

Postpartum Haemorrhage Prevention and Management: Midwives' Knowledge, Self-Reported Competence and Observed Clinical Practice at Obstetrics and Gynaecology Department in Kenyatta National Hospital Kenya

Darius Muli David

dariusmulid99@gmail.com

University of Nairobi

Emmah Kanini Matheka

University of Nairobi

Wakasiaka Sabina Nyanchera Marko

University of Nairobi

Research Article

Keywords: Postpartum haemorrhage, Midwives, Active Management of Third Stage of Labour, Clinical competence, Maternal health, Kenya, Obstetric emergencies

Posted Date: October 14th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10887923/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Background

Postpartum haemorrhage (PPH) is a major cause of maternal morbidity and mortality. Midwives are central to its prevention, early recognition and initial management; however, theoretical knowledge does not necessarily translate into timely and appropriate bedside practice. This study assessed midwives' knowledge, self-reported competence, observed clinical practice and perceived institutional barriers related to PPH prevention and management at Kenyatta National Hospital (KNH), Kenya.

Methods

A descriptive mixed-methods study was conducted in the Obstetrics and Gynaecology Department of KNH. Quantitative data were collected from 114 midwives using a structured questionnaire. Twenty-two midwives were directly observed during management of the second and third stages of labour, while five ward/floor in-charges participated in key informant interviews. Quantitative data were analysed using SPSS version 29.0 using descriptive statistics and appropriate inferential tests. Qualitative data were transcribed, coded and analysed thematically. Knowledge, self-reported competence and observed clinical performance were treated as distinct outcome domains.

Results

Among 114 respondents, 81 (71.1%) were female, 49 (43.0%) were aged 25–34 years and 73 (64.0%) had diploma-level education. Active management of the third stage of labour (AMTSL) training was reported by 85 (79.4%) participants, while 46.5% reported that their most recent training had occurred more than three years previously. Knowledge was high for uterotonic use (109/114, 95.6%), controlled cord traction (104/114, 91.2%) and uterine massage (102/114, 89.5%), but lower for cord-clamping practices (49/114, 43.0%).

Gender was not significantly associated with knowledge score ($t(112)=0.675$, $p=0.501$; mean difference 0.58, 95% CI –1.121 to 2.281). Self-reported independent competence was high for identifying PPH risk factors (83.3%) and diagnosing PPH (81.6%), but lower for bimanual uterine compression (44.7%) and manual removal of the placenta (46.5%). During direct observation, only 2/22 (9.1%) midwives administered a uterotonic within one minute, whereas 20/22 (90.9%) performed controlled cord traction correctly and 21/22 (95.5%) monitored uterine tone.

Immediate uterine massage was correctly performed in only 5/22 (22.7%) cases. Bladder emptying and assistance with maternal choice of birth position were not observed in any case. One PPH event occurred among the 22 observed deliveries (4.5%). Key informants identified workload, staffing constraints, resource shortages, communication problems, delays in accessing blood products and infrequent refresher training as important barriers.

Conclusions

The study identified a marked gap between theoretical knowledge, self-reported competence and observed clinical performance. Improving PPH readiness at KNH will require more than knowledge acquisition. Regular simulation-based training, supportive supervision, standardized protocols, reliable access to essential supplies and blood products, adequate staffing and stronger emergency communication systems are required to support consistent implementation of recommended PPH prevention and management practices.

Background

PPH is a major obstetric emergency and an important contributor to maternal morbidity and mortality. Rapid recognition and treatment are essential because haemorrhage can progress rapidly to hypovolaemic shock and other severe complications [1,2]. The burden is particularly important in low- and middle-income settings, where persistent maternal mortality from obstetric causes remains a major concern [5,7,8]. Evidence on the global burden and trends further demonstrates the continuing contribution of PPH to maternal mortality [3,4,6].

PPH commonly results from uterine atony, genital tract trauma, retained placental tissue or coagulation abnormalities [9,10]. Prevention therefore depends on systematic assessment of risk and skilled management of labour, together with timely implementation of evidence-based interventions during and immediately after birth [11–14].

Active management of the third stage of labour (AMTSL) has an important role in prevention of PPH [15,17]. In this study, AMTSL was assessed using the operational definition contained in the research project. AMTSL involves a series of interventions: administration of uterotonic drugs within one minute after the birth of the newborn, controlled cord traction (CCT) to deliver the placenta and subsequent uterine massage every 15 minutes for the first two hours [15,17,18].

Evidence from sub-Saharan Africa has demonstrated variability in the implementation of AMTSL despite widespread awareness of its importance [15,19,20]. Training and continuing professional development can influence providers' ability to translate knowledge into emergency obstetric practice [22,27]. In addition, workload, supervision and availability of institutional resources may affect the extent to which evidence-based practices are implemented consistently [20,21,24–26].

KNH is a National Teaching and Referral Hospital managing a high volume of maternity cases, including complicated obstetric referrals. In such a setting, midwives are required to recognize women at risk of PPH and initiate preventive interventions [11,21,24]. They must also identify haemorrhage promptly, begin appropriate emergency management and coordinate escalation within the multidisciplinary team [28–30].

Previous research has frequently assessed healthcare providers' knowledge or self-reported practice [31,32]. However, knowledge and self-reported ability do not necessarily correspond to actual behaviour at the bedside, making direct observation important when assessing clinical readiness [15,31,32]. The

present study consequently distinguishes between three related but different constructs: theoretical knowledge, self-reported competence and observed clinical performance. The study additionally explores institutional barriers that may contribute to discrepancies between these domains, including training and system-level factors [19,20,22,27].

The objective of this study was to assess midwives' knowledge, self-reported competence and observed clinical performance regarding PPH prevention and management at KNH, and to identify institutional and workplace factors that may influence implementation of recommended care.

Methods

Study design and setting

A descriptive mixed-methods study was conducted in the Obstetrics and Gynaecology Department of KNH, Nairobi, Kenya. The quantitative component assessed participants' socio-demographic characteristics, training exposure, knowledge, attitudes and self-reported clinical competence. The observational component assessed actual clinical performance during the second and third stages of labour. Key informant interviews explored institutional facilitators and barriers affecting PPH prevention and management.

