Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Obstetrics and Gynaecology

Practice of Care Bundle Approach in Management of PPH; To Observe Adherence to Guideline

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DOI: https://doi.org/10.36347/sjams.2025.v13i02.007 | **Received:** 27.11.2024 | **Accepted:** 06.01.2025 | **Published:** 03.02.2025

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Abstract **Original Research Article**

Background: Post-partum hemorrhage (PPH) remains a significant contributor to maternal mortality worldwide, responsible for 25% of maternal deaths. In Bangladesh, PPH accounts for 28.37% of maternal deaths, making it the leading cause of maternal mortality in the country. The shift from home births to facility-based deliveries presents an opportunity to reduce PPH-related mortality. The World Health Organization (WHO) introduced the concept of bundling evidence-based interventions for PPH to enhance the quality of care. ***Objectives:*** This study aimed to observe the existing practice of Care Bundle Approach in managing primary PPH and level of adherence to guideline. ***Method:*** A Cross-sectional Observational study was conducted in Dhaka Medical College Hospital (DMCH) from June 2022 to July 2023. Women with primary PPH following vaginal delivery attending the Department of Obstetrics and Gynecology were included to study by non-random purposive sampling. A pre-tested semi-structured questionnaire was used for data collection. Descriptive statistics was conducted and Chi-square test done. SPSS version 25.0 was used for statistical Analysis. ***Results:*** The study included a total of 101 participants, Majority (46.5%) belonged to 21-25 years' age group with a mean age of 26.04 years (±4.67). majority of respondents were housewives (78.2%) and 37.6% had primary education. The majority of participants were multi parous (69.3%) and 83.2% of patients had gestational age more than 36+ weeks. The mode of delivery was predominantly vaginal (96%). Majority of the patients (78%) delivered outside DMCH while 37. 7% had delivered by unskilled birth attendant. Majority of PPH was due to atonic uterus (62.4%) followed by retained bits of placenta (13%). First response bundle actions were implemented effectively and only 11% of patients required refractory PPH care. Administration of prophylactic uterotonics was 100%. Blood transfusion was given in 85.1% of cases. The first response to PPH bundle, which included uterotonic drugs (100%), isotonic crystalloids (100%), tranexamic acid (98%), and uterine massage (96%), was implemented. Furthermore, effective communication with pathology department (75.2%), and transfusion department (84.2%) was reported. However, communication with senior obstetricians during refractory PPH management was 72.7%. Only 7.9% of patients required ICU management and 2% underwent surgical procedures. Importantly, no maternal mortality was reported. ***Conclusion:*** At DMCH, the Care Bundle Approach for primary postpartum hemorrhage (PPH) management was effectively implemented. All first response measures, such as uterotonic administration, uterine massage, tranexamic acid were consistently applied, resulting in low refractory PPH rates and no PPH-related maternal mortality.

Keywords: Post-partum hemorrhage, maternal mortality, care bundle approach, obstetric care, healthcare quality.

INTRODUCTION

Post-partum hemorrhage (PPH) is considered as a major cause of maternal mortality, globally contributing 25% of maternal Death [1]. PPH occurs in 5% of all deliveries and most deaths occur within 4 hours of delivery, indicating that PPH is a consequence of third stage of labor [2]. Hemorrhage is responsible for 28.37% of maternal death in Bangladesh among which PPH is the most common cause [3]. Causes of PPH are separated into the 4 'T's-tone, thrombin, trauma and tissue. Common causes include uterine atony(tone), preeclampsia (thrombin), perineal laceration (trauma) and retained placenta (tissue) [4]. Because most PPH related deaths are preventable through the

