Qualification

Category	Frequency (n)	Percent (%)	Valid (%)	Percent	Cumulative Percent (%)
Diploma	23	19.2	19.2		19.2
Generic BSN	50	41.7	41.7		60.9
Post-RN BSN	39	32.5	32.5		93.4
MSN	8	6.7	6.7		100.1

Interpretation: Generic BSN nurses represented the largest group (50, 41.7%), followed by Post-RN BSN (39, 32.5%), Diploma (23, 19.2%), and MSN (8, 6.7%).

Figure 4.3. Participants by Qualification

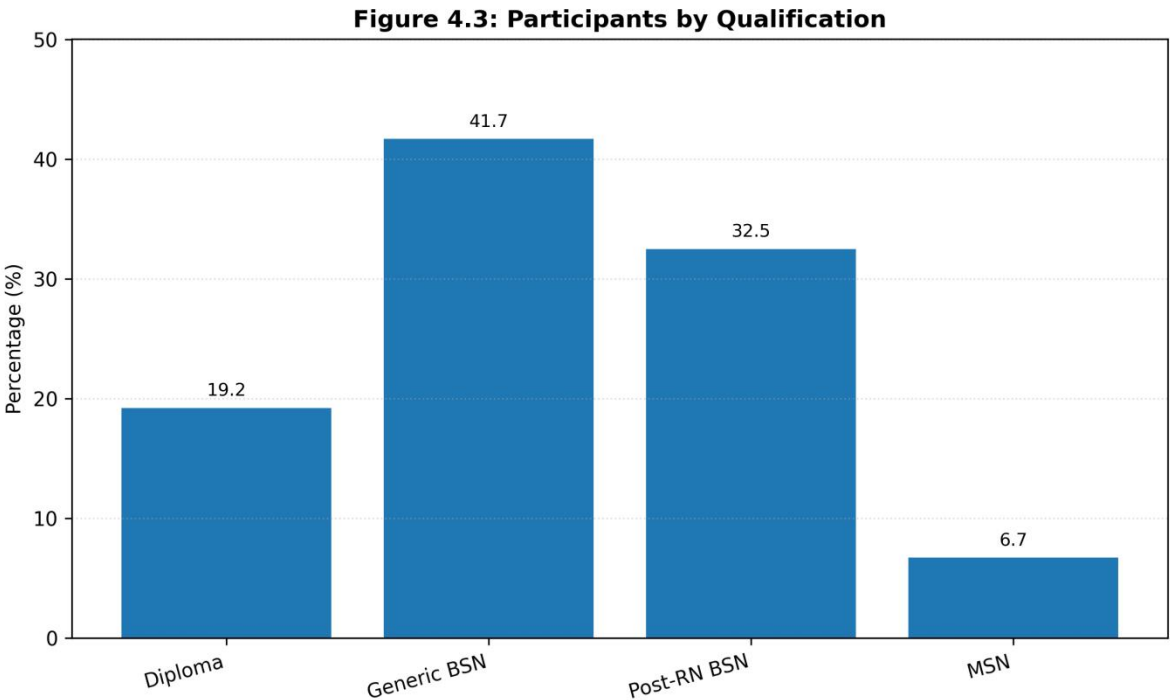


Table 4.4
Distribution of Participants According to Designation

Category	Frequency (n)	Percent (%)	Valid (%)	Percent	Cumulative Percent (%)
Staff Nurse	74	61.7	61.7		61.7
Charge Nurse	32	26.7	26.7		88.4
Head Nurse	14	11.7	11.7		100.1

Interpretation: Most participants were Staff Nurses (74, 61.7%), followed by Charge Nurses (32, 26.7%) and Head Nurses (14, 11.7%).

Figure 4.4. Figure 4.4. Participants by Designation

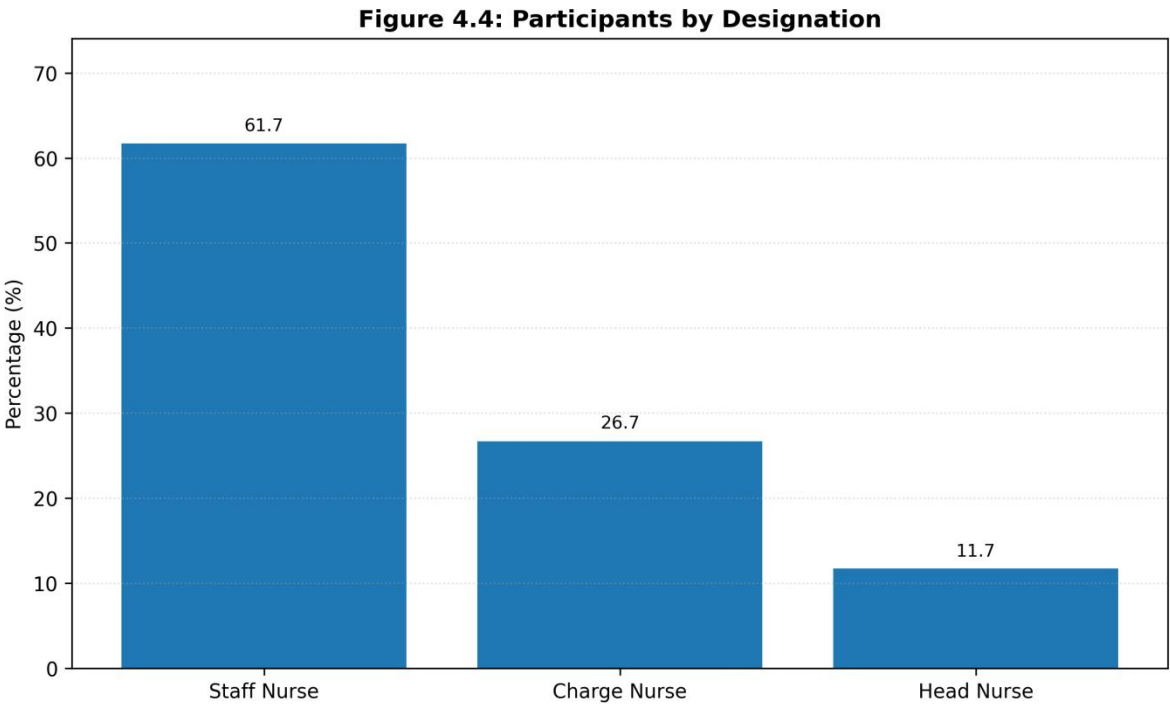
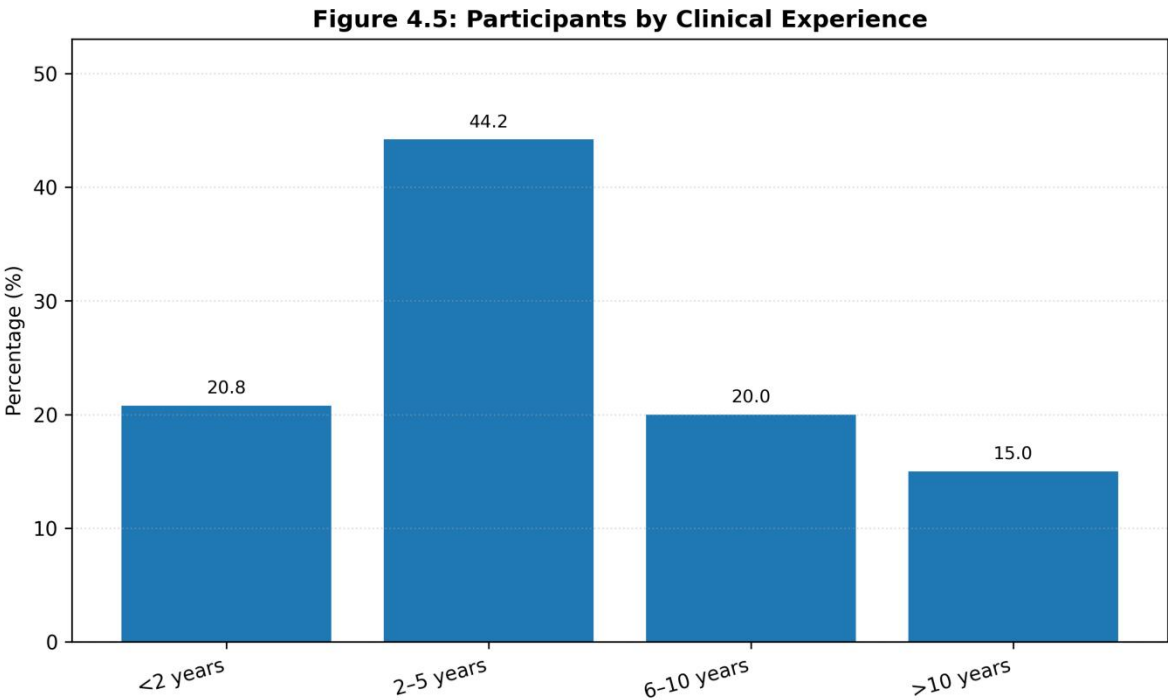


