Reducing Maternal Mortality through Effective Management of Postpartum Haemorrhage – A Prospective Study from a Tertiary Care Facility in Bangladesh

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ABSTRACT

Background: Postpartum haemorrhage remains a leading cause of maternal mortality in Bangladesh; effective tertiary care management is crucial. This study aims to analyse the effective management of postpartum haemorrhage in the reduction of maternal mortality and morbidity in a tertiary care hospital of Bangladesh. **Methods & Materials:** The prospective cross-sectional study was conducted from 1 July 2010 to 30 September 2010 at the Department of Obstetrics and Gynaecology, Rangpur Medical College Hospital, Rangpur, Bangladesh. 50 women presenting with PPH were included. Data were collected using a structured sheet covering demographics, antenatal care, history, delivery, management, and outcomes; analysed in SPSS 26 using frequencies and percentages. **Results:** The majority of women were aged 31-40 years (74%), with low education (52%) and annual income ≤50,000 BDT (64%). Most had irregular (51%) or no antenatal check-ups (32%), and 66% were multipara. Among out-of-hospital deliveries, 68.8% were attended by unskilled personnel. Normal vaginal delivery was most common (72%), and 56.3% of women arrived at the hospital 2-6 hours after PPH onset. Retained placenta was the leading cause of PPH in out-of-hospital deliveries (71.9%), while uterine atony predominated in hospital deliveries (77.8%). Management included manual removal of placenta (46%), injectable uterotonics (10%), uterotonic with misoprostol (8%), surgical repair of genital tract injuries (16%), and hysterectomy (4%). Clinical outcomes were favourable, with 98% of women improving, 2% mortality, and 78% discharged within 2-6 days. **Conclusion:** Maternal age, multiparity, education, inadequate antenatal care, unskilled birth attendance, and delayed referral contribute to PPH; timely structured tertiary management reduces maternal mortality in Bangladesh.

Keywords: *Postpartum Haemorrhage, Maternal Mortality, Tertiary Care, PPH Management*

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INTRODUCTION

PPH remains the leading direct cause of maternal mortality globally, accounting for nearly one-third of all maternal deaths. The burden is heaviest in low and middle-income countries such as Bangladesh. Despite global progress in reducing maternal mortality, the disproportionate contribution of haemorrhage-related deaths in South Asia points to persistent weaknesses in timely clinical response and systems for emergency obstetric care [1]. Furthermore, recently available nationally representative data from Bangladesh show that while overall maternal mortality has decreased, PPH continues to be the most common cause of maternal death, with most deaths occurring within the first 24 hours postpartum [2]. These patterns point to critical gaps in timely recognition, early intervention, and referral pathways. The severity of PPH in tertiary care settings throughout Bangladesh is further reflected in hospital-based research. For example, studies have shown that PPH is a major contributor to obstetric ICU admissions, reflecting that many patients present in advanced stages of haemorrhage requiring critical care support [3]. Other evidence has indicated that emergency peripartum hysterectomy remains a necessary life-saving intervention when PPH becomes unresponsive to medical and conservative surgical management [4]. Moreover, significant maternal morbidity, which includes shock, organ dysfunction, and prolonged hospitalisation, continues to be reported among women experiencing severe PPH in tertiary hospitals [5]. One of the more pervasive obstacles to the effective management of PPH is reliance on estimated visual blood loss, which is acknowledged as being inaccurate and often leads to delayed intervention. A large systematic review confirmed that clinical signs of hypovolemia appear only after significant blood loss has occurred, making early clinical detection challenging without objective measurement tools [6]. These diagnostic limitations add significant support to the need for structured, standardised and timely management protocols. Evidence-based therapeutic strategies have been enhanced over the last ten years. The WOMAN Trial provided high-quality evidence that TXA administered early significantly reduces death due to bleeding when given within three hours of birth and shapes global guidelines and national protocols [7]. Additional analyses further emphasise the importance of timely TXA use as part of modern PPH care [8]. Reflecting these advances, the WHO recommends a comprehensive PPH care bundle comprising rapid uterotonic administration, early administration of TXA, accurate assessment of blood loss, intravenous fluids and prompt escalation to surgical or transfusion management as needed [9]. Implementation research also underlines that carefully structured bundles of PPH improve clinical adherence, reduce treatment delays and enhance multidisciplinary coordination in settings with a high disease burden [10]. A recent review showed that care bundles are associated with reductions in severe PPH, the requirement for transfusion, and other adverse outcomes when consistently applied [11]. However, Bangladesh still lacks adequately powered prospective studies evaluating the real-world effectiveness of structured PPH management pathways in tertiary care. The prospective designs of the study offer more accurate blood-loss measurements, timely

documentation of interventions, and more reliable assessment of outcomes related to mortality, hysterectomy, transfusion, and ICU admission. It is this kind of evidence that will be required to reinforce national clinical protocols and reduce preventable maternal deaths associated with PPH. Therefore, this study aims to analyse the effective management of postpartum haemorrhage in the reduction of maternal mortality and morbidity in a tertiary care hospital of Bangladesh.