implementation of effective interventions, the recent shift from home births to facility births across low- and middle-income countries provide new opportunities for saving women's lives [5]. In 2001, the Institute for Healthcare Improvement (IHI) developed a formal approach to bundling care to increase the quality and efficiency of care delivery. In early 2017, the World Health Organization (WHO) opted to investigate whether combining bundle care with current WHO-recommended evidence-based interventions for PPH due to uterine atony could hasten the adoption and adherence to PPH guidelines [5]. The 'First response to PPH bundle' and the 'Response to refractory PPH bundle' were developed as two care bundles of clinical therapies for PPH [6]. Uterotonics, IV fluids, tranexamic acid and uterine massage were all part of the first response to PPH bundle were meant to be presented alongside supportive features including advocacy, training, teamwork, communication, respectful treatment and the implementation of best clinical practices, like any other clinical bundle [6]. Recently obstetricians of Bangladesh are concentrating more on establishing institutional practice of 'Care Bundle Approach' in PPH management through hospital-based training. But whether it is in practice or not is not monitored properly. No study is available in our country to assess the proper implementation of 'Care Bundle Approach'. Our study aimed to observe the degree of adherence of health care professionals to 'Care Bundle Approach' in PPH management.

MATERIALS AND METHODS

Type of Study: This was a cross-sectional observational study.

Place of Study: This study was carried out in the Department of Gynecology and Obstetrics in Dhaka Medical College Hospital (DMCH).

Period of Study: This study was conducted from June 2022 to July 2023. (12 months)

Study Population: Women with primary PPH following vaginal delivery attending department of Obstetrics and Gynecology in Dhaka Medical College and Hospital, Dhaka will be the study population.

Sampling Method: Non-random purposive sampling will be done according to the availability of the patients who will fulfill the inclusion criteria.

Sample Size: Sample size for hypothesis testing of the difference between two means

$$n = \frac{Z^2PQ}{d^2}$$

Calculating the above formula same size is
n = 101 (estimated sample size)

Selection of Patients:

A. Inclusion Criteria:

- Women with Primary PPH following vaginal delivery

B. Exclusion Criteria:

1. Women who developed secondary PPH
2. Women having primary PPH following Cesarean Section.

Study Procedure: This cross-sectional Observational study was conducted at the Department of Gynecology and Obstetrics. Approval for the study was obtained from the Institutional Review Board of DMCH before the study commenced. The study population was selected from women with primary PPH following vaginal delivery attending department of Obstetrics and Gynecology in Dhaka Medical College, Dhaka. The purpose and procedure of the study were discussed with the patients and written informed consent was obtained from each participant. Clinical examination included general examination, systemic examination, and routine gynecological examination.

Data Collection: Subjects were purposively selected based on the availability of patients. Detailed obstetric and medical histories, along with clinical examination findings, PPH management were obtained and then recorded in the preformed structured questionnaire.

Statistical Analysis of the Study: Statistical analysis was performed using SPSS statistical software, version 25.0 (SPSS, Chicago, IL). Frequency and Percentage was calculated for Nominal data. Continuous Data were given as mean ± SD. Comparisons of categorical variables were conducted using Chi-square testing and Fisher's Exact test. *P* values less than 0.05 were considered significant.

RESULTS

Table 1: Distribution of Sociodemographic Characteristics of Study Participants (n=101)

Characteristics	Frequency (n)	Percentage (%)
Age group (years)		
≤ 20	10	9.9
21-25	47	46.5
26-30	22	21.8
31-35	20	19.8
>35	2	2.0

Mean ± SD (Range)	**26.04 ±4.67 (18-36)**	
Occupation		
Housewife	79	78.2
Student	18	17.8
Service	4	4.0
Educational status		
Illiterate	9	8.9
Primary	38	37.6
Secondary	35	34.7
Higher secondary and Above	19	18.8

Table I highlights that almost half of the respondents (46.5%) belonged to 21-25year age group and only 2% were more than 35 years age. Majority of the respondents were housewife and only 18.8% have completed higher secondary education.