Study population and eligibility

The study population comprised registered midwives and registered nurses deployed in the KNH Obstetrics and Gynaecology Department and involved in direct clinical care. Participants were eligible if they were currently employed at KNH, involved in clinical care and willing to provide written informed consent. Staff who were not involved in clinical care, those on extended leave and individuals who declined or withdrew consent were excluded.

Sample size and sampling

The target population consisted of 162 maternity nurses/midwives. Using the finite-population correction described in the study, the required sample size was calculated as 113.96 and rounded to 114 participants. The quantitative component therefore included 114 participants. The research project described simple random sampling for the quantitative component and consecutive sampling for the 22 observed midwives. Five ward/floor in-charges were purposively selected for key informant interviews.

Data collection

A structured questionnaire was used to collect information on demographic characteristics, training exposure, knowledge of PPH prevention and management, attitudes and self-reported clinical skills. A

structured observation checklist was used to assess clinical performance during the second and third stages of labour. Qualitative data was collected from five ward/floor in-charges who were interviewed using a semi-structured interview guide. Each interview lasted approximately 30 minutes. The study tools were pre-tested before the main data collection.

Outcome domains and operationalization

For purposes of analysis, the study distinguished three outcome domains that had previously been grouped broadly under the concept of competence. [31, 32]

Knowledge refers to participants' correct responses to the questionnaire knowledge items. Self-reported competence refers to participants' reported ability to perform a clinical skill independently, with assistance or not even with assistance. Observed clinical performance refers to performance recorded using the structured observation checklist during actual clinical care. These three measures were not treated as interchangeable or as direct substitutes for one another. [20]

For knowledge items, percentages were calculated using the full quantitative sample of 114 participants as the denominator. Where the original project presented multiple-response outputs using a "percent of cases" denominator, these were not retained where they produced a denominator inconsistent with the total quantitative sample.

Data analysis

Quantitative data were analysed using SPSS version 29.0. Categorical variables were summarized using frequencies and percentages, while continuous variables were summarized using means and standard deviations where appropriate. Pearson's chi-square test or Fisher's exact test was used for categorical associations, while independent-samples t-tests were used for comparisons of continuous variables. Statistical significance was set at $p < 0.05$. Effect estimates and 95% confidence intervals were reported where available.

The 22 observed cases were treated primarily as descriptive evidence of bedside clinical performance. Given the small observational sample, these observations were not used to make broad population-level causal or predictive claims.

Qualitative interviews were transcribed, coded and analysed thematically. Themes were developed around provider competence, workflow, staffing, resources, communication, training and institutional readiness. Quantitative, observational and qualitative findings were subsequently triangulated during interpretation. [22, 27]

Quality assurance

The questionnaire and observation checklist were pre-tested before the main study. A research assistant was trained in data collection procedures, while completed instruments were reviewed for completeness and consistency. Participant identifiers were minimized to protect confidentiality.

Ethical considerations

Ethical approval

was obtained from the Kenyatta National Hospital–University of Nairobi Ethics and Research Committee, approval number: P164/03/2025. Regulatory authorization was obtained from the National Commission for Science, Technology and Innovation (NACOSTI), Ref No: 940492. Institutional permission was obtained from KNH, Ref: KNH/OBS& GYNAE- HOD/51/VOL. I/.

The study adhered to the Declaration of Helsinki, with informed consent obtained from all participants. Participation was voluntary, confidentiality was maintained and participants could withdraw at any time. The study was non-invasive, low-risk and inclusive.

Results

Participant characteristics

A total of 114 midwives participated in the questionnaire component. Most participants were female, with 81 (71.1%) identifying as female and 33 (28.9%) as male. The largest age group was 25–34 years, comprising 49 (43.0%) participants. Seventy-three participants (64.0%) reported college-level education, while 73 (64.0%) had diploma-level training. Forty-nine participants (43.0%) had between five and nine years of labour-ward experience, while 34 (29.8%) had between zero and four years of experience. Fifty-four participants (47.4%) reported having worked at KNH for more than five years. Table 1 presents the characteristics of the study participants.

Table 1
Socio-demographic and professional
characteristics of study participants (N = 114)

Characteristic	n	%
Female	81	71.1
Male	33	28.9
Age 25–34 years	49	43.0
College education	73	64.0
Diploma training	73	64.0
5–9 years labour-ward experience	49	43.0
> 5 years at KNH	54	47.4

Training exposure

AMTSL training was reported by 85 of the 114 participants (79.4%). Other reported training exposures included prevention of mother-to-child transmission (PMTCT), reported by 80 participants (74.8%); family planning, reported by 71 (66.4%); basic emergency obstetric care, reported by 67 (62.6%); antiretroviral training, reported by 51 (47.7%); and comprehensive emergency obstetric care, reported by 33 (30.8%).

Because participants could report more than one type of training, the percentages are not expected to total 100%. Notably, 46.5% of participants reported that their most recent training had occurred more than three years previously. Previous training exposure among the participants is presented in Fig. 1.

Knowledge of PPH prevention

Knowledge was high for several core PPH prevention interventions. Correct knowledge regarding uterotonic use was reported among 109 of 114 participants (95.6%), while 104 (91.2%) correctly identified controlled cord traction and 102 (89.5%) correctly identified uterine massage. Knowledge regarding cord-clamping practice was comparatively lower, with 49 participants (43.0%) providing the correct response. These findings are summarized in Table 2.

Table 2
Knowledge of selected PPH prevention interventions
among midwives

Knowledge item	Correct n/N	Correct %
Uterotonic use	109/114	95.6
Controlled cord traction	104/114	91.2
Uterine massage	102/114	89.5
Cord-clamping practice	49/114	43.0

These findings indicate that participants had strong theoretical knowledge of several major components of PPH prevention, although important gaps remained in specific areas.

Gender and knowledge score

Male participants had a mean knowledge score of 9.97 (SD 4.79; n = 33), compared with 9.39 (SD 3.87; n = 81) among female participants. The difference was not statistically significant, with $t(112) = 0.675$ and $p = 0.501$. The mean difference was 0.58, with a 95% confidence interval of - 1.121 to 2.281. The analysis therefore did not support an association between gender and knowledge score. The comparison is presented in Table 3.

