

Original Article

Optimizing Maternal Care: The Imperative Analysis of Rational Blood Transfusion Uses in Obstetrics

Afnan Rizwan¹, Sana Hassan², Ayesha Javed³, Bushra Kant⁴, Izah Zahid Shakoor⁵, Maria Tariq⁶

¹Associate Professor, Akbar Niazi Teaching Hospital/IMDC, Islamabad

²Senior Registrar, Akbar Niazi Teaching Hospital/IMDC, Islamabad

³Senior Registrar, Medicsi Hospital, Islamabad, ⁴Professor, Akbar Niazi Teaching Hospital/IMDC, Islamabad

⁵House Officer, Akbar Niazi Teaching Hospital/IMDC, Islamabad

⁶Assistant Professor, Akbar Niazi Teaching Hospital/IMDC, Islamabad

Correspondence: Dr Afnan Rizwan

Department of Obstetrics and Gynecology,

Islamabad Medical and Dental College,

Main Murree Road, Satran (17) Meel, Bhara Kahu, Islamabad.

Email: drafnan69@gmail.com

Abstract

Objective: To determine the frequency and indications of red cell transfusions in obstetrics and to evaluate their rational use according to established transfusion guidelines.

Methodology: This is a descriptive cross-sectional study conducted in the Department of Obstetrics and Gynecology at Akbar Niazi Teaching Hospital, Islamabad, Pakistan, over a period of two years, from January 2022 to January 2024. A total of 300 transfusions were administered in obstetric patients included in the study. All obstetric patients who required blood transfusion during pregnancy (including cases of miscarriage, ruptured ectopic pregnancy, molar pregnancy, antepartum hemorrhage), at the time of delivery, or within 7 days postpartum for obstetric causes such as postpartum hemorrhage or obstetric hysterectomy were included in the study.

Results: The mean age of transfused patients was 28.4 ± 4.6 years (range: 19–40 years). Among them, 72 (24%) were primigravida and 228 (76%) were multigravida. The majority, 129 (43%), were at ≥ 36 weeks of gestation. The proportion of obstetric patients who required blood transfusion was 300 (11%), some patients received more than one component. Packed red blood cells (PRBCs) were the most commonly used, accounting for 192 transfusions (64%), followed by whole blood 144 (48%), random donor platelets 45 (15%), and fresh frozen plasma (FFP) 33 (11%). The leading indications were postpartum hemorrhage (PPH) in 43 cases (30%) and anemia during pregnancy in 37 cases (25.7%). Platelet transfusions were most often required for gestational thrombocytopenia (11 cases, 24.5%) and other medical disorders (22 cases, 48.9%).

Conclusion: Red cell transfusions were predominantly required for hemorrhagic and anemic conditions, while platelet and FFP use was linked to pregnancy-related complications. These findings highlight the need for improved antenatal care and adherence to rational transfusion practices.

Keywords: Anemia; Blood Platelets; Blood Transfusion; Obstetrics; Plasma; Postpartum Hemorrhage; Pregnancy High-Risk.

Cite this article as: Rizwan A, Hassan S, Javed A, Kant B, Shakoor IZ, Tariq M. Optimizing Maternal Care: The Imperative Analysis of Rational Blood Transfusion Uses in Obstetrics. J Soc Obstet Gynaecol Pak. 2025; 15(4):264-267. DOI: 10.71104/jsogp.v15i4.963

Introduction

Obstetric hemorrhage and pregnancy-related anemia remain among the leading causes of maternal morbidity and mortality worldwide, with a particularly high burden in low- and middle-income countries where blood resources are scarce.¹ Rational transfusion—using the right blood component at the appropriate trigger—plays a vital role in minimizing risks, preserving limited supplies, and improving patient outcomes.²

component therapy has transformed transfusion practice. Component therapy offers several advantages over whole blood, which is now rarely used in modern obstetric practice due to its drawbacks. These include larger volume per unit (500 ml), a shorter shelf life (24 hours), platelet dysfunction, risk of hypercalcemia, and degradation of certain clotting factors within 1–2 days of storage.³

