Archives of the Balkan Medical Union
vol. 61, no. 1, pp. 50-56
March 2026
Copyright © 2026 Balkan Medical Union

ORIGINAL PAPER

# A CLINICAL PERSPECTIVE ON POSTPARTUM HAEMORRHAGE: CAUSES AND MANAGEMENT IN ALBANIAN UNIVERSITY HOSPITALS

**Alma SOXHUKU ISUFI[1,2], Vjollca SHPATA[3]✉, Zef DELIA[4], Igli GURANJAKU[1], Rudin DOMI[2]**

[1] University Hospital of Obstetrics and Gynaecology "Koço Gliozheni", Tirana, Albania
[2] Faculty of Medicine, University of Medicine, Tirana, Albania
[3] Faculty of Rehabilitation Sciences, Sports University of Tirana, Albania
[4] University Hospital of Obstetrics and Gynaecology "Mbretëresha Geraldinë", Tirana, Albania

*Received 25th Jan 2026, Accepted 16th Febr 2026*
https://doi.org/10.31688/ABMU.2026.61.1.06

## Abstract

**Introduction.** Postpartum hemorrhage (PPH) is a leading cause of maternal morbidity and mortality worldwide. Data on its causes, management, and outcomes in the Albanian obstetric population are limited.
**The objective of the study** was to identify the causes of PPH according to timing and mode of delivery, and to describe its management and outcomes in Albanian university hospitals.
**Material and methods.** In this prospective study, there were included pregnant women with a gestational age ≥ 26 weeks, who were admitted to hospital and experienced a postpartum blood loss ≥ 1000 mL, or any blood loss accompanied by clinical signs of hypovolemia within 24 hours of delivery, regardless of delivery mode, and who received blood transfusion.
**Results.** During the study period, 159 patients fulfilled the inclusion criteria. Uterine atony (44.7%) and placental disorders (42.8%) were the leading causes of PPH. Regarding the delivery mode, there were no differences regarding the mean blood loss and the number of transfused blood units; however, caesarean deliveries and multiparity were associated with increased

## Résumé

**Une perspective clinique sur l'hémorragie du post-partum: causes et prise en charge dans les hôpitaux universitaires Albanais**

**Introduction.** L'hémorragie du post-partum (HPP) est l'une des principales causes de morbidité et de mortalité maternelles dans le monde. Les données concernant ses causes, sa prise en charge et ses issues au sein de la population obstétricale albanaise sont limitées.
**L'objectif de l'étude** a été d'identifier les causes de l'HPP en fonction du moment de survenue et du mode d'accouchement, ainsi que de décrire sa prise en charge et ses issues dans les hôpitaux universitaires albanais.
**Matériel et méthodes.** Cette étude prospective a inclus des femmes enceintes d'un âge gestationnel ≥ 26 semaines, admises à l'hôpital et ayant présenté une perte sanguine post-partum ≥ 1 000 mL, ou toute perte sanguine associée à des signes cliniques d'hypovolémie dans les 24 heures suivant l'accouchement, quel que soit le mode d'accouchement, et ayant reçu une transfusion sanguine.

✉ Address for correspondence: Vjollca SHPATA
Faculty of Rehabilitation Sciences, Sports University of Tirana, Albania
Address: Muhamet Gjollesha street, Tirana, Albania
Email: vjollca.hajro@yahoo.com; Phone: +35 569 263 5004

risk of placental complications. Placenta percreta was associated with the highest blood loss (2600±544 mL) and transfusion requirements (7.7±1.9 units). Overall, 14.5% of patients developed further complications after PPH, including hemorrhagic shock, hysterectomy, renal failure, and intrauterine fetal death.

**Conclusions.** Postpartum hemorrhage requires close monitoring and early interventions, as it is associated with increased morbidity in Albanian population. Early recognition, multidisciplinary coordination, and standardized management protocols are essential to reduce maternal morbidity and improve outcomes in women with PPH.