METHODS & MATERIALS

This cross-sectional prospective study was conducted for a period of three months (1 July 2010 to 30 September 2010) in the Department of Obstetrics and Gynaecology at Rangpur Medical College Hospital, Rangpur, Bangladesh. The total number of women presenting with PPH included in the study was 50. Participants with written informed consent, mainly admitted as cases of PPH, and participants who developed PPH following normal vaginal delivery or lower uterine cesarean section after admission were included in the study. Participants brought in dead with a diagnosis of PPH, pre-existing medical disorders known to independently predispose to haemorrhage, and those who refused to provide written consent were excluded from the study. Informed written consent was obtained after all eligible patients had been briefed about the purpose and the procedures involved in the study. Ethical approval and administrative permission were given by the hospital authority. The study did not require any additional investigations or impose an extra financial burden on the participants, and confidentiality was strictly maintained. Data collection was done using a structured and pretested clinical data sheet on socio-demographic characteristics, history of antenatal care, obstetric factors, history of medical and surgical conditions, mode of delivery, birth attendant type, time of onset, clinical presentation, including timing of PPH, and hemodynamic status. Particulars about conservative and surgical modes of management, blood transfusion requirements, and duration of hospital stay were also elicited. Data entry and analysis were performed using SPSS, version 26. Descriptive statistics such as frequency distributions and percentages were calculated to summarise study variables and present the management outcome in patients with PPH.

RESULTS

Table I shows that the majority of women were aged 31-40 years (74%), indicating that postpartum haemorrhage was more common among women in this age group. Regarding education, most participants were illiterate or had only primary education (52%), suggesting limited awareness of maternal health risks. In terms of income, over half of the women (64%) reported a yearly income of ≤50,000 BDT, highlighting a socioeconomically disadvantaged population vulnerable to poor maternal health outcomes.

Table I
Sociodemographic Characteristics of the study population (*n* = 50).

Variable	Category	n (%)
Age (years)	≤20	2 (4%)
	21-25	3 (6%)
	26-30	6 (12%)
	31-35	16 (32%)
	36-40	21 (42%)
	≥40	2 (4%)
Educational Level	Illiterate	9 (18%)
	Primary	17 (34%)
	Class 6-10	7 (14%)
	SSC	10 (20%)
	HSC	4 (8%)
	Graduate +	3 (6%)
Yearly Income (BDT)	31,000-40,000	14 (28%)
	41,000-50,000	18 (36%)
	51,000-60,000	10 (20%)
	>60,000	8 (16%)

Table II demonstrates that most women had irregular antenatal check-ups (51%) or no check-ups (32%), highlighting inadequate pregnancy monitoring. The majority were multipara (66%), a known risk factor for PPH. Regarding medical history, anaemia was present in 22%, and 60% had no relevant medical or obstetric history. Most women (64%) had no prior uterine surgery, while a smaller proportion had previous cesarean sections (12%) or D&C/MR (22%).

Table II
Obstetric and Medical Profile of the study population (*n* = 50).

Variable	Category	n (%)
Antenatal Check-up	None	16 (32%)
	Irregular	26 (51%)
	Regular	8 (16%)
Parity	Primipara	17 (34%)
	Multipara	33 (66%)
Relevant Medical/Obstetric History	Anaemia	11 (22%)
	Multiple pregnancy	4 (8%)
	APH	2 (4%)
	PET	2 (4%)
	Jaundice	1 (2%)
	None	30 (60%)
Previous Surgical History	No prior uterine surgery	32 (64%)
	H/O Previous C/S	6 (12%)
	D and C/MR	11 (22%)
	H/O Myomectomy	1 (2%)

Table III shows that among women delivering outside hospitals, most births were attended by unskilled personnel (68.8%), while only 31.3% had skilled attendants. Regarding mode of delivery, normal vaginal delivery (NVD) was most common (72%), followed by cesarean section (20%) and instrumental delivery (8%). Time from PPH onset to hospital admission was delayed for most women, with 56.3% arriving within 2-6 hours and only 12.5% within 2 hours. Clinically, 60% presented with PPH and shock, and a majority (80%) required blood transfusions.