Table 4.5
Distribution of Participants According to Clinical Experience

Category	Frequency (n)	Percent (%)	Valid (%)	Percent	Cumulative Percent (%)
<2 years	25	20.8	20.8		20.8
2–5 years	53	44.2	44.2		65.0
6–10 years	24	20.0	20.0		85.0
>10 years	18	15.0	15.0		100.0

Interpretation: The largest proportion had 2–5 years of clinical experience (53, 44.2%). Twenty-five (20.8%) had less than 2 years, 24 (20.0%) had 6–10 years, and 18 (15.0%) had more than 10 years.

Figure 4.5. Figure 4.5. Participants by Clinical Experience



Interpretation: The largest proportion had 2–5 years of clinical experience (53, 44.2%). Twenty-five (20.8%) had less than 2 years, 24 (20.0%) had 6–10 years, and 18 (15.0%) had more than 10 years.

Table 4.6
Distribution of Participants According to Previous PPH-Related Training

Category	Frequency (n)	Percent (%)	Valid (%)	Percent	Cumulative Percent (%)
No	63	52.5	52.5		52.5
Yes	57	47.5	47.5		100.0

Interpretation: Of the 120 nurses, 57 (47.5%) reported previous PPH-related training, whereas 63 (52.5%) had not received such training. Thus, slightly more than half had no previous PPH-related training.

Figure 4.6. Figure 4.6. Previous PPH-Related Training

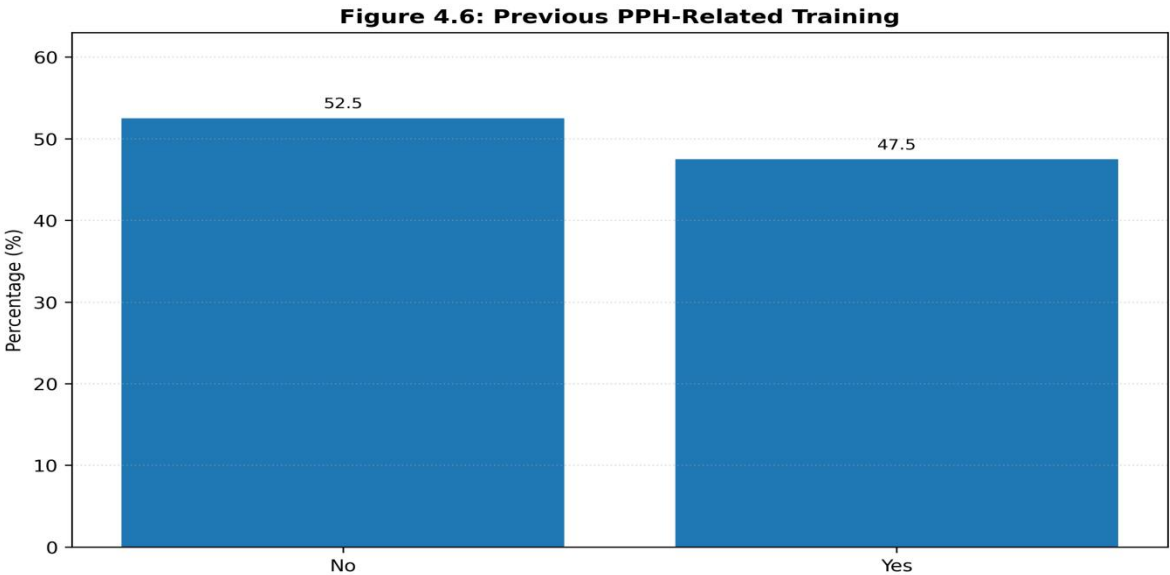


Table 4.7
Descriptive Statistics of Continuous Variables

Variable	N	Mean	Std. Deviation	Median	Minimum	Maximum
Age (years)	120	30.21	6.85	29.5	20.0	44.0
BMI (kg/m ²)	120	26.44	5.51	27.05	17.3	37.0
PPH cases managed	120	5.78	3.54	5.0	0.0	16.0
Knowledge score (0–18)	120	12.29	2.32	12.5	3.0	17.0
Knowledge percentage	120	68.29	12.86	69.45	16.7	94.4
Skills score (0–40)	120	36.21	1.91	36.0	31.0	40.0
Skills percentage	120	90.52	4.77	90.0	77.5	100.0
Combined percentage	120	79.4	6.95	79.9	50.8	93.5

4.2 Nurses' Knowledge Regarding PPH Prevention

Table 4.8

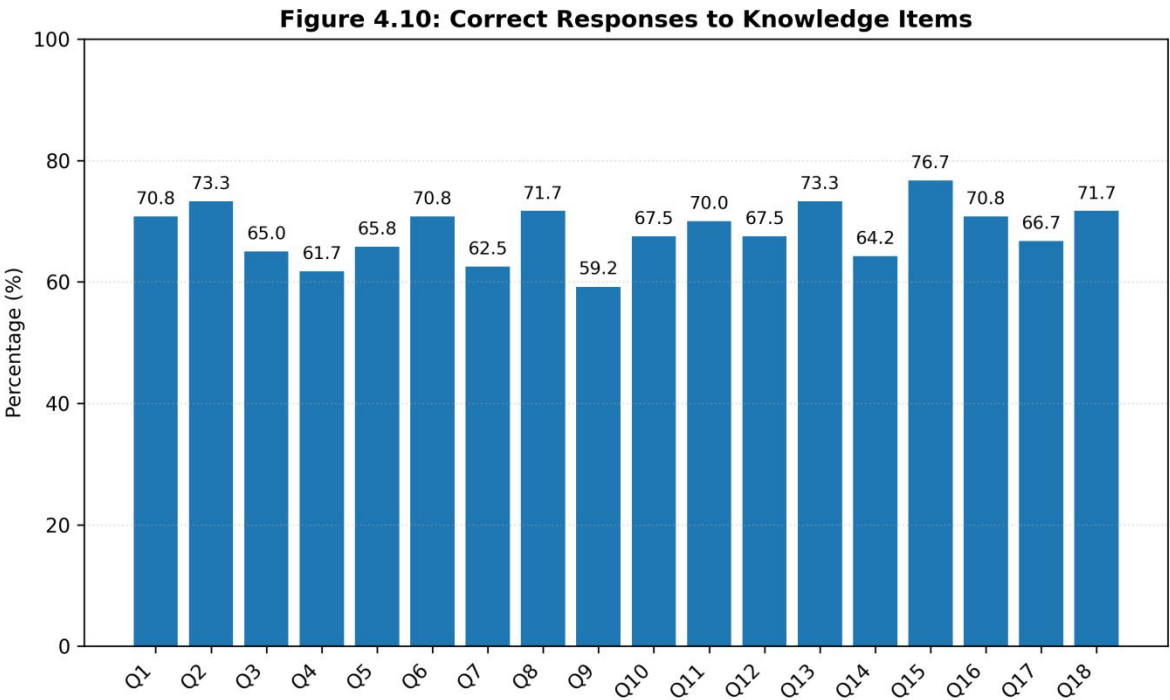
Item-Wise Correct Responses to the 18-Item Knowledge Questionnaire

Item	Correct n	Correct %
Q1	85	70.8
Q2	88	73.3
Q3	78	65.0
Q4	74	61.7
Q5	79	65.8
Q6	85	70.8
Q7	75	62.5
Q8	86	71.7
Q9	71	59.2
Q10	81	67.5
Q11	84	70.0
Q12	81	67.5
Q13	88	73.3
Q14	77	64.2
Q15	92	76.7
Q16	85	70.8
Q17	80	66.7
Q18	86	71.7

Note: Correct response = 1; incorrect/'I don't know' = 0.