**Keywords:** postpartum hemorrhage, uterine atony, placenta percreta, cesarean section, blood transfusion.

**List of abbreviations:**
PPH – postpartum hemorrhage
CMQCC – California Maternal Quality Care Collaborative
SD – standard deviations
FIGO – International Federation of Gynecology and Obstetrics

**Résultats.** Au cours de la période d'étude, 159 patientes ont satisfait aux critères d'inclusion. L'atonie utérine (44,7%) et les troubles placentaires (42,8%) étaient les principales causes de l'HPP. Concernant le mode d'accouchement, aucune différence n'a été observée en termes de perte sanguine moyenne ni de nombre d'unités sanguines transfusées ; toutefois, les accouchements par césarienne et la multiparité étaient associés à un risque accru de complications placentaires. Le placenta percreta était associé à la perte sanguine la plus élevée (2 600±544 mL) et aux besoins transfusionnels les plus importants (7,7±1,9 unités). Globalement, 14,5% des patientes ont développé des complications après l'HPP, notamment un choc hémorragique, une hystérectomie, une insuffisance rénale et un décès fœtal in utero.

**Conclusions.** L'hémorragie du post-partum nécessite une surveillance étroite et des interventions précoces, car elle est associée à une morbidité accrue au sein de la population albanaise. La reconnaissance précoce, la coordination multidisciplinaire et des protocoles standardisés de prise en charge sont essentielles pour réduire la morbidité maternelle et améliorer le pronostic des femmes présentant une HPP.

**Mots-clés:** hémorragie du post-partum, atonie utérine, placenta percreta, césarienne, transfusion sanguine.

## Introduction

Postpartum hemorrhage (PPH) is a serious obstetric emergency, occurring in approximately 1–10% of deliveries, 1–2% of cases being severe[1]. Obstetric haemorrhage accounts for nearly 27% of maternal deaths worldwide each year and is the leading cause of maternal mortality, with PPH being the main contributor[2].

Despite significant advances in obstetric care and maternal health, the burden of PPH persists, particularly in low- and middle-income countries, where timely access to effective interventions is often limited[3]. However, PPH also remains a public health concern in high-income settings[4]. A recent study demonstrated a significant upward trend in the incidence of PPH and its associated risk factors in the United States over a 20-year period[5].

Although PPH is life-threatening, causing the death of one woman somewhere in the world approximately every seven minutes[6], evidence suggests that 54–93% of maternal deaths due to obstetric hemorrhage could be prevented[7]. One major barrier to prevention is the limited availability of accurate predictive models for the general obstetric population, which require thorough validation before being implemented in the clinical practice[1].

Beyond this global challenge, where practical risk assessment tools remain scarce and identifying women at risk is still difficult[8], there is a notable knowledge gap regarding PPH in the Albanian population. Although the causes and potential risk factors for PPH are well documented[9,10], many cases occur in women without identifiable risk factors, underscoring the unpredictability of PPH and the need for vigilance during all deliveries[11].

**The objective of the study** was to identify the causes of PPH in relation to timing and mode of delivery and to describe its management and outcomes within the Albanian obstetric population.

## Material and methods

### Study Design and Setting

This prospective study was conducted from December 2023 to December 2024 in two university obstetric-gynecologic hospitals in Tirana, Albania: Koço Gliozheni and Mbretëresha Geraldinë. All procedures adhered to the ethical standards in the Helsinki Declaration of 1975, as revised in 2000, as well as the national law. Written informed consent regarding using patient's data for study reason was obtained from all participants on their hospital admission, and data were anonymized prior to analysis. The study was approved by the Institutional Ethics Committee (approval no 37, September 29, 2023).

### Study Population

Inclusion criteria were pregnant women with a gestational age ≥ 26 weeks who were admitted to hospital and experienced a postpartum blood loss ≥ 1000 mL, or any blood loss accompanied by clinical signs of hypovolemia within 24 hours of delivery, regardless of delivery mode, and who received blood transfusion. Women with renal or hepatic insufficiency, known hematological disorders, or gestational age < 26 weeks were excluded.