Since the 1970s, the shift from whole blood to

In clinical obstetrics, different blood components are

Authorship Contribution: ^{1,3}Substantial contributions to the conception or design of the work; or the acquisition, ⁴Final approval/supervision, ^{2,5,6}Drafting the work or revising it critically for important intellectual content, Data Analysis

Funding Source: none
Conflict of Interest: none

Received: Aug 21, 2025

Revised: Oct 16, 2025

Accepted: Oct 23, 2025

used to address specific pathophysiological derangements. Packed Red Blood Cells (PRBCs); are the first-line treatment in cases of hemorrhage, as they are essential for replacing lost RBCs. Each unit of PRBCs has a total volume of approximately 300 ml, consisting of 250 ml of RBCs and 50 ml of plasma. On average, each unit of PRBCs increases Hb by 1 g/dL and HCT by 3%.⁴

Whole blood; serves as the source material for preparing six key components used in modern transfusion therapy, such as fresh frozen plasma (FFP), platelets, cryoprecipitate, immunoglobulins, albumin, and clotting factors, each with its own specific function. It contains RBCs, platelets, and clotting factors. It is the preferred component for patients experiencing acute hemorrhage with blood loss exceeding 25%, as it helps improve oxygen-carrying capacity and restore blood volume.⁵

Platelets; are stored in plasma after being separated from the blood. Platelet transfusion is indicated when the platelet count falls below 20,000/mm³ after vaginal delivery, below 50,000/mm³ after a C-section, or if there is evidence of coagulopathy.⁵

FFP; is plasma that is separated from whole blood. It contains fibrinogen, antithrombin, and clotting factors V, XI, and XII. It also aids in volume resuscitation, as each unit contains approximately 250 ml.⁵

Cryoprecipitate is prepared by thawing a unit of FFP. It contains fibrinogen, von Willebrand factor, factor VIII, and XIII, all concentrated in a 15–20 mL bag. It is indicated for patients with severely low fibrinogen levels and is used alongside FFP during massive transfusions.⁵

Despite this importance, locally relevant data on transfusion practices in obstetrics remain limited. This study therefore provides essential, center-level evidence to guide clinicians and blood bank managers, support policy for rational component use, and identify areas within antenatal care where improvements may reduce transfusion demand. The study objective was to determine the frequency and indications of red cell transfusions in obstetrics and to evaluate their rational use according to established transfusion guidelines.

Methodology

This is a descriptive cross-sectional study conducted in the Department of Obstetrics and Gynecology at Akbar Niazi Teaching Hospital, Islamabad, Pakistan, over a

period of two years, from January 2022 to January 2024. Ethical approval was obtained from the ethical committee reference no 203/IMDC/IREB-2025 dated June 5, 2025. A total of 2730 women were admitted for obstetric inpatient care during the study period, of whom 300 required blood transfusions. Patients requiring emergency blood transfusion were informed about its necessity and the potential associated risks. Informed consent was obtained from all patients prior to transfusion. The WHO sample size calculator was used with the following parameters: a 5% margin of error, 95% confidence level, and an expected blood transfusion prevalence of 5.3%.⁶ The non-probability purposive sampling was employed to collect data from all patients.

For each patient included in the study, a detailed obstetric history was obtained, along with a focused general and obstetric examination relevant to their presenting condition. Clinical details and indications for requesting blood or blood products were recorded in the patient's case proforma, and blood requisition orders were processed with cross-matching performed in accordance with the hospital's transfusion guidelines.

The primary outcome variable was the type of transfusion (whole blood vs. component therapy), while the primary explanatory variable was the indication for transfusion (e.g., postpartum hemorrhage, anemia, medical disorders, thrombocytopenia). Additional clinical details, including transfusion triggers and patient characteristics, were also recorded.