Interpretation: Correct responses ranged from 59.2% to 76.7%. The highest proportion of correct responses was observed for Q15 (76.7%), whereas Q9 had the lowest correct-response rate (59.2%). Overall, the item-level results indicate moderate knowledge with considerable room for improvement on several individual PPH-related concepts.

Figure 4.10. Correct Responses to Knowledge Items



Interpretation: Correct responses ranged from 59.2% to 76.7%, with Q15 highest and Q9 lowest.

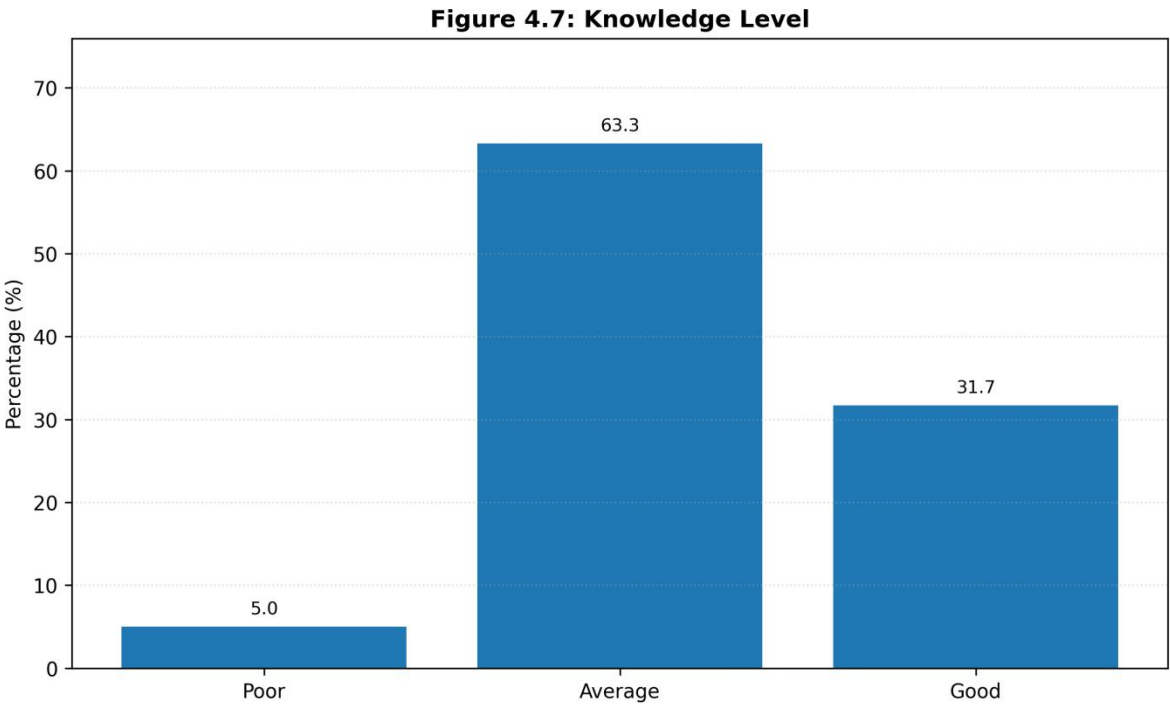
Table 4.9

Distribution of Participants According to Knowledge Level

Category	Frequency (n)	Percent (%)	Valid (%)	Percent	Cumulative Percent (%)
Poor	6	5.0	5.0		5.0
Average	76	63.3	63.3		68.3
Good	38	31.7	31.7		100.0

Interpretation: Most nurses had an average level of knowledge (76, 63.3%). Thirty-eight nurses (31.7%) had good knowledge, while 6 (5.0%) had poor knowledge. Therefore, the predominant knowledge category was average.

Figure 4.7. Knowledge Level



Interpretation: The majority of nurses (63.3%) had average knowledge, while 31.7% had good knowledge and 5.0% had poor knowledge.

4.3 Nurses' Observed Practical Skills Regarding PPH Prevention

Table 4.10

Item-Wise Distribution of Observed Practical Skills

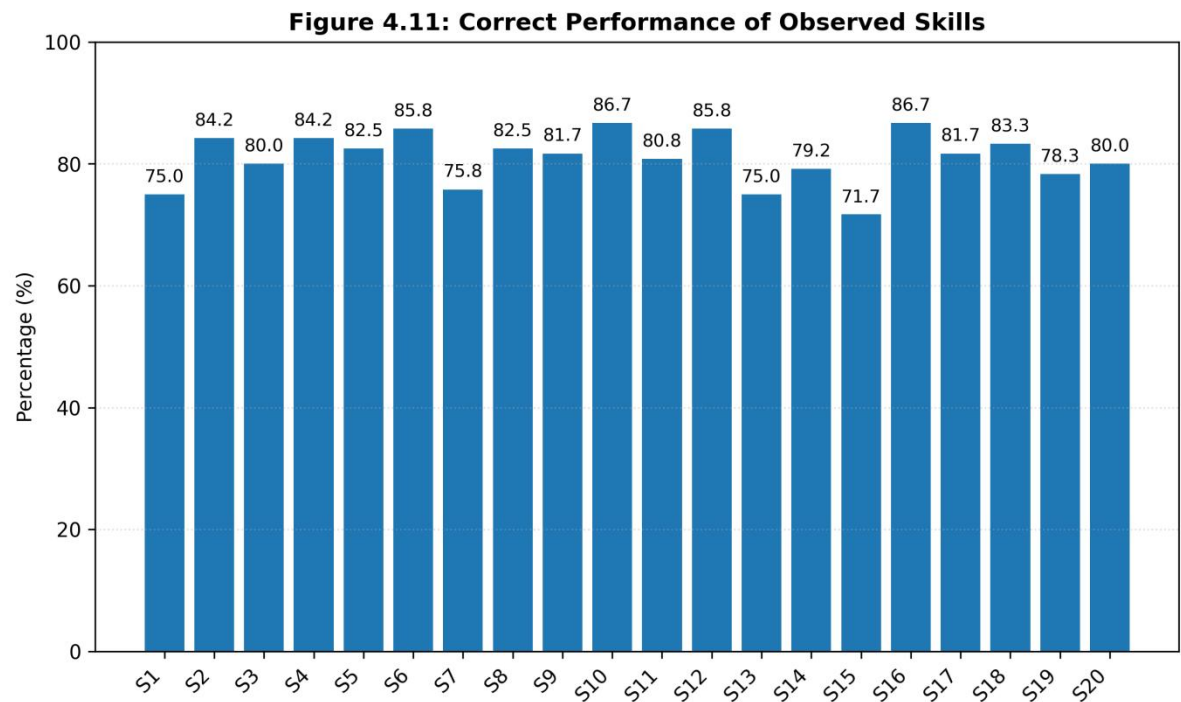
Item	Correct n	Correct %	Partial n	Partial %	Not performed/incorrect n	Not performed/incorrect %
S1	90	75.0	30	25.0	0	0.0
S2	101	84.2	19	15.8	0	0.0
S3	96	80.0	24	20.0	0	0.0
S4	101	84.2	19	15.8	0	0.0
S5	99	82.5	21	17.5	0	0.0
S6	103	85.8	17	14.2	0	0.0
S7	91	75.8	29	24.2	0	0.0
S8	99	82.5	21	17.5	0	0.0
S9	98	81.7	22	18.3	0	0.0
S10	104	86.7	16	13.3	0	0.0
S11	97	80.8	23	19.2	0	0.0

S12	103	85.8	17	14.2	0	0.0
S13	90	75.0	30	25.0	0	0.0
S14	95	79.2	25	20.8	0	0.0
S15	86	71.7	34	28.3	0	0.0
S16	104	86.7	16	13.3	0	0.0
S17	98	81.7	22	18.3	0	0.0
S18	100	83.3	20	16.7	0	0.0
S19	94	78.3	26	21.7	0	0.0
S20	96	80.0	24	20.0	0	0.0

Note: Correct = 2; Partial = 1; Not performed/incorrect = 0.

Interpretation: Correct performance across the 20 observed skills ranged from 71.7% to 86.7%. S10 and S16 had the highest correct-performance rate (86.7%), whereas S15 had the lowest (71.7%). No nurse was recorded as not performing any of the listed skills; the remaining observations were classified as partial performance.