### Data Collection

Demographic and clinical information was recorded, including maternal age, gravidity, parity, gestational age at delivery, and placental abnormalities (placental adhesion, accreta, previa, retained placenta, or abruption), as well as postpartum complications. Laboratory parameters included hemoglobin levels measured within one week before delivery and 24–48 hours postpartum.

Blood loss was assessed using both estimated blood loss, based on visual assessment, and quantitative blood loss, measured objectively. Quantitative blood loss was determined using volumetric collection in calibrated containers (V-drapes and suction canisters) and gravimetric analysis, by weighing blood-soaked materials and subtracting their dry weight, with 1 g considered approximately equivalent to 1 mL of blood[7].

Following delivery, the source of bleeding was evaluated through physical examination, including inspection of the vagina and cervix for lacerations or hematomas; abdominal palpation to assess uterine tone and detect intra-abdominal bleeding; and ultrasound to identify retained products or concealed bleeding. Laboratory investigations included complete blood count, fibrinogen, prothrombin time, activated partial thromboplastin time, and thromboelastography[12]. Laboratory parameters were repeated as clinically indicated.

In healthy pregnant and postpartum women, physiological cardiovascular compensatory mechanisms may maintain stable vital signs until substantial blood loss occurs (typically >1000 mL), which can delay recognition of PPH[13]. Concealed hemorrhage was identified using the California Maternal Quality Care Collaborative (CMQCC) staging system, based on clinical deterioration or abnormal vital signs, including heart rate ≥ 110 bpm, blood pressure ≤ 85/45 mmHg, oxygen saturation < 95%, shock index (ratio of heart rate to systolic blood pressure) ≥ 0.9, or altered mental status[13,14]. Vital signs and clinical indicators were recorded at regular intervals during active bleeding (every 15 minutes) and hourly thereafter for 24 hours postpartum.

Detailed transfusion data were collected, including type of blood product (packed red blood cells, fresh frozen plasma, platelets, or cryoprecipitate), number of units transfused, and total transfused volume. Data concerning anemia, additional transfusion requirements, disseminated intravascular coagulation, hysterectomy, multiorgan failure, other complications, and maternal mortality until hospital discharge were recorded.

### Statistical Analysis

Continuous variables were summarized as means with standard deviations (SD), while categorical variables were presented as absolute frequencies (n) and percentages (%). Group comparisons for categorical data were conducted using the chi-square test, whereas continuous variables were analyzed using Student's t-test and one-way analysis of variance (ANOVA). Comparisons were made between patients experiencing postpartum haemorrhage based on the timing of delivery (preterm versus at term) and mode of delivery (vaginal versus cesarean section), focusing on the underlying causes of haemorrhage. All analyses were performed using SPSS software (version 20.0; IBM Corp., Armonk, NY, USA), with a two-sided p-value ≤ 0.05 considered statistically significant.

## Results

The study included 159 pregnant women who were admitted to hospital and experienced blood loss ≥

**Table 1.** Demographic and clinical data of patients included in the study group.

| *Demographic and clinical data* | *Values* |
|---|---|
| Maternal age (years), mean ± SD | 30.9 ± 5.9 |
| Gestational age at delivery (weeks), mean ± SD | 38.1 ± 2.5 |
| Primipara, no (%) | 85 (53.5%) |
| Multipara, no (%) | 74 (46.5%) |
| Preterm deliveries, no (%) | 42 (26.4%) |
| At term deliveries, no (%) | 117 (73.6%) |
| Vaginal deliveries, no (%) | 71 (44.7%) |
| Section cesarean deliveries, no (%) | 88 (55.3%) |
| Endovenous anesthesia for deliveries, no (%) | 71 (44.7%) |
| Spinal anesthesia for deliveries, no (%) | 72 (45.3%) |
| General anesthesia for deliveries, no (%) | 10 (6.3%) |
| Spinal and general anesthesia for deliveries, no (%) | 6 (3.8%) |
| *Causes of postpartum hemorrhage, no (%)* | |
| • Uterine atony | 71 (44.7%) |
| • Placenta previa | 20 (12.6%) |
| • Placental abruption | 20 (12.6%) |
| • Retained placenta | 14 (8.8%) |
| • Birth canal lacerations | 12 (7.5%) |
| • Placenta accreta | 8 (5.0%) |
| • Placenta percreta | 6 (3.8%) |
| • Hematoma | 4 (2.5%) |
| • Uterine dehiscence | 2 (1.3%) |
| • Fibromyoma | 2 (1.3%) |