Table 3
Comparison of knowledge scores by gender

Sex	n	Mean knowledge score	SD
Male	33	9.97	4.79
Female	81	9.39	3.87

Self-reported competence

Participants generally reported high levels of confidence in identifying and diagnosing PPH. Ninety-five participants (83.3%) reported that they could independently identify PPH risk factors, while 93 (81.6%) reported that they could independently diagnose PPH.

Independent self-reported competence was lower for several technical procedures. Eighty-six participants (75.4%) reported that they could independently suture perineal tears and 89 (78.1%) reported independent competence in suturing episiotomies. In contrast, only 51 (44.7%) reported being able to independently perform bimanual uterine compression, while 53 (46.5%) reported independent competence in manual removal of the placenta. The distribution is presented in Table 4.

Table 4
Self-reported competence in selected PPH-related clinical skills

Skill	Unable even with assistance	Able with assistance	Able independently
Identify PPH risk factors	5 (4.4%)	14 (12.3%)	95 (83.3%)
Diagnose PPH	6 (5.3%)	15 (13.2%)	93 (81.6%)
Bimanual uterine compression	3 (2.6%)	60 (52.6%)	51 (44.7%)
Suture perineal tears	5 (4.4%)	23 (20.2%)	86 (75.4%)
Suture episiotomy	4 (3.5%)	21 (18.4%)	89 (78.1%)
Manual removal of placenta	6 (5.3%)	55 (48.2%)	53 (46.5%)

These findings describe participants' perceptions of their own abilities and should not be interpreted as direct evidence of demonstrated technical competence.

Observed clinical performance

Twenty-two midwives were directly observed during clinical care of women in labour. The observations demonstrated a substantial discrepancy between questionnaire responses and actual bedside performance.

Only two of the 22 observed midwives (9.1%) administered a uterotonic within one minute of birth. In seven cases (31.8%), performance required improvement, while in 13 cases (59.1%) the intervention was not performed within the specified timeframe. The observed performance is summarized in Table 5.

Controlled cord traction was performed correctly in 20 of the 22 observations (90.9%), with two cases (9.1%) requiring improvement. Continuous monitoring of uterine tone was performed in 21 cases (95.5%). However, immediate uterine massage was completely performed in only five cases (22.7%), required improvement in two cases (9.1%) and was not performed in 15 cases (68.2%). Hand hygiene and use of personal protective equipment were complete in 11 observations (50.0%) and required improvement in the remaining 11 (50.0%). Table 5 presents the observed clinical performance of the midwives during the second and third stages of labour.

Table 5
Observed clinical performance during the second and third stages of labour (n = 22)

Observed intervention	Complete/correct n (%)	Needs improvement n (%)	Not performed n (%)
Uterotonic within 1 minute	2 (9.1)	7 (31.8)	13 (59.1)
Correct controlled cord traction	20 (90.9)	2 (9.1)	0
Immediate uterine massage	5 (22.7)	2 (9.1)	15 (68.2)
Continuous uterine-tone monitoring	21 (95.5)	0	1 (4.5)
Hand hygiene/PPE	11 (50.0)	11 (50.0)	0

The discrepancy between knowledge and observed performance is particularly important. Although 95.6% of questionnaire respondents demonstrated correct knowledge regarding uterotonic use, only 9.1% of observed midwives administered the uterotonic within the specified one-minute period. This contrast is illustrated in Fig. 2.

Additional observed care

Bladder emptying and assistance with maternal choice of birth position were not observed in any of the 22 cases. Placement of the placenta in an appropriate receptacle was completed in all 22 cases.

Other technical components of placental delivery were inconsistently performed. These included maintaining cord tension while awaiting a strong contraction, holding the placenta with two hands and using the appropriate technique for delivery of the membranes.

Regarding uterine-tone care, 21 of the 22 cases (95.5%) demonstrated complete performance in ensuring that the uterus remained firm. However, when the uterus was soft, repeat uterine massage was completely performed in only five cases (22.7%). Teaching the woman to massage her uterus was not observed in 18 cases (81.8%). Figure 3 shows the findings from the observed uterine assessment and massage practices among the midwives.

Patient-centred communication

Procedure explanation was complete in 12 of the 22 observations (54.5%), required improvement in nine (40.9%) and was not performed in one case (4.5%). Emotional support was complete in 11 observations (50.0%) and required improvement in the remaining 11 (50.0%).

The study did not identify a statistically significant association between maternal characteristics and the observed communication practices.

Observed PPH event

One PPH event occurred among the 22 observed deliveries, corresponding to 4.5% of the observed cases. The observed case involved a term mother. The project documented that the midwife did not palpate the uterus to exclude another foetus, did not administer any uterotonic within one minute and did not use the documented abdominal hand position during controlled cord traction.

Following recognition of PPH, immediate uterine massage, explanation, emotional support and management were documented.

Because only one PPH event occurred among the 22 observations, the resulting 4.5% should not be interpreted as an estimate of the incidence of PPH at KNH. It represents only the proportion of PPH events observed within this small observational sample.

Qualitative findings

Provider knowledge and confidence

Key informants generally perceived midwives as having good foundational knowledge of common causes of PPH and first-line management. However, they identified gaps in knowledge and confidence relating to newer interventions and some advanced emergency procedures.

Workload and staffing

High patient-to-midwife ratios, competing maternal and neonatal responsibilities and fatigue were identified as important barriers to continuous monitoring and timely intervention. These pressures may make it difficult for midwives to complete all recommended interventions consistently, particularly during periods of high workload.

Resources and infrastructure

Key informants described shortages or access problems involving monitoring equipment, PPH supplies and blood products. Storage and access arrangements were also perceived to have the potential to delay administration of time-sensitive medicines.

Communication and escalation

Communication between midwives and other departments was described as inconsistent. This was perceived to contribute to delays in escalation and access to senior clinical support during obstetric emergencies.

Training and supervision

Infrequent refresher training, unequal access to training opportunities and limited reinforcement following training were identified as barriers to maintaining clinical competence over time. The qualitative themes are summarized in Table 6.