Figure 4.11. Correct Performance of Observed Skills



Interpretation: Correct performance ranged from 71.7% to 86.7%, with S10 and S16 highest and S15 lowest.

Table 4.11
Descriptive Statistics of Practical Skills Scores

Variable	N	Mean	Std. Deviation	Median	Minimum	Maximum
Skills score (0–40)	120	36.21	1.91	36.0	31.0	40.0
Skills percentage	120	90.52	4.77	90.0	77.5	100.0

Interpretation: The mean practical skills score was 36.21 out of 40, equivalent to 90.52%. The minimum observed score was 31 and the maximum was 40, indicating generally high observed performance with limited variability.

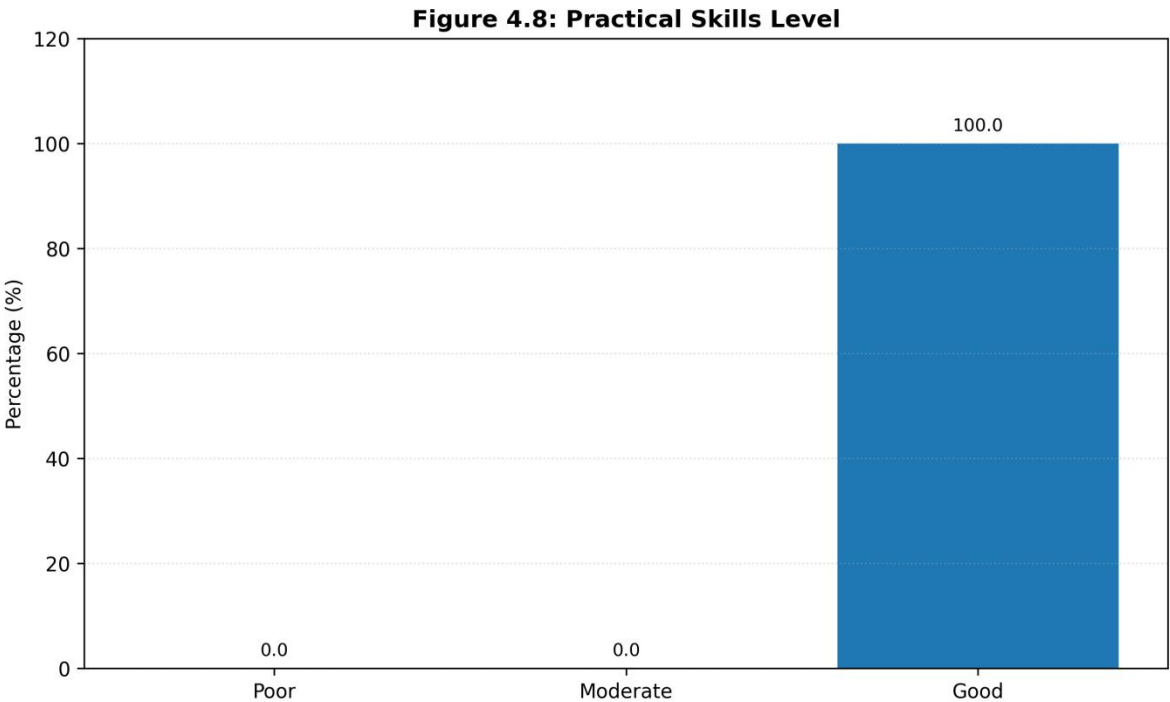
Table 4.12

Distribution of Participants According to Practical Skills Level

Category	Frequency (n)	Percent (%)	Valid (%)	Percent	Cumulative Percent (%)
Poor	0	0.0	0.0		0.0
Moderate	0	0.0	0.0		0.0
Good	120	100.0	100.0		100.0

Interpretation: All 120 nurses (100.0%) were classified as having good practical skills under the predefined scoring categories. No participants were classified as poor or moderate, indicating a ceiling effect in the categorical skills outcome.

Figure 4.8. Practical Skills Level



Interpretation: All 120 nurses were classified as having good practical skills; no participants were classified as poor or moderate.

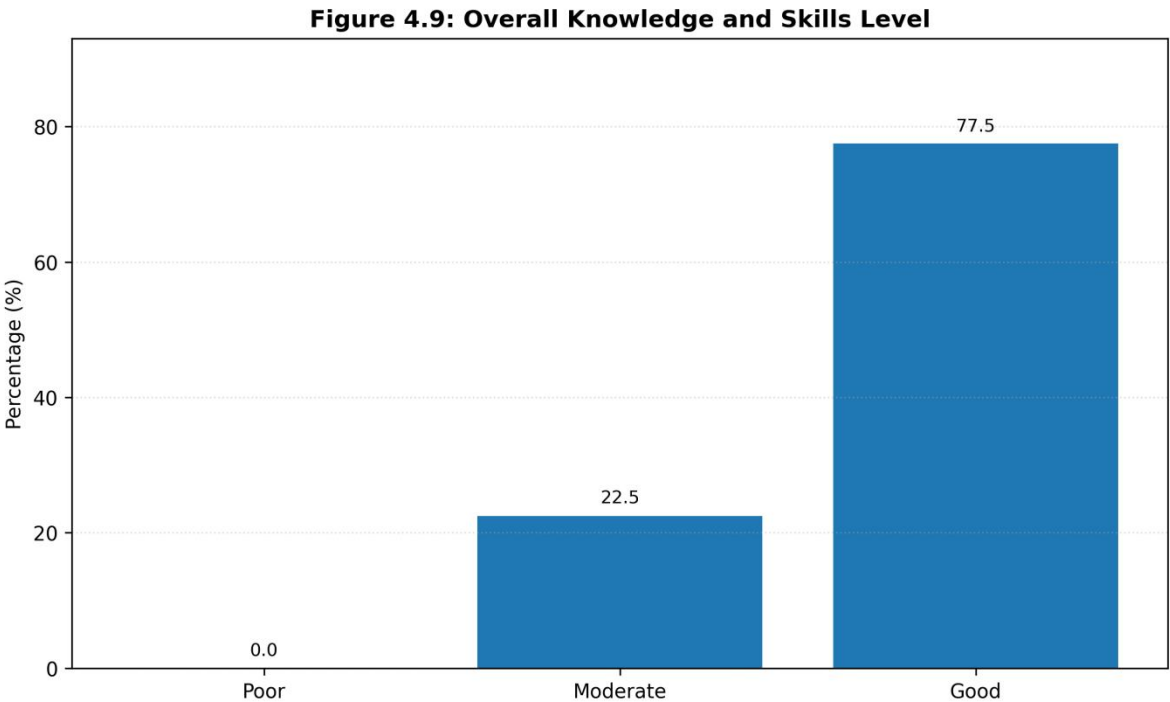
Table 4.13

Distribution of Participants According to Overall Knowledge and Skills Level

Category	Frequency (n)	Percent (%)	Valid (%)	Percent	Cumulative Percent (%)
Poor	0	0.0	0.0		0.0
Moderate	27	22.5	22.5		22.5
Good	93	77.5	77.5		100.0

Interpretation: Overall, 93 nurses (77.5%) were classified as having good combined knowledge and skills, while 27 (22.5%) were classified as moderate. No participant was classified as poor on the combined measure.

Figure 4.9. Overall Knowledge and Skills Level



Interpretation: Overall, 77.5% of nurses were classified as good and 22.5% as moderate.

4.4 Inferential Analysis

Table 4.14

Association Between Selected Characteristics and Knowledge Level

Variable	Pearson Chi-square	df	p-value	Expected cells <5	Expected cells <1
Age_Group	3.1599	6	0.7885	4	0
BMI_Category	12.8475	6	0.0455	5	1
Qualification	12.1099	6	0.0596	5	1
Designation	9.3626	4	0.0526	4	1
Experience_Group	6.3461	6	0.3856	4	1
Training_Attended	15.8449	2	0.0004	2	0

Note: Pearson chi-square results are reported. Several cross-tabulations contain expected counts below 5; these results should therefore be interpreted cautiously.

Interpretation: Knowledge level was significantly associated with BMI category ($\chi^2=12.848$, $p=0.0455$) and previous PPH-related training ($\chi^2=15.845$, $p<0.001$). Associations with age, qualification, designation, and clinical experience were not statistically significant at the 5% level. Because some expected cell counts were below 5, the significant BMI result should be interpreted cautiously.