Table 2: Distribution of Obstretics Characteristics among Study Participants (n=101), OVD=Operative vaginal delivery

Characteristics	Frequency (n)	Percentage (%)
Number of fetus		
Single	99	98.0
Multiple	2	2.0
Parity		
1	31	30.7
2	38	37.6
3	28	27.7
>3	4	4.0
Mode of Delivery		
Vaginal delivery	97	96.0
VBAC	2	2.0
OVD	2	2.0
Gestational Age(weeks)		
28-32	4	4.0
33-36	13	12.9
more than 36	84	83.2

Table shows that nearly all participants (98%) had singleton pregnancy and 96% had vaginal delivery. Only 4% participants were <32 weeks gestation. This figure depicts that more than three-fourth of the patients (78%) had delivery outside DMCH. The equal percentage (31.7%) delivery was conducted by both doctors and unskilled birth attendant

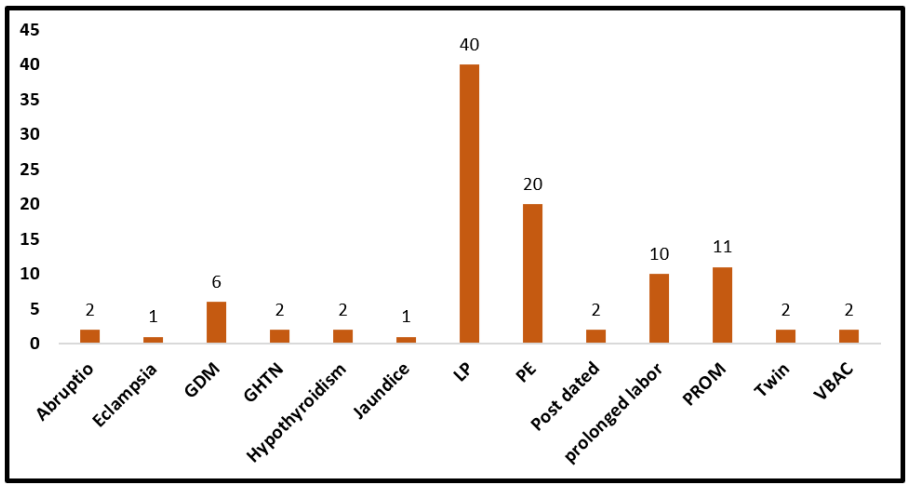

Figure 1: Distribution of the respondents by Antenatal Diagnosis (n=101)

This figure represents that more than one-third (39.6%) patients had no obstetric complication, they presented with labor pain. PE was the most frequent obstetric complication followed by PROM, prolonged labor. However, eclampsia, jaundice were the least frequent presentation.

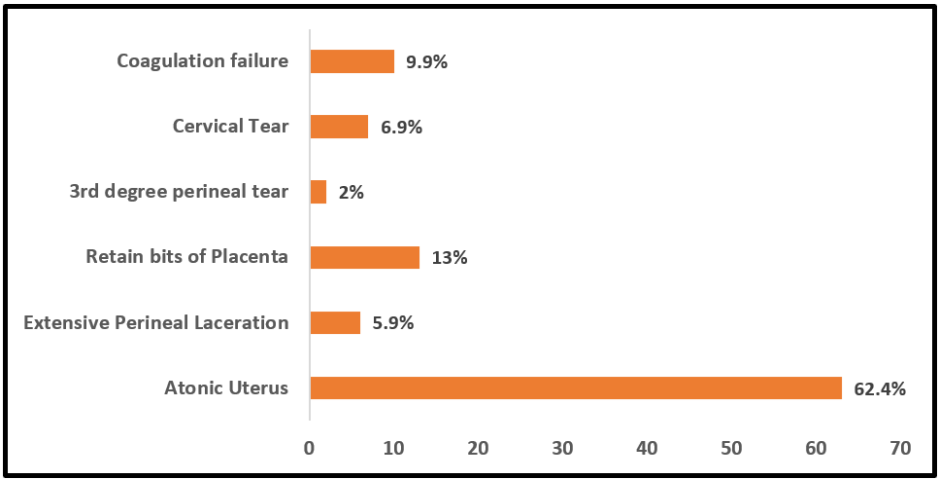

Figure 2: Distribution of the respondents by causes of PPH (n=101)

The figure describes that majority of the PPH was due to atonic uterus (62.4%) followed by retained bits of placenta (13%). Extensive perineal laceration, 3rd degree perineal tear and cervical tear together contributed to 14.8%.