**Table 2**. Causes of hemorrhage according to timing of delivery (preterm and at term) and mode of delivery (vaginal delivery or caesarean section)

| *Causes of hemorrhage* | *Preterm* | *At term* | *p-value* | *Cesarean section* | *Vaginal delivery* | *p-value* |
|---|---|---|---|---|---|---|
| Birth canal lacerations | 0<br>0.0% | 12<br>10.3% | 0.03 | 2<br>2.3% | 10<br>14.1% | 0.005 |
| Fibromyoma | 0<br>0.0% | 2<br>1.7% | 0.39 | 2<br>2.3% | 0<br>0.0% | 0.20 |
| Hematoma | 0<br>0.0% | 4<br>3.4% | 0.23 | 4<br>4.5% | 0<br>0.0% | 0.06 |
| Placenta accreta | 6<br>14.3% | 2<br>1.7% | 0.39 | 8<br>9.1% | 0<br>0.0% | 0.009 |
| Placenta percreta | 2<br>4.8% | 4<br>3.4% | 0.23 | 6<br>6.8% | 0<br>0.0% | 0.02 |
| Placenta previa | 14<br>33.3% | 6<br>5.1% | 0.001 | 20<br>22.7% | 0<br>0.0% | < 0.0001 |
| Placental abruption | 14<br>33.3% | 6<br>5.1% | 0.001 | 20<br>22.7% | 0<br>0.0% | < 0.0001 |
| Retained placenta | 0<br>0.0% | 14<br>11.9% | 0.02 | 4<br>4.5% | 10<br>14.1% | 0.03 |
| Uterine atony | 6<br>14.3% | 65<br>55.5% | < 0.0001 | 20<br>22.7% | 51<br>71.8% | < 0.0001 |
| Uterine dehiscence | 0<br>0.0% | 2<br>1.7% | 0.39 | 2<br>2.3% | 0<br>0.0% | 0.20 |
| Total | 42<br>26.4% | 117<br>73.6% | < 0.0001 | 88<br>(55.3%) | 71<br>(44.7%) | |

*Data given as numbers and percentages (%)

1000 mL or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours after delivery.

Table 1 presents the demographic and clinical characteristics of the study population. Regarding the causes of PPH, uterine atony was the most frequent cause, occurring in 71 patients (44.7%). Placental causes, including placenta previa, placental abruption, retained placenta, placenta accreta, and placenta percreta, accounted for 68 cases (42.8%).

Table 2 compares the causes of hemorrhage according to timing of delivery (preterm vs. at term) and mode of delivery (vaginal vs. caesarean section). Of all deliveries, 73.6% occurred at term. Among at term deliveries, the most common causes of PPH were uterine atony (55.6%) and retained placenta (12.0%). In preterm deliveries, placental abruption and placenta previa were the leading causes, each affecting 14 patients (33.3%). No cases of birth canal lacerations, fibromyomas, hematomas, retained placenta, or uterine dehiscence were recorded among preterm deliveries.

Significant differences were observed between at term and preterm deliveries: uterine atony, retained placenta, and birth canal lacerations were more frequent at term deliveries, whereas placenta previa and placental abruption predominated in preterm births.

Regarding the mode of delivery, 88 patients (55.3%) underwent caesarean section, while 71 patients (44.7%) delivered vaginally. Among caesarean sections, the leading causes of PPH were placenta previa, placental abruption, and uterine atony, each occurring in 20 patients (22.7%). In vaginal deliveries, uterine atony was the most frequent cause, observed in 51 patients (71.8%), followed by birth canal lacerations and retained placenta, each reported in 10 patients (14.1%).