Descriptive statistics were applied: means and standard deviations for quantitative variables, and frequencies and percentages for categorical variables. As the study was descriptive in nature, no inferential statistical analysis was performed, and no p-values were calculated. Data were analyzed using SPSS version 23.

Results

Over a span of two years, 300 transfusions were administered in obstetric patients. The proportion of obstetric patients who required blood transfusion was 11%. Of the 300 patients, the majority were multigravida 228 (76%), while 72 (24%) were primigravida. Blood transfusions in obstetric cases based on the gestational age. Most patients presented in the late third trimester [>36 weeks; 129 (43%)], followed by 27–36 weeks 84 (28%), 14–26 weeks 45 (15%), and 0–13 weeks 42 (14%). Hemoglobin levels

on admission showed that 120 (40%) had moderate anemia (Hb 6–7.9 g/dl), 96 (32%) had severe anemia (Hb 4–5.9 g/dl), and 54 (18%) had very severe anemia (Hb <4 g/dl), while 30 (10%) had mild anemia (Hb 8–11 g/dl).

In this study, some patients received more than one type of blood component transfusion, depending on their clinical indications. PRBCs accounted for 64% of transfusions, followed by whole blood at 48%, random donor platelets at 15%, and FFP at 11% (Table I). Whole blood was administered exclusively in obstetric cases involving acute blood loss exceeding 30% of blood volume, such as in severe PPH.

The different indications for transfusion of PRBC, whole blood, and platelets are presented in Table II. Table III indicates that 50% of obstetric patients received one unit of blood, while more than five units were transfused in 1% of cases.

Table I: Descriptive statistics of transfusion types. (n=300)

Transfusion type	Frequency	Percentage
PRBCs	192	64%
Whole blood	144	48%
FFP	33	11%
Random donor platelets	45	15%

Discussion

This two-year study analyzed 300 transfusions in obstetric patients, representing 11% of all admissions. Most transfusions (76%) were administered to multigravida patients, with the highest frequency (43%) at ≥ 36 weeks of gestation. Similar trends were reported by Chawla et al who also noted the predominance of transfusions among multigravida women and at advanced gestational ages (31–40 weeks).⁷ Our observation that primigravida women also required transfusions, particularly due to PPH, highlights that the risk is not confined to high-parity patients.

Table III: Number of blood transfusion units administered to patients.

Unit of blood	Frequency	Percentage
1	149	49.7%
2	108	36%
3	27	9%
4	12	4%
5	3	1%
> 5	1	0.3%
Total	300	100%

PRBCs were the most commonly used component (64%), followed by whole blood (48%). This pattern aligns with Anjali et al who also reported PRBCs as the preferred component in obstetric hemorrhage.⁸ In contrast, Bangal et al documented a higher reliance on FFP, largely because their cohort had more cases of massive hemorrhage, including APH, PPH, and hysterectomies.⁹ Such variation underscores how transfusion practices are influenced by institutional case mix and severity of presentation.

A major indication in our study was PPH (30%), followed by anemia during pregnancy (26%). Comparable studies from India and Japan similarly identified PPH as the leading trigger for transfusion.^{10,11} However, the persistence of moderate to severe anemia at delivery in our cohort raises concerns about the adequacy of antenatal screening and iron supplementation. Maqbool et al likewise stressed the need for timely detection and treatment of anemia before delivery to avoid emergency transfusion at labor.¹⁴

The transfusion rate in our setting (11%) is higher than that reported in several regional and international studies, where rates ranged between 0.3% and 1.3%.^{15,16} Conversely, Tyagi et al reported a rate of 14%, closer to our findings.¹² This discrepancy may be attributed to differences in patient population, availability of antenatal care, and thresholds for transfusion. In Pakistan and other low-resource countries, limited access to preventive care and higher

Table II: Indications for PRBC, whole blood, and platelet transfusions.