Table 4.15
One-Way ANOVA of Knowledge Score by Selected Characteristics

Variable	F	p-value	Levene W	Levene p
Age_Group	0.5662	0.6384	0.2829	0.8376
BMI_Category	1.4352	0.2361	2.5817	0.0568
Qualification	5.1145	0.0023	0.6012	0.6155
Designation	5.6478	0.0046	0.6685	0.5144
Experience_Group	0.7173	0.5436	0.1171	0.9499

Note: Levene's test assesses homogeneity of variance.
Interpretation: Knowledge scores differed significantly by professional qualification (F=5.115, p=0.0023) and designation (F=5.648, p=0.0046). No significant differences were observed by age group, BMI category, or clinical experience. Levene's tests were non-significant for all comparisons, supporting the homogeneity-of-variance assumption.

Table 4.16
Tukey HSD Post-Hoc Comparisons of Knowledge Score by Qualification

group1	group2	meandiff	p-adj	lower	upper	reject
Diploma	Generic BSN	0.2583	0.9666	-1.1901	1.7066	False
Diploma	Post-RN BSN	1.5039	0.0516	-0.0074	3.0152	False
Diploma	MSN	2.6033	0.0244	0.2437	4.9628	True
Generic BSN	Post-RN BSN	1.2456	0.0455	0.0175	2.4738	True
Generic BSN	MSN	2.345	0.0307	0.156	4.534	True
Post-RN BSN	MSN	1.0994	0.5747	-1.1318	3.3305	False

Note: Mean difference is reported for pairwise comparisons; p<0.05 indicates a statistically significant difference.

Table 4.16
Tukey HSD Post-Hoc Comparisons of Knowledge Score by Qualification

group1	group2	meandiff	p-adj	lower	upper	reject
Diploma	Generic BSN	0.2583	0.9666	-1.1901	1.7066	False
Diploma	Post-RN	1.5039	0.0516	-0.0074	3.0152	False

	BSN					
Diploma	MSN	2.6033	0.0244	0.2437	4.9628	True
Generic	Post-RN	1.2456	0.0455	0.0175	2.4738	True
BSN	BSN					
Generic	MSN	2.345	0.0307	0.156	4.534	True
BSN						
Post-RN	MSN	1.0994	0.5747	-1.1318	3.3305	False
BSN						

Note: Mean difference is reported for pairwise comparisons; $p < 0.05$ indicates a statistically significant difference.

Interpretation: The significant ANOVA result was followed by Tukey HSD testing. Statistically significant pairwise differences were identified for: Diploma vs MSN, Generic BSN vs Post-RN BSN, Generic BSN vs MSN.

Table 4.17
Tukey HSD Post-Hoc Comparisons of Knowledge Score by Designation

group1	group2	meandiff	p-adj	lower	upper	reject
Staff	Charge	1.4932	0.0056	0.3725	2.614	True
Nurse	Nurse					
Staff	Head	1.1718	0.1734	-0.372	2.7156	False
Nurse	Nurse					
Charge	Head	-0.3214	0.8947	-2.0188	1.3759	False
Nurse	Nurse					

Note: Mean difference is reported for pairwise comparisons; $p < 0.05$ indicates a statistically significant difference.

Interpretation: The significant ANOVA result was followed by Tukey HSD testing. Statistically significant pairwise differences were identified for: Staff Nurse vs Charge Nurse.

Table 4.18
One-Way ANOVA of Practical Skills Score by Selected Characteristics

Variable	F	p-value	Levene W	Levene p
Age_Group	0.0829	0.9692	0.6413	0.5899
BMI_Category	0.2508	0.8607	0.4417	0.7236
Qualification	1.596	0.1942	0.271	0.8462
Designation	2.0173	0.1376	0.557	0.5744
Experience_Group	1.2017	0.3124	1.628	0.1867

Note: Levene's test assesses homogeneity of variance.

Interpretation: There were no statistically significant differences in practical skills scores according to age group, BMI category, qualification, designation, or clinical experience (all $p>0.05$). The lack of categorical variation in the skill-level outcome is consistent with the finding that all participants were classified as good, so the continuous skill score was used for group comparisons.

Table 4.19
Comparison of Knowledge and Skills Scores by Previous PPH-Related Training

Outcome	Yes Mean SD N	Yes Mean SD	No Mean SD N	Independent t	p- value	Mann- Whitney U	M W p	Levene W	Levene p			
Total_Knowledge_Score	57	13.1754	2.0189	63	11.4921	2.2922	4.25	0.0	2531.5	0.0001	0.0676	0.7953
Skill_Total	57	36.0175	1.9865	63	36.381	1.8354	-1.0416	0.2997	1616.5	0.3413	0.2981	0.5861

Note: Independent-samples t-test is shown with Mann–Whitney U as a non-parametric sensitivity analysis.

Interpretation: Nurses who had previous PPH-related training had significantly higher knowledge scores than those without previous training (13.18 vs 11.49; $t=4.250$, $p<0.001$). In contrast, practical skills scores did not differ significantly between trained and untrained nurses (36.02 vs 36.38; $t=-1.042$, $p=0.299$).

Table 4.20
Correlation Between Knowledge and Practical Skills Scores

Analysis	Coefficient	p-value
Pearson	0.0393	0.6697
Spearman	0.014	0.8796

Note: Pearson correlation is the primary parametric result; Spearman correlation is provided as a non-parametric sensitivity analysis.

Interpretation: There was no statistically significant relationship between knowledge and practical skills scores (Pearson $r=0.039$, $p=0.670$; Spearman $p=0.014$, $p=0.880$). Thus, higher questionnaire-based knowledge scores were not associated with higher observed practical skills scores in this sample.

Table 4.21
Tests of Normality for Knowledge and Practical Skills Scores

Variable	N	Shapiro-Wilk W	p-value
Total knowledge score	120	0.95417	0.00044
Total practical skills score	120	0.95920	0.00109

Interpretation: Both total knowledge and practical skills scores showed statistically significant Shapiro–Wilk tests ($p<0.05$), indicating departures from normality. Therefore, non-parametric sensitivity analyses were retained where appropriate.

Table 4.22
Reliability Analysis of the Study Instruments

Instrument	Reliability statistic	Items	Coefficient
Knowledge questionnaire (18 dichotomous items)	KR-20	18	0.297
Observed skills checklist (20 items; 0–2 scoring)	Cronbach's alpha	20	0.168

Note: KR-20 was calculated for the dichotomous knowledge items; Cronbach's alpha was calculated for the 20-item skills checklist using its 0–2 scoring.

Interpretation: The 18-item knowledge questionnaire had a KR-20 coefficient of 0.297, while the 20-item skills checklist had a Cronbach's alpha of 0.168. These coefficients describe the internal consistency of the instruments in the present sample.

4.5 Summary of Major Findings

- The study included 120 nurses.
- The mean knowledge score was 12.29 ± 2.32 out of 18, while the mean practical skills score was 36.21 ± 1.91 out of 40.
- Most nurses (63.3%) had average knowledge, whereas 31.7% had good knowledge and 5.0% had poor knowledge.
- All nurses (100.0%) were classified as having good practical skills according to the predefined skills-score categories.
- Overall, 77.5% had good combined knowledge and skills, while 22.5% had moderate combined performance.
- Previous PPH-related training was associated with higher knowledge level and higher knowledge scores, but not with practical skills scores.

- Knowledge scores differed significantly by professional qualification and designation, whereas practical skills scores did not differ significantly across the examined demographic/professional groups.
- No significant correlation was found between knowledge and practical skills scores.

4.6 Statistical Interpretation Note

The analyses in this chapter were based on the original 120-participant dataset and the recorded item-level responses. Where statistical assumptions were not fully met, the relevant non-parametric sensitivity analyses were retained. Several knowledge-level chi-square tables also contained expected cell counts below 5; these findings should therefore be interpreted with caution. The 100% good practical-skills classification indicates limited variation in the categorical skills outcome and should be considered when interpreting associations involving skill level.