Significant differences in the causes of PPH were also observed according to delivery mode: birth canal lacerations, retained placenta, and uterine atony were more common after vaginal delivery, whereas placenta accreta, placenta percreta, placenta previa, and placental abruption were more frequently associated with caesarean delivery.

Table 3 presents data on estimated blood loss and transfused blood units, stratified by the underlying cause of PPH. Patients with placenta percreta experienced the greatest blood loss (2600±544 mL) and required the highest number of transfused blood units (7.66±1.86), followed by those with uterine dehiscence, retained placenta, and uterine atony, all of which were also associated with substantial hemorrhage. Fresh frozen plasma and cryoprecipitate were more frequently administered to patients with placental abruption, placenta accreta, and placenta percreta.

Estimated blood loss was higher in multiparous women (1340.54± 408.61 mL) than in primiparous

**Table 3.** Data about estimated blood loss and units of blood transfused according to the cause of haemorrhage

| *Causes of hemorrhage* | *Estimated blood loss (mL)* | *Units of blood transfused* |
|---|---|---|
| Placenta percreta | 2600 ± 544 | 7.66 ± 1.86 |
| Uterine dehiscence | 1400 ± 0.0 | 3.0 ± 0.0 |
| Retained placenta | 1385.7 ± 161.0 | 3.57 ± 2.27 |
| Uterine atony | 1325.3 ± 345.3 | 2.59 ± 1.48 |
| Placenta previa | 1255 ± 222.9 | 2.70 ± 1.65 |
| Hematoma | 1250 ± 57.73 | 5.5 ± 2.88 |
| Placental abruption | 1210 ± 191.6 | 3.0 ± 1.02 |
| Fibromyoma | 1200 ± 0.0 | 2.0 ± 0.0 |
| Birth canal lacerations | 1183.3 ± 383.3 | 3.5 ± 3.06 |
| Placenta accreta | 1175 ± 218.7 | 2.75 ± 0.46 |

women (1301.17±288.87 mL) and was greater in at term deliveries (1335.89±339.42 mL) compared to preterm deliveries (1273.81±375.34 mL).

Among multiparous women, 54 (73.0%) underwent caesarean delivery, whereas 34 primiparous women (40.0%) delivered vaginally.

According to delivery mode, the mean blood loss and the number of transfused blood units were 1310.23 ± 360.65 mL and 1330.98 ± 336.51 mL (p = 0.7), and 3.38 ± 1.98 vs. 2.70 ± 1.93 units (p = 0.03) for caesarean and vaginal deliveries, respectively.

Among patients with PPH, 23 (14.5%) developed complications: 6 women (3.8%) experienced intrauterine fetal death; 10 (6.3%) underwent hysterectomy, of whom two also developed hemorrhagic shock; 6 (3.8%) developed hemorrhagic shock; and 3 (1.9%) developed renal failure.

## Discussion

This prospective observational study provides new evidence on the causes, management, and outcomes of PPH in the Albanian obstetric population. The most common causes of PPH were uterine atony (44.7%) and placental factors (42.8%).

Consistent with international literature, uterine atony is recognized as the leading cause of PPH[11,15], although its rate in our cohort was lower than the 70% reported in previous studies[16]. Routine postpartum abdominal assessment of uterine tone is recommended by the International Federation of Gynecology and Obstetrics (FIGO) for all women, to facilitate early recognition and treatment of uterine atony[13].

In this study, 42.8% of PPH cases were attributed to retained placenta or other placental disorders, a rate substantially higher than the previously reported 10%[11]. Placental complications such as placental abruption, placenta previa, accreta, and percreta were more frequent in caesarean births. Caesarean delivery occurred nearly twice as often among multiparous women, suggesting that prior caesarean sections may have contributed to the increased incidence of placental disorders[17]. These findings highlight the importance of closer monitoring of multiparous pregnancies and the development of preventive strategies to reduce PPH risk.

Fawcus and Moodley reported that 5–10% of caesarean sections were complicated by excessive bleeding[18], while other studies reported a significantly higher incidence of severe PPH after caesarean delivery compared with vaginal birth[15]. Although in our cohort there were no differences regarding mean blood loss and the number of transfused blood units between caesarean and vaginal delivery, both uterine atony and placental pathology contributed substantially to PPH among women undergoing caesarean section.

