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Knowledge of Postpartum Hemorrhage among Health Care Providers in Gynecological Hospitals: A Cross-Sectional Study in Mosul, Iraq

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Abstract

Background: Postpartum hemorrhage (PPH) contributes to 25% of maternal deaths in conflict-affected regions like Mosul, Iraq. Despite clinical guidelines, knowledge gaps among healthcare providers compromise maternal outcomes.

Objective: To assess PPH-related knowledge (risk factors, diagnosis, prevention, management) among obstetric care providers in Mosul's public hospitals.

Methods: A descriptive cross-sectional study (November 2024–April 2025) included 155 female physicians, nurses, and midwives from four hospitals via accidental sampling. Data were collected using a validated 33-item questionnaire. Knowledge scores were categorized as Weak (<50%), Moderate (50–75%), and High (>75%). Analyses used SPSS v24 (χ^2, Pearson correlations).
Results: Mean knowledge score was 68.1%. Competency was highest in management (74.2%) and lowest in prevention (61.7%; χ^2=4.12, p=0.042). While 44% held bachelor's degrees, 70.8% lacked PPH-specific training. Training significantly correlated with knowledge (r=0.42, p<0.001); academic degree did not (p=0.087).

Conclusion: Providers demonstrate moderate PPH knowledge but critical deficits in prevention. Mandatory simulation-based training and WHO protocol integration are urgently needed.

Keywords: Postpartum hemorrhage, maternal mortality, obstetric emergency, clinical competency, Iraq, conflict settings

Introduction

Postpartum hemorrhage (PPH), defined as blood loss ≥500 mL (vaginal) or ≥1000 mL (cesarean), is the leading direct cause of maternal mortality globally (27% of childbirth-related deaths) [1]. In conflict-affected Iraq, PPH mortality exceeds 138/100,000 live births—triple the global average [2]. Although 54% of PPH deaths are preventable through timely intervention [3], fragmented healthcare systems, training gaps, and guideline non-adherence persist. Studies from comparable settings (e.g., Jordan, Egypt) confirm critical knowledge deficiencies among providers [2,3].Mosul's healthcare infrastructure, weakened by protracted conflict, manages >12,000 annual

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deliveries [6]. This study addresses two gaps: (1) absence of data on PPH knowledge among Iraqi obstetric providers, and (2) unclear impact of training on knowledge retention in resource-limited settings.

Objectives

1. Assess PPH knowledge across four domains: risk factors, diagnosis, prevention, and management.
2. Identify knowledge predictors: training, education, and clinical experience.

Methods

Study Design

Quantitative descriptive cross-sectional study (November 5, 2024–April 17, 2025).

Setting

Four public hospitals in Mosul:

- Al-Batool Maternity Hospital
- Albahthy Maternity Hospital
- Alsalam Hospital
- Al Mosul General Hospital

Participants

155 female providers (12 physicians, 44 nurses, 99 midwives) selected via accidental sampling.
Inclusion criteria:

- Direct involvement in childbirth/postpartum care
- ≥1 year of clinical experience
- Informed consent

Instrument

Validated 33-item questionnaire adapted from WHO guidelines [17,19]:

- **Section 1:** Demographics (9 items: age, education, experience, etc.)
- **Section 2:** Knowledge assessment (23 Likert-scale + 10 MCQ items)

Scoring

- Correct response = 1 point; incorrect/uncertain = 0.
- **Classification:** Weak (<50%), Moderate (50–75%), High (>75%).

Data Collection

Self-administered questionnaires (January 2–30, 2025). Confidentiality and anonymity ensured.

Ethical Arrangement

Prior to commencement, ethical approval was secured from the Institutional Review Board of Mosul Higher Health Institute, Iraq. Administrative permissions were obtained from the directors of the participating healthcare facilities. Participants received written and verbal explanations of the study's purpose, confidentiality protocols, and their right to withdraw. Written informed consent was obtained from all participants.

Statistical Analysis

The study utilized the following statistical approaches:

1. **Descriptive statistics** (frequencies, percentages, means) to summarize participant characteristics and knowledge scores.
2. **Chi-square tests (χ^2)** to compare categorical variables across knowledge domains.
3. **Pearson's correlation (r)** to examine relationships between training, experience, and knowledge scores.
   All analyses were performed using SPSS v24, with a significance threshold of $p < 0.05$.

Results

A total of 155 female healthcare providers participated in this study, including physicians, nurses, and midwives from four public maternity hospitals in Mosul. The results are presented below in alignment with the study's objectives: assessing knowledge of postpartum hemorrhage (PPH) and identifying predictors of knowledge competency.