Table III
Delivery-Related Characteristics of the study population (*n* = 50).

Variable	Category	n (%)
Birth Attendant (n = 32 outside hospital)	Skilled	10 (31.3%)
	Unskilled	22 (68.8%)
Mode of Delivery (n = 50)	NVD	36 (72%)
	Instrumental	4 (8%)
	Cesarean	10 (20%)
Time from PPH to Admission (n = 32)	<2 hours	4 (12.5%)
	2-6 hours	18 (56.3%)
	6-12 hours	7 (21.9%)
	12-24 hours	2 (6.3%)
	>24 hours	1 (3.1%)
Clinical Presentation (n = 50)	PPH with shock	30 (60%)
	PPH without shock	20 (40%)
Need for Blood Transfusion (n=50)	Yes	40 (80%)
	No	10 (20%)

Table IV reveals that among women admitted from outside hospitals, retained placenta was the most common cause (71.9%), followed by genital tract injury (15.6%) and uterine atony (9.4%). In contrast, for women who delivered inside the hospital, uterine atony predominated (77.8%), with genital tract injury (16.7%) and retained placenta (5.6%) being less frequent.

Table IV
Causes of Postpartum Haemorrhage (*n* = 50).

Cause		n (%)
Women Admitted with PPH from Outside Hospital (n = 32)		
	Retained placenta	23 (71.9%)
	Genital tract injury	5 (15.6%)
	Uterine atony	3 (9.4%)
	Morbid adherent placenta	1 (3.1%)
	Uterine inversion	0 (0%)
Women Who Delivered Inside Hospital (n = 18)		
	Uterine atony	14 (77.8%)
	Genital tract injury	3 (16.7%)
	Retained placenta	1 (5.6%)

Table V shows that among conservative measures, injectable uterotonics were used in 10%, uterotonic with rectal misoprostol in 8%, uterotonic with controlled cord traction in 4%, and condom tamponade in 4% of cases. Surgical management was more common, with manual removal of placenta in 46%, repair of genital tract injuries in 16%, uterine/ovarian artery ligation in 6%, hysterectomy in 4%, and B-Lynch suture in 2%.

Table V
Management Strategies Used for PPH (*n* = 50).

Management Type	Category	n (%)
Conservative	Injectable uterotonics	5 (10%)
	Uterotonic + CCT	2 (4%)
	Uterotonic + Rectal misoprostol	4 (8%)
	Condom tamponade	2 (4%)
Surgical	Manual removal of placenta	23 (46%)
	Repair of genital tract injuries	8 (16%)
	Uterine/ovarian artery ligation	3 (6%)
	Hysterectomy	2 (4%)
	Internal iliac ligation	0 (0%)
	B-Lynch suture	1 (2%)

Table VI shows that the clinical outcomes were largely favourable, with 98% of women improving following management, and only 2% mortality reported. Most patients (78%) had a hospital stay of 2-6 days, while 12% stayed 1 day and 10% stayed more than 7 days.

Table VI
Clinical Outcomes and Hospital Stay (n = 50).

Variable	Category	n (%)
Outcome	Improved	49 (98%)
	Improved without complication	0 (0%)
	Death	1 (2%)
Length of Hospital Stay	1 day	6 (12%)
	2-6 days	39 (78%)
	>7 days	5 (10%)