Table 6
Summary of qualitative themes and implications for PPH care

Theme	Key finding	Potential implication
Provider knowledge and confidence	Good foundational knowledge but gaps in some advanced procedures	Targeted skills training and simulation
Workload and staffing	High patient-to-midwife ratios and competing responsibilities	Review staffing and workload
Resources	Problems with equipment, supplies and blood access	Strengthen availability and logistics
Communication	Inconsistent escalation and interdepartmental communication	Standardize emergency communication pathways
Training and supervision	Infrequent refresher training and limited reinforcement	Regular CPD, mentorship and supportive supervision

Discussion

The principal finding of this study was not simply that midwives had high or low knowledge of PPH prevention and management. Rather, the findings demonstrate a clear divergence between three different domains: theoretical knowledge, self-reported competence and observed clinical performance.

Knowledge of several PPH prevention interventions exceeded 89%. Correct knowledge of uterotonic use was particularly high at 95.6%, while knowledge of controlled cord traction and uterine massage was 91.2% and 89.5%, respectively. Despite this, direct observation demonstrated considerably lower implementation of some time-critical interventions. Only 9.1% of observed midwives administered a uterotonic within one minute, and immediate uterine massage was completely performed in only 22.7% of observations. Similar gaps between awareness and implementation of AMTSL components have been reported in facility-based studies [15,19,32].

This discrepancy suggests that questionnaire-based assessment alone may overestimate readiness for time-critical obstetric care [33,34]. A provider may know what should be done but still fail to perform the intervention at the appropriate time because of workload, competing responsibilities, workflow constraints, resource limitations or other contextual factors. Evidence from facility-level studies indicates that the quality and consistency of emergency obstetric care can be affected by such system and provider factors [20,22,27].

The findings therefore support a distinction between knowing what to do, believing that one can do it and actually doing it correctly in clinical practice. This distinction is particularly important in obstetric emergencies, where several interventions need to occur rapidly and sometimes simultaneously.

The high observed performance for controlled cord traction and uterine-tone monitoring suggests that some practices may be more consistently incorporated into routine care. Controlled cord traction was

correctly performed in 90.9% of observations, while uterine tone was monitored in 95.5%. In contrast, immediate uterine massage and timely administration of uterotonics were less consistently implemented. These findings are relevant to established AMTSL guidance, which emphasizes correct sequencing and completion of the key third-stage interventions [15,17].

The contrast between high uterine-tone monitoring and low performance of immediate uterine massage is particularly informative. It suggests that identifying or monitoring uterine tone may be incorporated into routine practice, whereas the subsequent intervention may be less consistently completed. This may indicate a problem with sequencing and execution rather than a simple lack of knowledge.

The low observed frequency of timely uterotonic administration is also important because this is a time-dependent intervention [16,35]. The qualitative findings provide a plausible systems-level explanation. Midwives may simultaneously be responsible for the newborn, preparing medication, assessing bleeding, monitoring the mother and attending to other women in labour. Under these circumstances, even a knowledgeable provider may fail to perform a time-sensitive intervention within the required period. Similar concerns about variation in the delivery of competent care and the influence of continuing professional development have been documented in facility-based settings [20,22,27].

The self-reported competence findings further support this interpretation. Participants reported high confidence in identifying risk factors and diagnosing PPH, but considerably lower independent competence for bimanual uterine compression and manual removal of the placenta. These procedures are less frequently encountered and require technical precision, consistent with the broader literature on the complexity of PPH diagnosis and emergency management [11,33,34]. Their lower self-reported competence suggests areas in which regular simulation, supervised practice and emergency drills may be particularly beneficial [22,27,37].

The findings also demonstrate why self-reported competence should not be treated as equivalent to observed competence. For example, the majority of respondents reported being independently competent in several skills, yet direct observation identified considerable deficiencies in selected aspects of PPH prevention. Self-report can therefore provide useful information about confidence and perceived capability but cannot replace direct assessment of clinical performance.

The study findings also suggest that training alone may not be sufficient to improve PPH management. Although AMTSL training was reported by 79.4% of participants, almost half reported that their most recent training occurred more than three years previously. The original study report indicated an association between training and competence; however, the exact statistical output necessary to quantify this relationship was not available in the extracted study tables. The relationship should therefore be verified using the original SPSS dataset before publication rather than overstated. The importance of maintaining emergency obstetric competencies through continuing professional development is supported by recent evidence from Rwanda and Kenya [22,27].

The qualitative findings reinforce the importance of system-level factors. Staffing levels, workload, availability of supplies, access to blood products, communication and supervision may either facilitate or undermine the implementation of evidence-based practice. Consequently, a provider-focused intervention that only increases knowledge may have limited impact if the clinical environment continues to constrain performance.

Patient-centred care also emerged as an area requiring attention. Procedure explanation was complete in just over half of observations, while emotional support was complete in only half. Although these activities may appear separate from technical PPH management, communication, respectful care and effective interaction with women are important components of quality maternity care [20,30]. They should therefore remain part of clinical competency during obstetric emergencies.

The observed PPH event should also be interpreted cautiously. The occurrence of one event among 22 observations provides useful qualitative information regarding the sequence of care but cannot be used to estimate the incidence of PPH at KNH. The small number of observed cases makes any facility-level incidence inference inappropriate.

Overall, the findings indicate that improving PPH outcomes requires a multidimensional approach. Knowledge acquisition should be combined with simulation-based training and repeated skills practice to strengthen provider competence [22,27]. Supportive supervision, reliable supplies, adequate staffing and standardized protocols are also important for translating knowledge into consistent practice [19,20,25,26]. Efficient emergency communication and access to appropriate escalation and resuscitation measures are equally important components of comprehensive PPH management [30,38,39].

Strengths and limitations

A major strength of this study was the triangulation of questionnaire data, direct observation and key informant interviews. The questionnaire provided information on theoretical knowledge and perceived competence, direct observation provided information on actual clinical performance and interviews provided information about contextual and institutional factors.

Direct observation was particularly valuable because it enabled comparison between what participants reported being able to do and what was observed during actual clinical care. This helped identify a knowledge–practice gap that would not have been apparent from questionnaire data alone.

The quantitative component included 114 participants and therefore provided a broad description of the target workforce. However, the observational component included only 22 midwives. This small observational sample limits precision and prevents strong generalization of the observed clinical performance to all midwives at KNH.

The observed participants may also have differed according to shift, workload and clinical case mix. The possibility of a Hawthorne effect should additionally be considered, as participants may alter their behaviour when they know they are being observed. If observation improved behaviour, the actual practice gap in routine care could potentially be greater than observed.