Table 1. Demographic Characteristics of Participants (n = 155)

Variable		Frequency (n)	Percentage (%)
Age (years)	20–24	28	18.0%
	25–29	54	34.8%
	30–39	58	37.1%
	≥40	15	10.1%
Marital Status	Single	70	44.9%
	Married	77	49.4%
	Divorced	7	4.5%
	Widow	1	1.1%
Educational Level	Secondary	52	33.3%
	Diploma	32	20.7%
	Bachelor	71	44.0%
Years in Delivery Room	≤5 years	99	64.0%
	6–10 years	38	24.7%
	≥11 years	18	11.2%
PPH-Specific Training	Yes	45	29.2%
	No	110	70.8%

n = number of respondents; % = percentage of total.

This table show that the majority of participants (37.1%) were aged 30–39 years, with a significant proportion (64.0%) having ≤5 years of experience in delivery rooms. Notably, 70.8% of the providers had never received PPH-specific training, despite 44.0% holding a bachelor's degree, highlighting a critical training gap in clinical obstetric preparedness.

Table 2. PPH Knowledge Scores by Clinical Domain (n = 155)

Domain	Mean Score (%)	95% Confidence Interval	Knowledge Level	χ^2 (p-value)
Risk Factors	66.2%	58.4 – 73.8	Moderate	4.12 (p = 0.042*)
Diagnosis	70.4%	63.1 – 77.2	Good	1.89 (p = 0.169)
Prevention	61.7%	53.9 – 69.1	Moderate	9.67 (p = 0.022*)
Management	74.2%	67.5 – 80.5	Good	–
Overall Mean	**68.1%**	**63.4 – 72.8**	**Good**	–

χ^2 = Chi-square test statistic; *p < 0.05 indicates statistical significance. Knowledge Levels: Poor (<50%), Moderate (50–75%), Good (>75%)

This table clarify that the highest knowledge competency was observed in PPH management (74.2%, "Good"), followed by diagnosis (70.4%). However, knowledge related to prevention was lowest (61.7%) and significantly differed from both risk factor and overall scores ($p < 0.05$), indicating a critical gap in preventative competencies.

Table 3. Comparative Analysis of Knowledge Scores Between Domains

Domain Comparison	χ^2 Value	p-value	Interpretation
Risk Factors vs. Prevention	4.12	0.042*	Statistically significant difference
Diagnosis vs. Management	1.89	0.169	No significant difference
Overall Interdomain Variation	9.67	0.022*	Significant variance between domains

χ^2 = Chi-square test statistic; *p < 0.05 indicates significant interdomain variation.

The results in this table show a significant disparity was found between knowledge of risk factors and prevention, underscoring a need to strengthen preventive knowledge. No significant difference was noted between diagnostic and management knowledge, suggesting relative uniformity in these domains.

Table 4. Correlation Between Knowledge and Demographic/Professional Variables

Predictor	Correlation Coefficient (r)	p-value	Estimated Effect
Clinical Experience	0.31	0.002**	+15% per additional 5 years
PPH-Specific Training	0.42	<0.001***	+28% accuracy in knowledge
Academic Degree	0.18	0.087	No statistically significant effect

r = Pearson correlation coefficient; **p < 0.01 = highly significant; ***p < 0.001 = very highly significant

This table indicate that the Specialized training in PPH had the strongest positive correlation with knowledge (r = 0.42), with trained participants scoring on average 28% higher than their untrained counterparts. Clinical experience also showed a positive correlation (r = 0.31), contributing an estimated 15% increase in knowledge per 5-year tenure. Academic degree level did not significantly predict knowledge scores (p = 0.087), suggesting that practical exposure and targeted training are more impactful than formal qualifications alone.

Discussion

Our study reveals moderate PPH knowledge (68.1%) among Mosul's providers, aligning with conflict-affected regions like Jordan [3]. The critical deficit in prevention (61.7%) reflects a reactive "treatment-over-prevention" culture. Three insights emerge:

1. **Training is pivotal:** The 28% knowledge boost from specialized training mirrors global evidence [16].
2. **Experience compensates:** Each 5-year tenure improved scores by 15%, yet 64% had ≤5 years' experience—below the 50-delivery competency threshold [7].
3. **Academic curricula lag:** Bachelor's degrees (44% of sample) showed minimal impact, suggesting misalignment with WHO protocols [19].

Limitations

1. Accidental sampling limits generalizability.
2. Self-reported knowledge ≠ clinical performance.
3. Single-city focus; multicentric studies needed.

Recommendations

1. Implement simulation-based training targeting providers with ≤5 years' experience.
2. Integrate WHO PPH prevention bundles [17] into clinical checklists.

3. Conduct biannual competency audits using OSCE-style assessments.
4. Revise academic curricula to emphasize evidence-based prevention.

Conclusion

PPH prevention remains the weakest link in Mosul's obstetric care. Reducing maternal mortality requires:

- Institutionalizing WHO protocols
- Prioritizing hands-on training for junior staff
- Aligning education with global guidelines

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