DISCUSSION

The present study assessed nurses' knowledge and practical skills regarding the prevention of postpartum hemorrhage among 120 nurses working in tertiary-care hospitals in Lahore. The findings demonstrated that the participants had a comparatively stronger level of observed practical performance than questionnaire-based knowledge. The mean knowledge score was 12.29 ± 2.32 out of 18, corresponding to approximately 68.3%, whereas the mean practical skills score was 36.21 ± 1.91 out of 40, corresponding to approximately 90.5%. This difference suggests that although most nurses were able to demonstrate appropriate practical actions during observation, their theoretical understanding of some important aspects of PPH prevention and early response was less consistent.

The demographic findings showed that the largest proportion of nurses belonged to the 20–25-year age group, while most participants were Staff Nurses. A considerable proportion had a Generic BSN qualification, followed by Post-RN BSN qualifications, and the largest group had 2–5 years of clinical experience. This distribution indicates that the study population consisted largely of relatively young and professionally active nurses who were engaged in routine clinical care. The presence of nurses with different educational qualifications and levels of experience also provided variation that allowed the study to examine whether professional characteristics were associated with knowledge and skills.

The knowledge findings demonstrated that the majority of nurses had an average level of knowledge, with 63.3% falling within the average category, 31.7% demonstrating good knowledge, and only 5.0% having poor knowledge. Although the overall knowledge level was not poor, the findings indicate that a substantial proportion of

nurses did not achieve the highest knowledge category. At item level, correct responses varied considerably across the 18 questions. The highest proportion of correct responses was observed for the question related to the importance of bladder emptying, whereas the lowest proportion was observed for the question concerning routes of misoprostol administration. This variation indicates that nurses may possess adequate knowledge of commonly encountered clinical measures while having weaker knowledge of specific pharmacological and management-related details.

The relatively moderate knowledge level observed in the present study is important because prevention and early recognition of PPH require nurses to understand both routine preventive measures and the clinical significance of early warning signs. Knowledge regarding uterotonic use, blood-loss assessment, recognition of uterine atony, identification of deterioration, and immediate nursing actions is particularly important because delays in recognition or response can adversely affect maternal outcomes. The present findings therefore suggest that knowledge improvement should focus not only on general awareness of PPH but also on specific areas in which item-level performance was comparatively lower.

In contrast to the knowledge findings, the observed practical skills of the nurses were high. The mean skills score was 36.21 ± 1.91 out of 40, and all participants were classified as having good practical skills according to the predefined scoring criteria. Correct performance across individual skills ranged from 71.7% to 86.7%. The strongest performance was observed in recognition of uterine atony and continued monitoring, while assistance with IV fluid resuscitation showed the lowest proportion of completely correct performance. This pattern suggests that nurses were generally capable of performing important immediate PPH-related actions, but some components of emergency management may require further reinforcement.

The finding that all nurses were categorized as having good practical skills should, however, be interpreted carefully. The absence of participants in the poor and moderate categories indicates limited variation in the categorical skills outcome. Therefore, although the overall observed performance was strong, the individual-item findings remain important because they identify specific areas where partial performance occurred. In particular, skills related to quantitative blood-loss assessment, IV access, fluid resuscitation, uterotonic-related interventions, and escalation should continue to receive attention during continuing professional education and clinical training.

Previous PPH-related training showed an important relationship with nurses' knowledge. Nurses who had previously received PPH-related training demonstrated a significantly higher mean knowledge score than those who had not received training.

The statistical analysis also demonstrated a significant association between previous training and knowledge level. This finding supports the importance of structured continuing education in maintaining and improving nurses' theoretical knowledge regarding PPH. At the same time, previous training was not significantly associated with the observed practical skills score. This may be partly explained by the generally high skill scores and the absence of variation in the categorical skills level, which makes it difficult to identify differences between groups.

Professional qualification was also significantly associated with knowledge scores. Nurses with different educational qualifications did not demonstrate identical knowledge performance, indicating that educational background may contribute to differences in theoretical understanding. The post-hoc analysis further demonstrated significant differences between selected qualification groups. Similarly, designation was significantly associated with knowledge score, with a significant difference identified between Staff Nurses and Charge Nurses in the post-hoc analysis. These findings suggest that academic preparation and professional role may influence exposure to PPH-related knowledge and responsibilities. However, clinical experience itself did not demonstrate a statistically significant association with knowledge score, indicating that longer clinical service alone may not necessarily result in better theoretical knowledge. The study found no statistically significant relationship between nurses' knowledge and their observed practical skills. The Pearson correlation was very weak and non-significant, while the Spearman correlation produced the same overall conclusion. This is an important finding because it demonstrates that theoretical knowledge and practical performance should not automatically be considered equivalent. A nurse may perform a clinical procedure correctly because of repeated clinical exposure, established routines, supervision, or previous hands-on experience even when some theoretical knowledge is incomplete. Conversely, a nurse may possess theoretical knowledge but not consistently demonstrate it during an observed clinical situation. Therefore, assessment of both knowledge and practical skills provides a more complete evaluation of nurses' competency regarding PPH prevention.

Overall, the findings indicate that nurses in the selected tertiary-care hospitals demonstrated strong practical performance but only moderate overall theoretical knowledge regarding PPH prevention. The combination of good practical skills and moderate knowledge suggests that the existing clinical environment may provide nurses with substantial practical exposure, while opportunities for structured theoretical updating may be less consistent. Regular PPH-focused educational sessions, competency-based assessments, simulation exercises, and periodic refresher training

could help strengthen areas of theoretical weakness while maintaining the already strong practical performance. Particular attention should be given to pharmacological knowledge, quantitative blood-loss assessment, fluid resuscitation, escalation, and other areas identified through the item-level assessment.

In conclusion, the study demonstrates that nurses possessed a generally satisfactory level of competency in the practical prevention and early response to PPH, but theoretical knowledge was comparatively less strong. Previous PPH-related training was associated with better knowledge, while professional qualification and designation were also related to knowledge performance. Practical skills remained high across the participant group, and no significant relationship was found between knowledge and practical skills. These findings emphasize that assessment of PPH competency should include both knowledge-based and direct skills-based evaluation rather than relying on either component alone. Strengthening continuing education and competency-based PPH training may help ensure that nurses maintain both the knowledge and practical skills required for timely prevention and early response to postpartum hemorrhage.

Conclusion

The present study was conducted to assess nurses' knowledge and practical skills regarding the prevention of postpartum hemorrhage in tertiary-care hospitals. A total of 120 nurses participated in the study. The findings demonstrated that the participants had a comparatively stronger level of practical skills than theoretical knowledge. The mean knowledge score was 12.29 ± 2.32 out of 18, while the mean practical skills score was 36.21 ± 1.91 out of 40. The findings therefore indicate that although nurses demonstrated generally strong practical performance, their theoretical knowledge regarding PPH prevention and early response was comparatively moderate.

The majority of nurses, 76 (63.3%), had an average level of knowledge, while 38 (31.7%) had good knowledge and 6 (5.0%) had poor knowledge. At the practical level, all 120 nurses (100.0%) were classified as having good practical skills according to the predefined scoring criteria. Overall, 93 (77.5%) participants were classified as having good combined knowledge and skills, whereas 27 (22.5%) were classified as moderate.

Previous PPH-related training was significantly associated with nurses' knowledge. Nurses who had received previous PPH-related training had a higher mean knowledge score (13.18) than nurses who had not received training (11.49), and the difference was statistically significant ($p < 0.001$). Knowledge scores also differed significantly according to professional qualification ($F = 5.115$, $p = 0.002$) and designation ($F = 5.648$, $p = 0.005$). However, no statistically significant differences were identified in practical skills according to age, BMI, qualification, designation or clinical experience.

The study also found no statistically significant relationship between theoretical knowledge and observed practical skills. The Pearson correlation was $r = 0.039$, $p = 0.670$, while the Spearman correlation was $\rho = 0.014$, $p = 0.880$. This indicates that higher theoretical knowledge scores were not necessarily associated with higher observed practical skills scores in this sample.

Overall, the study concludes that nurses demonstrated good practical competency but predominantly average theoretical knowledge regarding PPH prevention and early response. The findings emphasize the importance of maintaining practical competency while strengthening theoretical knowledge through regular, structured and competency-based PPH education.

6.2 Limitations of the Study

The study had several limitations that should be considered when interpreting its findings. First, the study used a cross-sectional design, which assessed nurses' knowledge and practical skills at one point in time. Therefore, the study cannot establish causal relationships or determine whether nurses' knowledge and skills change over time.