The qualitative component included five ward/floor in-charges. Their perspectives may therefore place greater emphasis on supervisory and institutional issues and may not fully capture the experiences of frontline midwives.

The single-site design is another limitation. KNH is a National Referral and Teaching Hospital, and its staffing, workload and resource environment may differ from County, private and lower-level facilities. The findings should therefore be transferred cautiously to other settings.

Finally, the original project used the term “competence” across knowledge, self-report and observation. The present manuscript deliberately separates these constructs to avoid implying that theoretical knowledge or self-reported ability represents demonstrated clinical competence.

Conclusions

Midwives at Kenyatta National Hospital demonstrated strong theoretical knowledge of several important PPH prevention measures and generally high self-reported confidence in recognizing and diagnosing PPH. However, direct observation identified substantial deficiencies in the timely and complete execution of several key interventions. This distinction between knowledge, self-reported competence and observed practice is consistent with concerns raised in previous provider-focused studies [2,21,31,32].

The principal finding is therefore a gap between knowledge, perceived competence and observed clinical performance. The findings indicate that improving PPH readiness cannot depend solely on increasing theoretical knowledge.

Regular simulation-based refresher training, supportive supervision, standardized PPH protocols and checklists, reliable access to uterotonics and other essential supplies, adequate staffing, improved access to blood products and structured emergency communication systems should be integrated into efforts to improve PPH prevention and management. WHO guidance emphasizes standardized prevention and treatment approaches, while evidence from facility-based settings highlights the importance of implementation capacity and continuing professional development [18,19,22].

Recommendations

Regular simulation-based PPH drills should be implemented, with particular emphasis on time-critical interventions and emergency procedures that are encountered less frequently. Repeated skills practice

and continuing professional development can help maintain competence in emergency obstetric care [22,27].

A standardized and easily accessible PPH protocol and bedside checklist should be introduced or reinforced to support consistent sequencing of interventions. Standardized protocols are particularly useful where rapid recognition and structured escalation are required [11,40].

Maternity staffing should be reviewed in relation to workload so that maternal and neonatal responsibilities can be managed concurrently without compromising time-sensitive interventions.

Point-of-care availability and storage arrangements for essential PPH medicines, equipment and supplies should be improved to minimize delays. Evidence from Kenyan health facilities indicates that availability and organization of essential commodities can influence the delivery of basic maternal care and PPH-related interventions [25,26].

Communication and escalation pathways between midwives, obstetricians, theatre, critical care and blood-bank services should be strengthened. Variation in the quality of competent and respectful maternity care highlights the importance of coordinated systems and effective referral or escalation processes [20,29].

Routine clinical audit and feedback should be used to compare documented and observed performance and identify recurrent gaps in PPH prevention and management. Comparing actual clinical performance with expected standards can help identify implementation gaps and guide quality-improvement activities [19,30].

Structured mentorship and supervised skills practice should be provided for procedures in which self-reported confidence is lower, including bimanual uterine compression and manual removal of the placenta.

Respectful maternity care, procedure explanation and emotional support should be incorporated into obstetric emergency training rather than being treated as separate from technical PPH management. Evidence on competent and respectful delivery care supports maintaining these dimensions alongside technical clinical performance [20].

Abbreviations

AMTSL, active management of the third stage of labour; CCT, controlled cord traction; CPD, continuing professional development; KNH, Kenyatta National Hospital; PPH, postpartum haemorrhage; PPE, personal protective equipment; WHO, World Health Organization.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Kenyatta National Hospital–University of Nairobi Ethics and Research Committee, approval number: P164/03/2025. Regulatory authorization was obtained from the National Commission for Science, Technology and Innovation (NACOSTI), Ref No: 940492. Institutional permission was obtained from KNH, Ref: KNH/OBS& GYNAE- HOD/51/VOL. I/).

The study adhered to the Declaration of Helsinki, with informed consent obtained from all participants. Participation was voluntary, confidentiality was maintained and participants could withdraw at any time. The study was non-invasive, low-risk and inclusive.

Consent for publication

Not applicable. No individual participant-identifying information is reported.

Availability of data and materials

The datasets generated and/or analysed during the study are not publicly available because of confidentiality and ethical considerations but may be available from the corresponding author on reasonable request, subject to institutional and ethical requirements.

Competing interests

The author declares no competing interests.

Funding

No external research funding was reported in the study materials.

Authors' information

Darius Muli David conceived and designed the study, collected, interpreted the findings and drafted the manuscript. Emmah Kanini Matheka and Wakasiaka Sabina Nyanchera Marko contributed to the study design and methodology, critically revised the manuscript and approved the final version. All authors agreed to be accountable for their respective contributions and approved the submitted manuscript.

Authors' affiliations

Darius Muli David¹, Emmah Kanini Matheka¹ Wakasiaka Sabina Nyanchera Marko¹.

¹ Department of Nursing Sciences, University of Nairobi, Kenya.

Acknowledgements

The author acknowledges the University of Nairobi, Kenyatta National Hospital, Study Supervisors, Data Analyst, participating Midwives and Key Informants.