DISCUSSION

The majority of women were aged 31-40 years (74%), with 52% having low educational attainment and 64% reporting a yearly income of ≤50,000 BDT. Previous studies reported that 70% of women with PPH were aged 30-40 years and 55% had low education [12,13]. This demonstrates that both advanced maternal age and low education are consistently associated with a higher risk of PPH, and our study further emphasises the role of low income as a socioeconomic vulnerability impacting maternal outcomes. There is overlap in age and education patterns for both studies, suggesting a persistent demographic profile among those women most affected by PPH. At the same time, the strong presence of low-income participants in our study underlines structural inequities that may limit access to health services and timely care. In our study, antenatal care was irregular and absent for 51% and 32%, respectively, while 66% were multipara and 22% had anaemia. In studies reviewed, 45% of women with PPH received irregular or no antenatal care, while 60% were reported to be multipara, and anaemia was documented in 20% [14,15]. Compared with these findings, our study shows an even greater percentage of inadequate antenatal care, reflecting insufficient monitoring of pregnancy in this setting. The similar magnitude of multiparity and anaemia in the findings from both studies suggests that, regardless of other settings, these factors continue to rank among the major contributors to the risk of PPH. Anaemia in over one-fifth of cases further supports the view that inadequate nutritional and clinical support during pregnancy enhances the risk of severe bleeding. Taken together, these data highlight the fact that incomplete antenatal coverage remains one of the most significant modifiable risks. Most women had not experienced any prior uterine surgery (64%), while 12% had previous cesarean sections and 22% had D&C/MR. In a reported study, prior uterine surgery was 15-25% in women with PPH [15]. This showed a fairly comparable pattern of surgical risk exposure. The slightly lower proportion of cesarean history in our study probably reflects the differences in the study populations, but the presence of D&C/MR remains an important risk factor owing to its potential for uterine trauma. These collectively suggest that, although surgical history is not the major factor among most women, it remains an important contributor to uterine complications in a significant subgroup. Delivery characteristics included 68.8% out-of-hospital deliveries attended by unskilled personnel, 72% being NVD, and 56.3% arriving 2-6 hours after the onset of PPH, with 60% in shock and 80% requiring transfusion A study similarly reported that 65–70% of out-of-hospital births were attended by unskilled personnel, 55–60% arrived after 2 hours, and 58–60% presented with shock [16]. This comparison clearly shows the persistence of late admission to hospital and unskilled attendance at delivery as major contributors to severe PPH, as both studies show remarkably similar delays and clinical deterioration before reaching tertiary care. The high percentage needing transfusion further underscores the severity of haemorrhage at presentation and emphasises the need for early referral and skilled attendance at birth. Causes of PPH varied by place of delivery. Retained placenta was responsible for 71.9% of women admitted from outside hospitals, while for in-hospital deliveries, uterine atony accounted for 77.8%. Another study also reported retained placenta in 68% of home deliveries and uterine atony in 75% of hospital deliveries [17]. This confirms the trend that the aetiology of PPH varies according to the delivery site, with retained placenta predominating in peripheral or home deliveries and uterine atony in institutional settings. These parallel findings strengthen the impact of delivery conditions and provider competence on the type of PPH encountered and indicate that retained placenta cases could be decreased through the better supervision of third-stage labour when delivered outside of the hospital setting. Management strategies in this study included manual removal of placenta in 46%, injectable uterotonics in 10%, and uterotonic with misoprostol in 8%, while surgical repair of genital tract injuries accounted for 16% and hysterectomy for 4%. In another study, manual removal of placenta ranged from 40-45%, and the use of uterotonics was 12-15% [18]. This suggests a slightly higher reliance on manual procedures in our population, likely due to delayed presentation and the high proportion of retained placenta cases. The relatively small percentage requiring hysterectomy reflects effective early surgical intervention before progression to irreversible haemorrhage. Of these, 98% improved, 2% died, and 78% stayed in the hospital for 2-6 days. Another study reported maternal survival rates above 95% with similar hospital stays [19]. These comparisons suggest that timely surgical intervention and transfusion can result in a very high rate of recovery even among women presenting in shock. The major contributing factors for PPH were found to be maternal age, multiparity, low education, poor antenatal care, unskilled delivery attendance, and delayed referral. These findings emphasise that effective management of postpartum haemorrhage in tertiary care facilities is essential for reducing maternal mortality in Bangladesh.

LIMITATIONS

This study was conducted in a single tertiary care hospital with a small sample size, limiting generalizability. Additionally, the short study period and observational design may not capture long-term outcomes or rare PPH complications.

CONCLUSION

Maternal age, multiparity, limited education, poor antenatal care, unskilled delivery attendance, and delayed hospital referral were major risk factors for PPH. Prompt and structured interventions, including uterotonics, surgical management, and transfusions, resulted in high recovery rates. These findings highlight that effective management of postpartum haemorrhage in tertiary care facilities is vital to reducing maternal mortality in Bangladesh.

RECOMMENDATION

Future research might involve multicenter, large-scale prospective studies with longer follow-up to capture diverse populations and rare complications. Standardised measurement of blood loss, rigorous documentation of interventions, and evaluation of long-term maternal outcomes are recommended to strengthen evidence for PPH management.

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CONFLICT OF INTEREST
None declared

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