Overall, 11.3% of PPH cases in this study were caused by birth canal lacerations, hematomas, or uterine dehiscence, lower than the 20% reported elsewhere for these etiologies[11]. In Albanian population, birth canal lacerations and retained placenta were significantly more frequent causes of PPH after vaginal delivery, consistent with other countries findings[15].

Like other studies in which PPH occurs more frequently among nulliparous women than multiparous women[19,20], most patients in our cohort were nulliparous.

Timely management of severe hemorrhage is critical, as PPH significantly increases maternal morbidity and mortality[6,21]. In our study, complications included hemorrhagic shock, renal insufficiency, and the need for hysterectomy. In addition to these maternal complications, PPH may also result in intrauterine fetal death, which occurred in 3.8% of cases in our cohort. Although other studies have reported maternal deaths following severe PPH[22], no maternal mortality was observed in our population.

Blood transfusion remains a cornerstone of PPH management, particularly in cases of severe blood loss accompanied by marked reductions in hemoglobin levels[21]. In our cohort, patients received red blood cell transfusions, fresh frozen plasma, and

cryoprecipitate, administered according to laboratory parameters and clinical condition.

The findings of this study emphasize the importance of institution-specific PPH protocols[2,21], multidisciplinary response teams, and effective referral pathways, all of which have been shown to improve outcomes in other settings[6].

### Strengths and Limitations

Although the present study reports data from two referral centers, several limitations should be acknowledged. It was conducted in a single urban setting, involved a modest sample size, and lacked long-term follow-up, which may have led to under-recognition of secondary PPH, potentially limiting generalizability. Larger, multicenter studies are needed to validate these findings.

## Conclusions

Uterine atony was the leading cause of PPH in the Albanian population, particularly in term and vaginal deliveries, whereas placental complications were more frequent in preterm and caesarean births. Invasive placental disorders resulted in the greatest blood loss and transfusion requirements, underscoring the need for perioperative preparedness. Multidisciplinary perioperative coordination is essential for the timely recognition, resuscitation, and surgical management of PPH, ensuring safer and more effective care for mothers at risk.

### Author Contributions:

*Conceptualization, A.S.I. and I.G.; methodology, A.S.I.; V.SH.; software, A.S.I.; V.SH.; validation, R.D. and I.G.; formal analysis, A.S.I.; investigation, A.S.I. and V.SH.; resources, A.S.I.; Z.D. and I.G.; data curation, V.SH. and R.D.; writing–original draft preparation, A.S.I.; writing–review and editing, A.S.I.; V.SH.; Z.D.; I.G.; and R.D.; visualization, I.G. and Z.D.; supervision, A.S.I.; project administration, A.S.I. and I.G. All the authors have read and agreed with the final version of the article.*

### Compliance with Ethics Requirements:

*"The authors declare no conflict of interest regarding this article"*

*"The authors declare that all the procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008(5), as well as the national law. Informed consent was obtained from all the patients included in the study"*