References

1. American College of Obstetricians and Gynecologists. (2017). Practice bulletin no. 183: postpartum haemorrhage. *Obstet Gynecol.* 2017;130(4)–e186.
2. Bienstock JL, Eke AC, Hueppchen NA. Postpartum haemorrhage. *N Engl J Med.* 2021;384(17):1635–45.
3. Carroli G, Cuesta C, Abalos E, Gulmezoglu AM. Epidemiology of Postpartum Haemorrhage. *Syst Rev Best Pract Res Clin Obstet Gynecol.* 2008;22(6):999–1012.
4. Corbetta-Rastelli CM, Friedman AM, Sobhani NC, Arditi B, Goffman D, Wen T. Postpartum haemorrhage trends and outcomes in the United States, 2000–2019. *Obstet Gynecol.* 2023;141(1):152–61.
5. Gilian H, Otieno T, Njuguna K. Global Trends in Maternal Mortality and PPH in Sub-Saharan Africa. *J Global Health Rep.* 2023;7(3):300–15.
6. Institute for Health Metrics and Evaluation. *GBD Compare* (2018).
7. UNICEF, UNFPA. Trends in maternal mortality: 1990–2015: estimates from WHO. World Bank Group and the United Nations Population Division; 2015.
8. World Health Organization. Sexual and Reproductive Health: Maternal Mortality: Level and Trends 2000 to 2017. Geneva: WHO; 2019.
9. Edhi MM, Aslam HM, Naqvi Z, Hashmi H. Post partum haemorrhage: causes and management. *BMC Res Notes.* 2013;6:1–6.
10. Ende HB, Lozada MJ, Chestnut DH, Osmundson SS, Walden RL, Shotwell MS, Bauchat JR. Risk factors for atonic postpartum haemorrhage: a systematic review and meta-analysis. *Obstet Gynecol.* 2021;137(2):305–23.
11. Escobar MF, Nassar AH, Theron G et al. FIGO recommendations on the management of postpartum hemorrhage 2022. *Int J Gynecol Obstet.* 2022; 157.
12. Kelly CW, Radia TJ, Suzanne BB. (2024): Postpartum Hemorrhage.
13. Matthew A, Margaret S. (2022) A longitudinal study of incidence and mortality of postpartum haemorrhage at the Gambian tertiary hospital.
14. World Health Organization. (2023). Postpartum Haemorrhage: Key Facts.
15. Bartlett L, Cantor D, Lynam P, Kaur G, Rawlins B, Ricca J et al. (2015) Facility-based active management of the third stage of labour: assessment of quality in six countries in sub-Saharan Africa. *Bull World Health Organ.* Nov 1;93(11):759–67.
16. Callaghan WM, Kuklina EV, Berg CJ. Trends in postpartum haemorrhage: United States, 1994–2006. *Am J Obstet Gynecol.* 2010;202(4):353–e1.
17. Karen LM, Steven WH, Sim SG. Preventing postpartum hemorrhage. managing the third stage of labor; 2006.

18. World Health Organization. WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva: WHO; 2012.
19. Althabe F, Therrien MNS, Pingray V, Gulmezoglu M. Impact of Care Bundles on Management of Postpartum Haemorrhage: A WHO Technical Consultation. *Int J Gynecol Obstet*. 2020;144(1):59–67.
20. Arsenault C, English M, Gathara D, Malata A, Mandala W, Kruk ME. Variation in competent and respectful delivery care in Kenya and Malawi: a retrospective analysis of national facility surveys. *Trop Med Int Health*. 2020. Apr;25(4):442–53.
21. Dennis ML, Benova L, Abuya T, Campbell OMR. Facility-based Delivery and Postpartum Haemorrhage in Kenya: A Review. *BMC Pregnancy Childbirth*. 2018;18(1):100.
22. Gakwerere M et al. (2024;) Access to continuous professional development for capacity building among nurses and midwives providing emergency obstetric and neonatal care in Rwanda. 24 (394).
23. Gitobu C, Gichangi P, Mwanda W. Linda Mama Program: Impact on Maternal Health Care in Kenya. *Afr J Reprod Health*. 2018;22(1):35–42.
24. Gitobu C, Gichangi P, Mwanda W. Facility-based delivery and postpartum haemorrhage in Kenya. *Rev BMC Pregnancy Childbirth*. 2018;18(1):100.
25. Kibira FW, Kiwanuka SN, Zirabamuzale M. Scaling Up Uterotonic Drugs in the Management of PPH in Kenyan Facilities. *East Afr Med J*. 2021;98(3):75–82.
26. Margaret EK, Hannah HL, Stéphanie V, Godfrey MM, Richard KA, Ana L. (2016): Quality of basic maternal care functions in health facilities of five African countries: an analysis of national health system surveys.
27. Shikuku DN, Mwaura C, Nandikove P, et al. An evaluation of the effectiveness of an updated pre-service midwifery curriculum integrated with emergency obstetric and newborn care in Kenya: a cluster randomised controlled trial. *BMC Med Educ*. 2024;24:1562.
28. Andrikopoulou M, D'Alton ME. (2019, February). Postpartum haemorrhage: early identification challenges. In *Seminars in perinatology* 43, (1), 11–17. WB Saunders.
29. Junita H, Emma CD, Dan H, Nora M, Kennedy O, Monica O, Burke T, Jessica LC, Margaret M. (2022). Health care providers' knowledge of clinical protocols for postpartum haemorrhage care in Kenya: A cross-sectional study.
30. Souza JP, Gülmezoglu AM, Vogel J, Carroli G, Lumbiganon P, Qureshi Z, et al. Moving beyond essential interventions for reduction of maternal mortality (the WHO Multicountry Survey on Maternal and Newborn Health): A cross-sectional study. *Lancet*. 2013;381(9879):1747–55.
31. Angelina JA, Kibusi SM, Mwampagatwa I. Factors influencing nurses' knowledge and skills in the prevention and management of postpartum haemorrhage. *Afr J Midwifery Women's Health*. 2019;13(4).
32. Daniel LM, Angelina AJ. (2022). Knowledge and skills on active management of the third stage of labour for prevention of postpartum haemorrhage among health care providers in Lake Zone, Tanzania: a cross-sectional study.

33. Borovac-Pinheiro A, Pacagnella RC, Cecatti JG, Miller S, Ayadi E, Souza AM, J.P., Winikoff B. Postpartum haemorrhage: new insights for definition and diagnosis. *Am J Obstet Gynecol.* 2018;219(2):162–8.
34. Rath W. Postpartum Haemorrhage – Update on Problems of Definitions and Diagnosis. *Acta Obstet Gynecol Scand.* 2011;90(5):421–8.
35. Evensen A, anderson JM, Fontaine P. Postpartum haemorrhage: prevention and treatment. *Am Family Phys.* 2017;95(7):442–9.
36. Nyfløt LT, Sandven I, Stray-Pedersen B, et al. Risk factors for severe postpartum haemorrhage: A case-control study. *BMC Pregnancy Childbirth.* 2017;17(1):1–9.
37. Santosh R, Karthik R, Patel A, Garg D, Shalini D. Severe Maternal Morbidity and Mortality Related to Postpartum Haemorrhage in Low- and Middle-Income Countries. *Int J Obstet Gynecol.* 2023;131(4):564–72.
38. Maria FE, Carlos EF, Javier AC, et al. Experience in the use of non-pneumatic anti-shock garment (NASG) in the management of postpartum haemorrhage with hypovolemic shock in the Fundación. Colombia: Valle Del Lili, Cali; 2017.
39. Watkins EJ, Stem K. Postpartum Haemorrhage JAAPA. 2020;33(4):29–33.
40. Pulei P, Omwenga I, Kimani F. Protocol for the Prevention and Management of Postpartum Haemorrhage at Kenyatta National Hospital. *Kenya Med J.* 2018;32(4):123–32.