Second, the study was conducted in selected tertiary-care hospitals in Lahore. The findings may therefore not be directly generalizable to nurses working in secondary-care hospitals, primary-care settings, private hospitals or other geographical areas of Pakistan.

Third, the study included a sample of 120 nurses. Although the sample was sufficient for the planned study, a larger sample involving more hospitals and different healthcare settings could provide greater representativeness and improve the generalizability of the findings.

Fourth, the knowledge component was assessed using a structured 18-item questionnaire. Questionnaire-based assessment measures participants' responses to specific questions and may not completely reflect their ability to apply theoretical knowledge during an actual PPH emergency.

Fifth, practical skills were assessed through direct observation using a 20-item observation checklist. The presence of an observer may have influenced participants' behaviour, as nurses may have performed differently because they knew they were being assessed. This possibility of an observer or Hawthorne effect should therefore be considered.

Another important limitation was the ceiling effect in the practical skills outcome. All 120 nurses were classified as having good practical skills. Although the continuous skill scores showed some variation, the categorical skill-level variable had no participants

in the poor or moderate categories. This limited the ability to examine associations between categorical skill level and demographic or professional characteristics.

Finally, the study identified relatively low internal-consistency coefficients for the instruments in the present sample. The calculated KR-20 for the 18-item knowledge questionnaire was 0.297, while the Cronbach's alpha for the 20-item skills checklist was 0.168. These findings indicate limited internal consistency in this particular dataset and should be acknowledged when interpreting the instrument-level results. The coefficients should not be presented as evidence of high reliability.

6.3 Recommendations

Based on the findings of the study, regular refresher training on postpartum hemorrhage prevention and early response should be provided to nurses working in maternity, labour-room and obstetric units. The present findings showed that theoretical knowledge was predominantly average, indicating a need for continued educational reinforcement.

Hospitals should organize regular PPH-focused educational sessions covering prevention, early recognition, risk factors, uterine atony, quantitative blood-loss assessment, uterotonic medications, maternal vital-sign monitoring, IV access, fluid resuscitation and escalation of care.

Training should not be limited to theoretical lectures. Simulation-based training, practical demonstrations, emergency drills and competency-based assessments should be incorporated so that nurses can repeatedly practice appropriate responses to PPH emergencies.

Particular attention should be given to the knowledge areas where correct responses were comparatively lower. The item-level assessment showed that correct responses varied across the 18 knowledge questions, ranging from 59.2% to 76.7%. Therefore, future training should address specific knowledge gaps rather than relying only on general PPH awareness sessions.

Hospitals should ensure that standardized PPH protocols, emergency checklists and essential PPH equipment are readily available in labour and delivery areas. Nurses should be familiar with the location and appropriate use of emergency equipment and should know the institutional escalation pathway.

Regular competency assessments should include both knowledge testing and direct observation of practical performance. This is particularly important because the present study found no significant correlation between knowledge and practical skills. Assessing only one component may therefore provide an incomplete picture of nurses' PPH competency.

Nursing managers should also consider incorporating PPH competency into routine continuing professional development and periodic performance assessments. Previous PPH-related training was significantly associated with higher knowledge scores in the present study, supporting the value of structured continuing education.

6.4 Implications for Nursing Practice

The findings have important implications for nursing practice because nurses are frequently involved in the prevention, early recognition and initial response to postpartum hemorrhage. The practical performance observed in the study was generally strong, with a mean skills score of 36.21 out of 40 and all participants classified as having good practical skills.

Nurses should continue to maintain systematic assessment of women during the third stage of labour and the immediate postpartum period. This includes monitoring uterine tone, assessing postpartum bleeding, monitoring vital signs, recognizing early signs of deterioration and promptly communicating abnormal findings.

Nurses should also maintain competence in appropriate PPH-related interventions within their professional scope and institutional protocol. These include assisting with or administering prescribed uterotonics, performing appropriate uterine massage when indicated, assisting with IV access and fluid resuscitation, continuing close monitoring and escalating care when bleeding persists or the woman deteriorates.

The findings also suggest that practical competence should not be assumed solely on the basis of theoretical knowledge. Because the correlation between knowledge and practical skills was not statistically significant, nursing practice should incorporate both knowledge-based and performance-based competency assessment.

6.5 Implications for Nursing Education

The findings have implications for both undergraduate nursing education and continuing professional development. Since 63.3% of nurses demonstrated average knowledge, educational programmes should provide greater emphasis on strengthening theoretical understanding of PPH prevention and early management.

Nursing education should integrate PPH content across classroom teaching, clinical practice and simulation-based learning. Students and practicing nurses should be exposed to realistic scenarios involving excessive postpartum bleeding, uterine atony, maternal deterioration and emergency escalation.

Pharmacological education should also receive appropriate attention. Nurses should understand the indications, appropriate administration and important contraindications associated with commonly used uterotonic medications within their professional scope and institutional protocols.

Simulation-based assessment can provide an opportunity to evaluate whether nurses can translate theoretical knowledge into appropriate clinical action. Objective structured clinical examinations and standardized observation checklists can be incorporated into nursing education and continuing professional development.

The findings also support the importance of regular refresher education after qualification, because previous PPH-related training was associated with significantly higher knowledge scores in the present study.

6.6 Implications for Hospital Administration

Hospital administration has an important role in maintaining nurses' preparedness for PPH emergencies. The findings indicate that although practical skills were generally strong, theoretical knowledge was not uniformly at the good level. Hospital management should therefore provide institutional support for continuous PPH education.

Hospitals should establish or regularly update standardized PPH management protocols and ensure that these protocols are accessible in relevant clinical areas. Essential emergency equipment and supplies should be checked regularly and maintained in a state of readiness.

Hospital administration should also facilitate regular PPH simulation drills and competency assessments. These activities can help identify gaps in nurses' knowledge and performance before an actual obstetric emergency occurs.

Nurse managers should maintain records of staff participation in PPH-related training and ensure that newly appointed nurses receive appropriate orientation. Nurses who demonstrate identified competency gaps should be provided with targeted refresher education and reassessment.

The administration should also encourage multidisciplinary teamwork involving nurses, obstetricians, anesthetists, blood-bank personnel and other relevant healthcare professionals because effective PPH management requires rapid communication and coordinated action.

6.7 Implications for Future Research

Future studies should include larger samples and participants from multiple hospitals and different levels of healthcare facilities to improve the generalizability of findings. Multicentre research could determine whether the findings observed in the present tertiary-care setting are consistent across different regions and healthcare systems.

Longitudinal studies should be conducted to assess changes in nurses' knowledge and practical skills over time. Such studies could determine whether improvements following PPH training are maintained in the long term.

Intervention-based research is also recommended. Future researchers could compare conventional educational approaches with simulation-based training, blended learning or competency-based training to determine which approach produces the greatest improvement in PPH knowledge and practical performance.

Future research should also investigate factors that may influence nurses' PPH competency, including frequency of exposure to obstetric emergencies, workload, staffing levels, availability of emergency equipment, institutional protocols, previous simulation experience and participation in continuing professional development. Because all participants in the present study were classified as having good practical skills, future studies should consider using more sensitive and standardized performance-assessment methods capable of distinguishing different levels of competency. Multiple observations or structured simulation assessments may provide greater variability and reduce the ceiling effect observed in the current study.

Future researchers should also further evaluate and, where necessary, refine the study instruments before wider application. The relatively low internal-consistency coefficients observed in the present sample indicate that the questionnaire and checklist may benefit from additional psychometric evaluation, item review and validation in larger samples.

6.8 Final Conclusion

Postpartum hemorrhage remains an important obstetric emergency in which timely prevention, recognition and response are essential. The present study assessed 120 nurses and demonstrated that their practical performance regarding PPH prevention and early response was generally strong, while their theoretical knowledge was predominantly at an average level.

The mean knowledge score was $12.29 \pm 2.32/18$, and the majority of nurses (63.3%) had average knowledge. In contrast, the mean practical skills score was $36.21 \pm 1.91/40$, and 100% of nurses were classified as having good practical skills. Overall, 77.5% demonstrated good combined knowledge and skills.

Previous PPH-related training was significantly associated with better knowledge, while professional qualification and designation were also significantly associated with knowledge scores. However, practical skills did not differ significantly according to the examined demographic and professional characteristics. Furthermore, theoretical knowledge was not significantly correlated with observed practical skills.