Table 3: Distribution of Participant by first response to PPH Bundle(n=101)

Characteristics	Frequency (n)	Percentages (%)
Blood transfusion given	86	85.1
AMTSL done	101	100
ORRT was ready at labour Room?	97	96.0
ORRT Was in Action in needed in Labour Room?	97	96.0
Conduct uterine message in 15 minutes	97	96.0
Provide IV fluid	101	100.0
Prepare Uterotonics to use after delivery	101	100.0
Provide Tranexamic Acid	99	98.0
Assessment of Vaginal laceration and perineal Tear	101	100.0
Treated Extensive perineal laceration	6	5.9%
Assist Patient to Empty bladder	101	100

This table shows that 85.1% required blood transfusion. ORRT was in action in nearly all patient (97%). IV fluid and uterotonics required in all patients and AMTSL was done. Extensive perineal laceration was present in 5.9% and was repaired.

Table 4: Distribution of Participant by use of Uterotonics (n=101)

Characteristics	Frequency (n)	Percentages (%)
Oxytocin		
Yes	95	94.1
No	6	5.9
Misoprostol		
Yes	88	87.1
No	13	12.9
Ergometrin		
Yes	43	42.6
No	58	57.4

The table describes that nearly all patient required additional oxytocin (94.1%) and misoprostol (87.1%) but only 42% required Ergometrin to control PPH.

Table 5: Distribution of Participant by Refractory PPH management (n=11)

Characteristics	Frequency (n)	Percentages (%)
Refractory PPH management required	11	100
Method of Compression		
Aortic	2	18.2
Bi-manual	9	81.8
Intrauterine BalloonTamponade	11	100
Availability of non-pneumatic anti shock garments in labor room.	11	100
Use of non-pneumatic anti shock garments in labor room	00	00

This table shows that only 11 patients out of 101 required refractory PPH management. Among them 81.8% required bimanual compression and non-pneumatic anti shock garments was used in none.

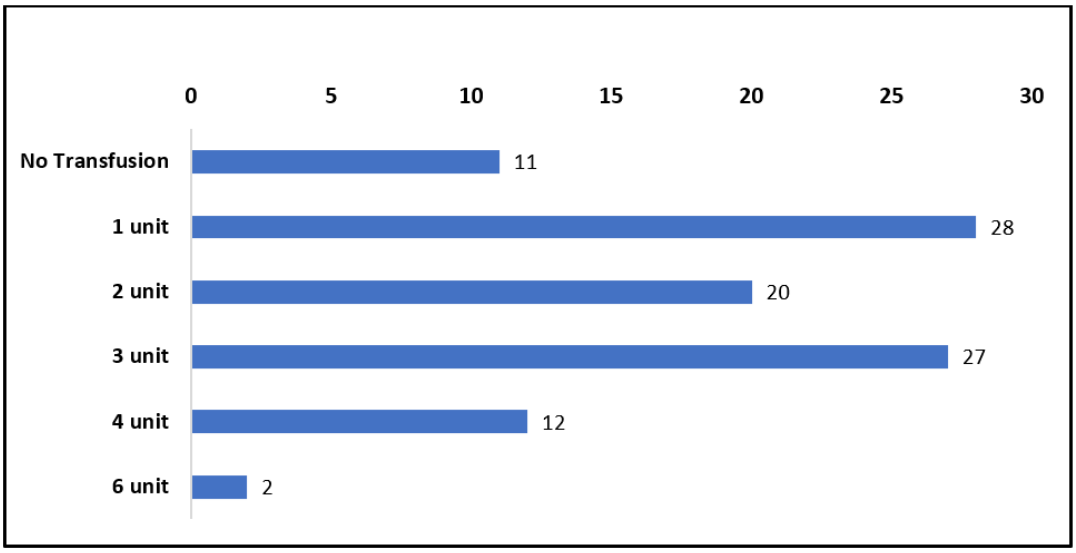

Figure 3: Distribution of units of blood transfusion among participants (n=101)

This figure shows that one-fourth of the participants (27.6%) received one unit blood and 26.7% needed 3 units blood transfusion. 11% required no transfusion.