Figures

Figure 1. Previous PPH/obstetric training exposure among midwives

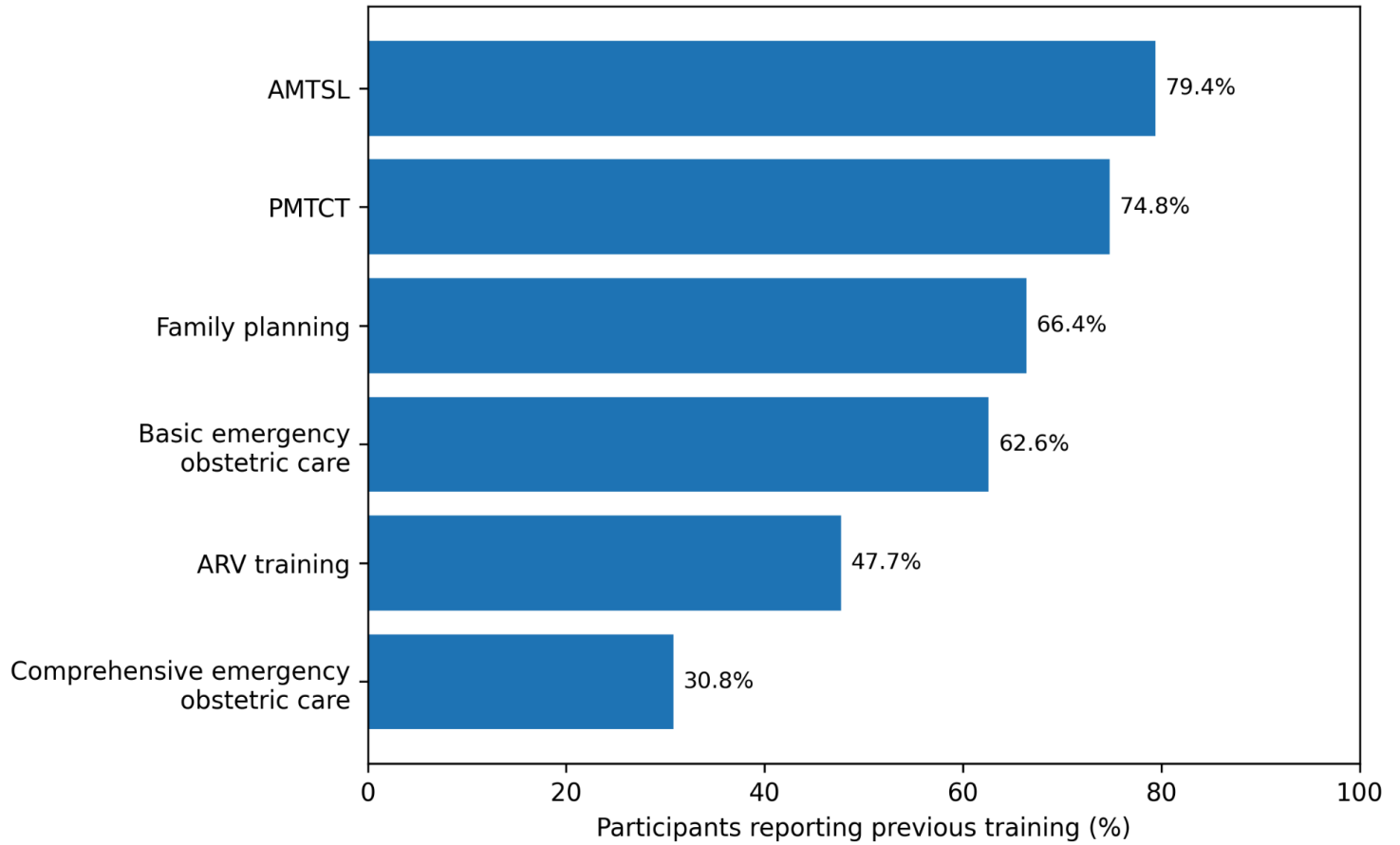


Figure 1

Previous training exposure among participants.

Figure 2. Knowledge versus observed performance for key PPH prevention interventions