The overall findings indicate that maintaining nurses' existing practical competency while strengthening theoretical knowledge should be a priority. Regular PPH refresher training, simulation-based education, competency assessment,

standardized protocols and emergency drills should therefore be incorporated into routine nursing practice and professional development.

The study ultimately emphasizes that knowledge and practical skills are complementary but distinct components of nursing competency. Evaluating both components can provide a more accurate assessment of nurses' preparedness to prevent, recognize and respond to postpartum hemorrhage and may contribute to improved quality and safety of maternal care.

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APPENDIX D

INFORMED CONSENT FORM

"Nurses Knowledge and Skills towards Prevention of Postpartum Hemorrhage in Tertiary Care Hospital"**Purpose of the Study**

You are invited to participate in this study, which aims to assess nurses' knowledge and practical skills regarding the prevention, early recognition, and initial response to postpartum hemorrhage (PPH).

Procedure

If you agree to participate, you will complete an 18-item knowledge questionnaire. Your practical skills will also be assessed using a 20-item observation checklist during the standardized assessment.

Voluntary Participation

Your participation is completely voluntary. You may refuse to participate or withdraw from the study at any time without any penalty or effect on your employment or professional status.

Confidentiality

All information collected will be kept confidential and used only for research purposes. Your name and personal identity will not be disclosed in the research report or publication.

Consent Statement

I have read and understood the information provided above. I have had the opportunity to ask questions and received satisfactory answers. I understand that my participation is voluntary and that I may withdraw at any time.

Participant ID: _____

Participant Signature/Thumb Impression: _____

Date: _____

Nurses Knowledge and Skills towards Prevention of Postpartum Hemorrhage in Tertiary Care Hospital

Participant Information

Participant ID: _____ Hospital: _____ Age: _____ years

BMI: _____ kg/m² Qualification: _____ Designation: _____

Clinical Experience: _____ Previous PPH Training: ☐ Yes ☐ No

Most Recent PPH Training: _____ Previous PPH Case Managed/Assisted:

☐ Yes ☐ No

Date: _____ Observer ID: _____

1. Postpartum Hemorrhage (PPH) is defined as blood loss of more than:

- ☐ 250 mL
- ☐ 500 mL
- ☐ 1500 mL
- ☐ I don't know

2. Primary PPH occurs within:

- ☐ 24 hours after delivery
- ☐ 48 hours
- ☐ 1 week
- ☐ I don't know

3. The MOST common cause of PPH is:

- ☐ Uterine atony (Tone)
- ☐ Genital trauma
- ☐ Retained tissue
- ☐ I don't know

4. The "4 Ts" of PPH causes stand for:

- ☐ Tone, Trauma, Tissue, Thrombin
- ☐ Time, Trauma, Tissue, Test
- ☐ Tone, Time, Test, Thrombin
- ☐ I don't know

5. A known risk factor for PPH is:

- ☐ Grand multiparity
- ☐ Prolonged labor
- ☐ Multiple pregnancy
- ☐ All of the above

6. Active Management of Third Stage of Labor (AMTSL) includes:

- ☐ Uterotonic + controlled cord traction + uterine massage

- ☐ Waiting only for spontaneous delivery
- ☐ Immediate breastfeeding only
- ☐ I don't know

7. First-line uterotonic drug for PPH prevention is:

- ☐ Oxytocin
- ☐ Aspirin
- ☐ Paracetamol
- ☐ I don't know

8. Standard dose/route of Oxytocin given after delivery is:

- ☐ 10 IU IM/IV
- ☐ 1 IU IM/IV
- ☐ 100 IU IM/IV
- ☐ I don't know

9. Misoprostol is typically administered via:

- ☐ Oral/Sublingual/Rectal
- ☐ IV infusion only
- ☐ IM injection only
- ☐ I don't know

10. An early sign of PPH-related shock is:

- ☐ Tachycardia and hypotension
- ☐ Bradycardia and hypertension
- ☐ Fever only
- ☐ I don't know

11. Uterine atony is identified by:

- ☐ Soft, boggy uterus on palpation
- ☐ Firm, well-contracted uterus
- ☐ Normal lochia only
- ☐ I don't know

12. The first immediate nursing action when PPH is suspected is:

- ☐ Fundal massage + call for help
- ☐ Wait and observe for 30 minutes
- ☐ Discharge the patient
- ☐ I don't know

13. Blood loss is most accurately estimated by:

- ☐ Weighing pads/calibrated drape
- ☐ Visual estimation only

- ☐ Asking the patient
☐ I don't know

14. Untreated PPH may lead to:

- ☐ Hypovolemic shock & DIC
☐ Improved uterine tone
☐ No complications
☐ I don't know

15. Bladder emptying is important in PPH because:

- ☐ A full bladder prevents effective uterine contraction
☐ There is no relation to uterine contraction
☐ It is only for comfort
☐ I don't know

16. A contraindication for Ergometrine use is:

- ☐ Hypertension/Pre-eclampsia
☐ Normal blood pressure
☐ Anemia
☐ I don't know

17. IV access (large-bore cannula) should be established:

- ☐ Immediately on suspicion of PPH
☐ After 1 hour
☐ Only if the patient requests
☐ I don't know

18. The nurse's role in PPH prevention during the third stage of labor is:

- ☐ Administer uterotonics + monitor vital signs/blood loss closely
☐ No active role is needed
☐ Only post-delivery documentation
☐ I don't know

Scoring

- Correct answer = 1
- Incorrect/I don't know = 0
- Maximum score = 18

Knowledge Level:

Score	Percentage	Level
0–8	<50%	Poor
9–13	50–75%	Average

Score	Percentage	Level
14–18	>75%	Good

Knowledge Score: ____ / 18

Knowledge Percentage: ____ %

OBSERVATION CHECKLIST FOR NURSES' PRACTICAL SKILLS

A. Preparation and Prevention

No.	Observable Skill	2	1	0	N/A
S1	Performs appropriate hand hygiene and uses appropriate PPE before patient care.	☐	☐	☐	☐
S2	Assesses the woman's general condition and relevant PPH risk factors.	☐	☐	☐	☐
S3	Ensures/identifies availability of essential PPH emergency equipment and supplies.	☐	☐	☐	☐
S4	Ensures appropriate uterotonic administration after birth according to hospital protocol and professional scope.	☐	☐	☐	☐
S5	Assesses uterine tone following delivery and reports an abnormal finding promptly.	☐	☐	☐	☐
S6	Assesses postpartum vaginal bleeding systematically.	☐	☐	☐	☐
S7	Uses an appropriate quantitative method for assessing blood loss when available.	☐	☐	☐	☐
S8	Measures and records maternal vital signs appropriately.	☐	☐	☐	☐
S9	Recognizes abnormal findings suggestive of clinical deterioration.	☐	☐	☐	☐
S10	Recognizes a soft/boggy uterus as suggestive of uterine atony and responds appropriately.	☐	☐	☐	☐
S11	Calls for assistance/escalates care promptly when PPH is suspected.	☐	☐	☐	☐
S12	Performs appropriate uterine/fundal massage when uterine atony is identified.	☐	☐	☐	☐
S13	Establishes or assists with rapid IV access according to institutional protocol and scope.	☐	☐	☐	☐
S14	Prepares/administers or assists with appropriate uterotonic treatment according to prescription/protocol and scope.	☐	☐	☐	☐
S15	Assists with appropriate IV fluid resuscitation according to the emergency protocol.	☐	☐	☐	☐

No.	Observable Skill	2	1	0	N/A
S16	Continues frequent monitoring of vital signs and blood loss after initial intervention.	☐	☐	☐	☐
S17	Communicates the patient's condition clearly to the responsible healthcare team.	☐	☐	☐	☐
S18	Assists with assessment/examination to identify the likely source of bleeding according to team direction.	☐	☐	☐	☐
S19	Recognizes persistent bleeding or deterioration and escalates care without unnecessary delay.	☐	☐	☐	☐
S20	Correctly documents blood loss, vital signs, interventions, medications and patient response.	☐	☐	☐	☐

Skills Scoring

Score	Percentage	Interpretation
0–19	<50%	Poor
20–29	50–75%	Average
30–40	>75%	Good

Total Skill Score: _____ / 40

Skill Percentage: _____ %

Overall Skill Level:

☐ Poor

☐ Average

☐ Good