Table 6: Distribution of Participant by non-clinical approach (n=101)

Characteristics	Frequency (n)	Percentages (%)
Training received by ORRT member	101	100
Senior obstetrician informed during management of refractory PPH	74	72.7
Effective communication maintained with transfusion department	85	84.2
Effective communication with Pathology department	76	75.2
Documentation of events	101	100

This table shows that all ORRT member received training and in majority of cases effective communication was made with senior obstetrician (72.7%), transfusion (84.2%) and pathology department (75.2%). All cases were documented properly in registry book.

Table 7: Distribution of Participant by Maternal Outcome (n=101)

Characteristics	Frequency (n)	Percentages (%)
Referred to ICU		
Yes	8	7.9
No	93	92.1
Required Surgery		
Yes	2	2.0
No	99	98.0
Alive mother	101	100

This table depicts that only 8% of patients required ICU management; among them only 2% required surgery. Fortunately, no maternal mortality observed.

DISCUSSIONS

The observed gaps in quality of care may have important implications for morbidity and mortality from PPH. Timely administration of prophylactic uterotonics and assessment of the placenta and membranes are important for reducing the risk of PPH [7]. Many cases of PPH cannot be easily predicted based on patient characteristics [8]. Therefore, monitoring of vital signs, blood loss and uterine tone is needed to ensure early identification of PPH and initiation of timely action so that complications can be managed before they become severe [9]. In current study, the mean age of study participants was 26.04± 4.67. In terms of educational status, the data indicates that a considerable portion of the participants had completed primary education (37.6%), followed closely by those with secondary education (34.7%). Only a minority (8.9%) were illiterate, and 18.8% had completed higher secondary education or above. This educational diversity underscores the need for tailored healthcare communication and education strategies to accommodate varying levels of literacy and awareness among expectant mothers. Jigyasa S *et al.,* [10] also conducted a similar study on bundle care approach in India where they found that mean age was 24±5 and had lower level of education. This study delves into obstetric characteristics, offering crucial information about the pregnancies and deliveries of the study participants. Notably, the vast majority of participants (98%) experienced singleton pregnancies, while only 2% had multiple fetuses, indicating that multiple pregnancies were relatively rare in the study population. When it comes to the mode of delivery, the overwhelming majority of respondents had vaginal deliveries (96%). A very small percentage had either a vaginal birth after a cesarean (VBAC) or an operative vaginal delivery (OVD), both accounting for 2%. This high prevalence of vaginal deliveries aligns with the World Health Organization's recommendations for promoting vaginal births as the preferred mode of delivery, whenever possible. Our study reveals that a significant portion of the study participants had pregnancies beyond 36 weeks (83.2%). A smaller percentage fell within the 33-36 weeks gestational age range (12.9%), and only 4% had pregnancies between 28 and 32 weeks. This data indicates that most pregnancies in the study population were near term, with only a limited number of preterm pregnancies. Another study conducted by Jigyasa S *et al.,* [10] also found that majority were > 36 weeks gestation, having primarily single pregnancy; majority had 3 or more children. This study found that those who presented with PPH, majority (78%) had their delivery outside DMCH. All patients required refractory PPH management care delivered outside DMCH; this association was found statistically significant ($p<.05$). Besides in this group, blood transfusion required more frequently, required ICU support and surgical approach to control PPH. This may be due to poor implication of bundle care approach in managing PPH in primary and secondary health care facilities and lack of training of ORRT members. Poor supervision of ORRT team by seniors and lack of clinical audit may be another contributing factors for this poor outcome. Another previous study represented that only 15% patients were referred cases which contradict our study [10]. This may be explained by the fact that in India majority of the complicated cases are delivered in tertiary health care centres or the delivery conductors in primary and secondary centres are very well trained. The current study provides insights into the distribution of delivery conductors. It reveals that an equal percentage (31.7%) of deliveries were conducted by both doctors and unskilled birth attendants. This finding suggests that in the study area, a significant proportion of deliveries were attended by unskilled birth attendants, highlighting the need for initiatives to enhance the training and skills of birth attendants to ensure the proper implementation of bundle care approach leading to safe deliveries. A noteworthy finding is that more than one-third of patients (39.6%) presented with labor pain and had no obstetric complications. Among those with complications, preeclampsia (PE) was the most frequent followed by premature rupture of membranes (PROM) and prolonged labor, while eclampsia and jaundice were less common. This data highlights the need for effective antenatal care to detect and manage complications early, especially given the high prevalence of PE. Previous study found that 58% of deliveries were conducted by midwives Clarke-Deelder E *et al.,* [11] and the most frequent antenatal complication was PROM, PE was less than 2% [10]. Based on the diagnosis stated by ORRT members during care, the most common cause was atonic uterus (62.4%), followed by retained products of conception (13) coagulation failure (9.9%), cervical tear (6.9%), perineal lacerations (5.9%) and third degree perineal tear (2%). PPH was typically managed by a team of providers. The most frequent provider involved in PPH care was ORRT member in 100% of cases. Consultant physicians were involved in PPH care in 72.7%of the observed cases. Clarke-Deelder E *et al.,* [11] also found that the most common cause was atonic uterus (50%), followed by retained products of conception (44%), vaginal lacerations (23%), perineal lacerations (18%) and cervical lacerations (5%). Providers completed all recommended actions for preventive care in almost all deliveries. Providers almost always supported the perineum during delivery, assessed patients for perineal or vaginal lacerations following delivery, administered a prophylactic uterotonic following delivery, and performed uterine massage within 15 minutes of delivery (AMTSL done in 100% cases). However, assessment of completeness of the placenta and membranes was comparatively less common (77%), and prophylactic