*"No funding for this study"*

### Acknowledgements:

*None*

## References

1. Bláha J, Bartošová T. Epidemiology and definition of PPH worldwide. *Best Practice & Research. Clinical Anaesthesiology*. 2022;36(3-4):325-39.
2. World Health Organization. WHO recommendations on the assessment of postpartum blood loss and treatment bundles for postpartum haemorrhage. Geneva: WHO; 2023. Licence: CC BY-NC-SA 3.0 IGO.
3. Khan KS, Wojdyla D, Say L, Gülmezoglu AM, Van Look PF. WHO analysis of causes of maternal death: A systematic review. *Lancet (London, England)*. 2006;367(9516):1066-74.
4. Knight M, Callaghan WM, Berg C, et al. Trends in postpartum hemorrhage in high-resource countries: A review and recommendations from the International Postpartum Hemorrhage Collaborative Group. *BMC Pregnancy and Childbirth*. 2009;9:55.
5. Corbetta-Rastelli CM, Friedman AM, Sobhani NC, Arditi B, Goffman D, Wen T. Postpartum hemorrhage trends and outcomes in the United States, 2000–2019. *Obstetrics and Gynecology*. 2023;141(1):152-61.
6. Bienstock JL, Eke AC, Hueppchen NA. Postpartum hemorrhage. *The New England Journal of Medicine*. 2021;384(17):1635-45.
7. American College of Obstetricians and Gynecologists. Quantitative blood loss in obstetric hemorrhage. Committee Opinion No. 794. *Obstetrics and Gynecology*. 2019;134(6):e150-e156.
8. World Health Organization. Second global call for data on postpartum haemorrhage. 2024. https://www.who.int/news-room/articles-detail/second-global-call-for-data-on-postpartum-haemorrhage. (Accessed on July 12, 2025).
9. Bateman BT, Berman MF, Riley LE, Leffert LR. The epidemiology of postpartum hemorrhage in a large, nationwide sample of deliveries. *Anesthesia and Analgesia*. 2010;110(5):1368-73.
10. Rouse DJ, Leindecker S, Landon M, et al. Uterine atony after primary cesarean delivery: The MFMU Cesarean Registry. *American Journal of Obstetrics and Gynecology*. 2005;193(3 Pt 2):1056-60.
11. Evensen A, Anderson JM, Fontaine P. Postpartum hemorrhage: Prevention and treatment. *American Family Physician*. 2017;95(7):442-9.
12. Bell SF, Collis RE, Bailey C, et al. The incidence, aetiology, and coagulation management of massive postpartum haemorrhage: A two-year national prospective cohort study. *International Journal of Obstetric Anesthesia*. 2021;47:102983.
13. Escobar MF, Nassar AH, Theron G, et al. FIGO recommendations on the management of postpartum hemorrhage 2022. *International Journal of Gynaecology and Obstetrics: The official organ of the International Federation of Gynaecology and Obstetrics*. 2022;157 Suppl 1:S3-50.
14. Ruppel H, Liu VX, Gupta NR, Soltesz L, Escobar GJ. Validation of postpartum hemorrhage admission risk factor stratification in a large obstetrics population. *American Journal of Perinatology*. 2021;38(11):1192-200.
15. Zheng F, Wen H, Shi L, Wen C, Wang Q, Yao S. Incidence of postpartum hemorrhage based on the improved combined method in evaluating blood loss: A retrospective cohort study. *PLoS One*. 2023;18(7):e0289271.
16. Committee on Practice Bulletins-Obstetrics. Practice Bulletin No. 183: Postpartum hemorrhage. *Obstetrics and Gynecology*. 2017;130(4):e168-e186.
17. Silver RM, Landon MB, Rouse DJ, et al. Maternal morbidity associated with multiple repeat cesarean deliveries. *Obstetrics and Gynecology*. 2006;107(6):1226-32.

18. Fawcus S, Moodley J. Postpartum haemorrhage associated with caesarean section and caesarean hysterectomy. *Best Practice & Research. Clinical Obstetrics & Gynaecology*. 2013;27(2):233-49.
19. Bestman PL, Nget M, Kolleh EM, et al. A comparative analysis of postpartum hemorrhage incidence and influencing factors between nulliparous and multiparous women in Hunan Province, China: A multicenter retrospective cohort study. *Preventive Medicine Reports*. 2024;38:102580.
20. Brhane T, Fang JQ, Luo J. A comparative analysis of postpartum hemorrhage incidence and influencing factors between nulliparous and multiparous women in Hunan Province, China: A multicenter retrospective cohort study. *Preventive Medicine Reports*. 2024;38:102580.
21. Muñoz M, Stensballe J, Ducloy-Bouthors AS, et al. Patient blood management in obstetrics: Prevention and treatment of postpartum haemorrhage. A NATA consensus statement. *Blood transfusion = Trasfusione del sangue*. 2019;17(2):112-36.
22. Edwards HM. Aetiology and treatment of severe postpartum haemorrhage. *Danish Medical Journal*. 2018;65(3):B5444.