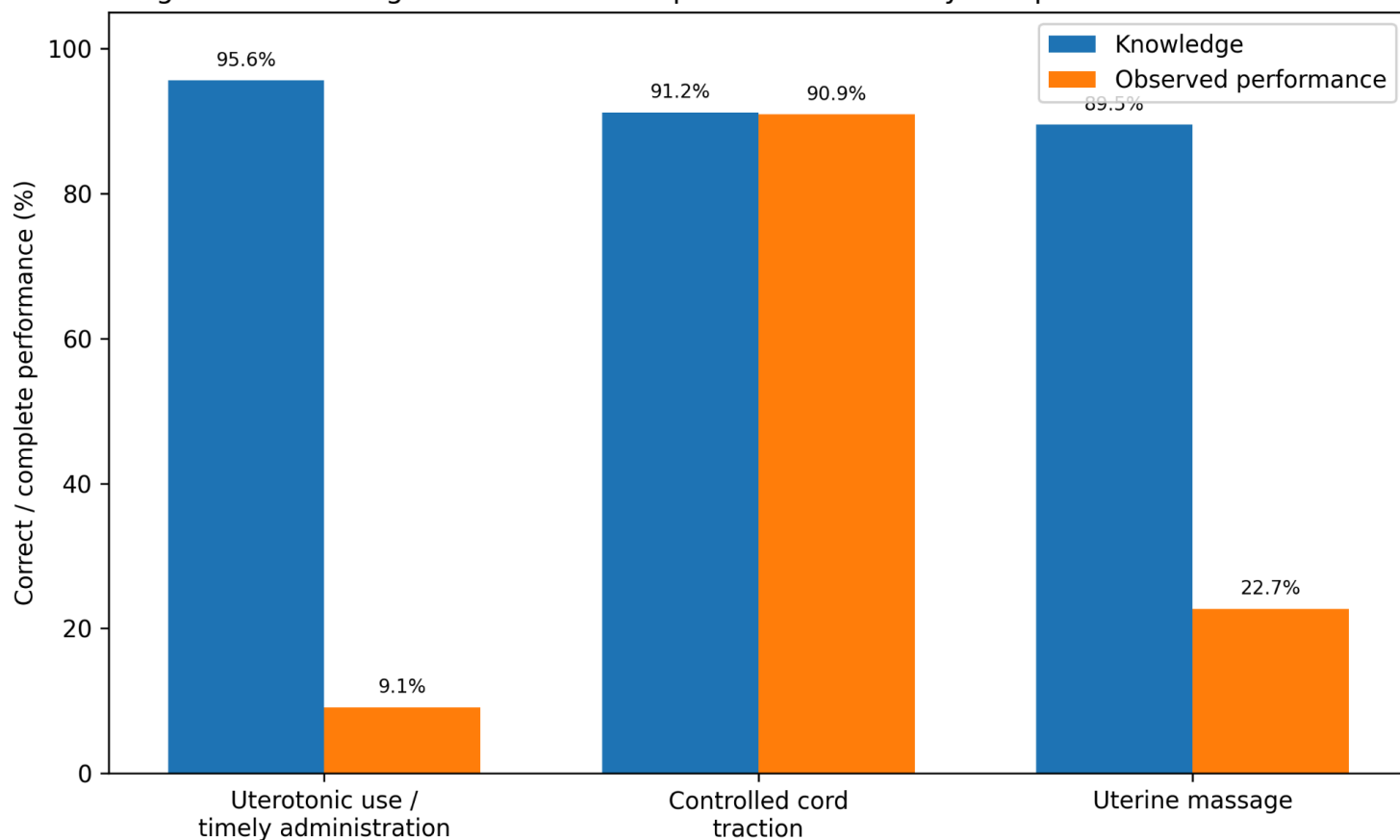


Figure 2

A substantial discrepancy was observed between theoretical knowledge and bedside performance.

Figure 3. Observed performance of uterine assessment and massage

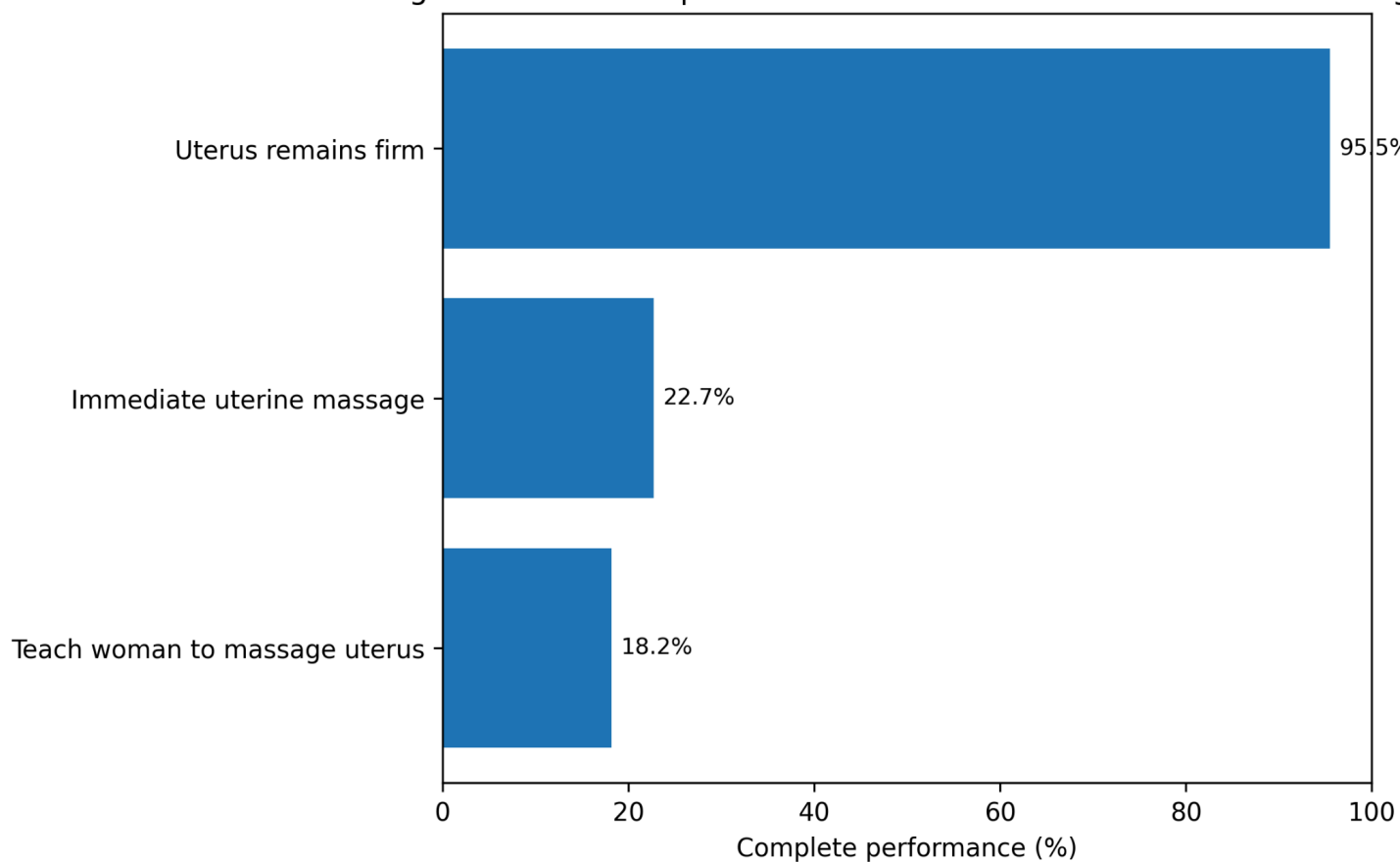


Figure 3

Observed performance of uterine assessment and massage.