uterotonics were administered in the recommended timeframe of 1 minute in all deliveries. Our findings are not in line with a growing literature documenting gaps in maternity care quality in LMICs. This literature demonstrates that gaps in preventive care actions are common. This indicates good adherence to guideline considering primary response of bundle care and the effectiveness of ORRT training. Probably due to strict adherence to primary response care, only 11% patients required refractory PPH care. In our study, only 7.9% patients required ICU management and only 2% needed surgical approach to manage refractory PPH and no maternal mortality reported. This indicates that strict adherence to guideline and prompt action can prevent maternal mortality due to PPH. In this study, we observed that non-pneumatic anti shock garments were available in the labour ward but not used in management of PPH. We need to focus more on this to reduce the need for ICU and better outcome and less hospital stay of patients. Our findings are particularly concerning since the study hospitals serve as referral and teaching hospitals. Together, they perform huge number of deliveries annually and manage the cases with PPH referred from primary and secondary health care systems. Moreover, the quality of care in these hospitals serves as a reference for providers who train there and go on to practice throughout the country. As researchers and policymakers consider ways to redesign health systems so that more patients deliver in hospitals or other advanced care health facilities [12], it will be important to address gaps in the quality of care at this level of the health system. It is a great news that we found a good adherence to bundle care approach in managing primary PPH and that can be an example for other health care system.

CONCLUSION

This study at DMCH assessed the implementation of the bundle care approach for primary post-partum hemorrhage (PPH) and adherence to clinical guidelines. Findings revealed successful implementation of the bundle care approach, associated with reduced refractory PPH cases and no maternal mortality from PPH. Primary care responses demonstrated high adherence to guidelines, although communication discrepancies were noted with pathology and transfusion departments. Effective communication was more common with the transfusion department, while involvement of senior obstetricians during refractory PPH management was less frequent.

Limitation of the study

- ORRT members did not adhere to guidelines for postpartum monitoring, including assessment of vital signs, uterine tone, and blood loss during the 24 hours following delivery, in any of the observed deliveries
- Timeliness of routine care and PPH management were not taken into consideration.
- Observers might not have captured all actions, leading to an underestimation of adherence, despite efforts to minimize this risk.
- The study focused on vaginal deliveries, and PPH cases after cesarean sections or post-hospital discharge were not observed.
- Single center may limit the generalizability of study findings.

Recommendations:

Building upon the findings of this study, the following recommendations are proposed:

Continued Training and Supervision: Maintain a strong focus on the continuous training and supervision of healthcare providers in PPH management, with particular emphasis on primary response actions and enhanced communication with relevant hospital departments. Regular supervision and clinical audits should be conducted to ensure the quality of care remains consistently high.

Enhanced Interdisciplinary Communication: Strengthen communication with all relevant hospital departments, and ensuring the presence of senior obstetricians during the management of refractory PPH.

Training for Unskilled Birth Attendants: Introduce initiatives to enhance the training and skills of unskilled birth attendants to ensure safe deliveries and adherence to clinical guidelines.

Continuous Quality Improvement: Commit to ongoing research and quality improvement efforts to address any identified gaps in the quality of care, particularly in primary and secondary healthcare facilities.

REFERENCES

1. Say, L., Chou, D., Gemmill, A., Tunçalp, Ö., Moller, A. B., Daniels, J., ... & Alkema, L. (2014). Global causes of maternal death: a WHO systematic analysis. The Lancet global health, 2(6), e323-e333.
2. Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. (2022). Accessed: April 4, 2022:
3. Sultana, N., Sultana, N., Sultana, R., & Begum, R. A. (2016). Maternal mortality and morbidity due to obstetric haemorrhage: A one year review in a tertiary hospital. Medicine Today, 28(1), 9-11.
4. Hawker, L., & Weeks, A. (2020). Postpartum haemorrhage (PPH) rates in randomized trials of PPH prophylactic interventions and the effect of underlying participant PPH risk: a meta-analysis. BMC pregnancy and childbirth, 20, 1-12.
5. Althabe, F., Therrien, M. N., Pingray, V., Hermida, J., Gülmezoglu, A. M., Armbruster, D., ... & Miller, S. (2020). Postpartum hemorrhage care bundles to improve adherence to guidelines: a WHO technical

consultation. International Journal of Gynecology & Obstetrics, 148(3), 290-299.

6. Bohren, M. A., Lorencatto, F., Coomarasamy, A., Althabe, F., Devall, A. J., Evans, C., ... & Miller, S. (2021). Formative research to design an implementation strategy for a postpartum hemorrhage initial response treatment bundle (E-MOTIVE): study protocol. Reproductive health, 18, 1-16.
7. World Health Organization. WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva: World Health Organization; 2012.
8. Aoyama, K., D'Souza, R., Pinto, R., Ray, J. G., Hill, A., Scales, D. C., ... & Fowler, R. A. (2018). Risk prediction models for maternal mortality: a systematic review and meta-analysis. PLoS One, 13(12), e0208563.
9. Eppes, C. S., Han, S. B., Haddock, A. J., Buckler, A. G., Davidson, C. M., & Hollier, L. M. (2021). Enhancing obstetric safety through best practices. Journal of women's health, 30(2), 265-269.
10. Jigyasa, S., Agrawal, S., Pandey, U., Sachan, S., Rajan, M., Singh, T. B., & Sapna, S. (2022). Implementation of Postpartum Hemorrhage Emergency Care Using a Bundle Approach at a Tertiary Care Hospital in North India. Cureus, 14(7). doi: 10.7759/cureus.26819. PMID: 35847163; PMCID: PMC9279140.
11. Clarke-Deelder, E., Opondo, K., Achieng, E., Garg, L., Han, D., Henry, J., ... & Cohen, J. (2023). Quality of care for postpartum hemorrhage: A direct observation study in referral hospitals in Kenya. PLOS Global Public Health, 3(3), e0001670.
12. Roder-DeWan, S., Nimako, K., Twum-Danso, N. A., Amatya, A., Langer, A., & Kruk, M. (2020). Health system redesign for maternal and newborn survival: rethinking care models to close the global equity gap. BMJ Global Health, 5(10), e002539.