Indication	PRBCs	Whole blood	Platelets
Postpartum hemorrhage (PPH, $\leq 7d$)	90 (46.9%)	43 (29.9%)	-
Anemia in pregnancy	54 (28.2%)	37 (25.7%)	-
Antepartum hemorrhage (APH)	21 (10.9%)	6 (4.2%)	-
Molar pregnancy	11 (5.7%)	26 (18.1%)	-
Ruptured tubal ectopic pregnancy	10 (5.2%)	22 (15.2%)	-
Incomplete miscarriage	6 (3.1%)	10 (6.9%)	-
Obstetric hysterectomy	-	-	6 (13.3%)
Gestational thrombocytopenia	-	-	11 (24.5%)
Medical disorders in pregnancy	-	-	22 (48.9%)
Disseminated intravascular coag. (DIC)	-	-	6 (13.3%)
Total	192 (100%)	144 (100%)	45 (100%)

prevalence of untreated anemia likely contribute to increased transfusion needs.¹⁷

Our findings also reaffirm the WHO's advocacy for rational blood use through component therapy, which allows a single donation to benefit multiple patients while reducing unnecessary exposure to whole blood elements.¹³ The predominance of PRBC use in our study demonstrates movement toward guideline-based practice, though the continued use of whole blood indicates areas for improvement

Conclusion

PPH, followed by anemia during pregnancy, were the two most frequent indications for PRBC and whole blood transfusions. Medical conditions complicating pregnancy and gestational thrombocytopenia were the two most common indications for platelet concentrate transfusion. Among the study participants who received FFP transfusions, the indications were evenly distributed across APH, ruptured tubal ectopic pregnancy, DIC, hypertensive disorders of pregnancy, and obstetric hysterectomy.

References

- Obeagu EI, Obeagu GU, Ezeonwumelu JO. Safety and Efficacy of Blood Transfusions in Pregnant Women. *Elite J Haematol*. 2024;2(3):96-106.
- Gammon RR, Coberly E, Dubey R, Jindal A, Nalezinski S, Varisco JL. Patient blood management-It is about transfusing blood appropriately. *Ann Blood*. 2022;7. <https://doi.org/10.21037/aob-21-70>
- Okonofua F, Balogun JA, Odunsi K, Chilaka VN, editors. Contemporary obstetrics and gynecology for developing countries. Springer; 2021. <https://doi.org/10.1007/978-3-030-75385-6>
- Rood KM, Francois KE. Antepartum and Postpartum Hemorrhage. In: Gabbe's Obstetrics: Normal and Problem Pregnancies, Ninth Edition 2024:391-421. Elsevier.
- Kloka JA, Friedrichson B, Jasny T, Old O, Piekarski F, Zacharowski K, et al. Anemia, red blood cell transfusion and administration of blood products in obstetrics: a nationwide analysis of more than 6 million cases from 2011-2020. *Blood Transfus*. 2023;22(1):37. <https://doi.org/10.2450/BloodTransfus.528>
- Mondal B, Samsuzzaman M, Das S, Das DK. A study on utilisation of blood and blood components in a tertiary care hospital in West Bengal, India. *Medicine*. 2022;15(19):78-95. <https://doi.org/10.7860/JCDR/2022/52356.16129>
- Chawla S, Bal MH, Vardhan BS, Jose CT, Sahoo I. Blood transfusion practices in obstetrics: our experience. *J Obstet Gynaecol India*. 2018;68(3):204-207. <https://doi.org/10.1007/s13224-018-1092-x>
- Anjali K, Varsha K, Sulabha J, Anuja B, Bhavana K, Savita S. Blood transfusion in Obstetrics and Gynaecology: A retrospective analysis. *Panacea J Med Sci*. 2015;5(3):109-112.
- Bangal VB, Gavhane SP, Aher KH, Bhavsar DK, Verma PR, Gagare SD. Pattern of utilization of blood and blood components in obstetrics at tertiary care hospital. *Int J Reprod Contracept Obstet Gynecol*. 2017;6(10):4671-4676. <https://doi.org/10.18203/2320-1770.ijrcog20174462>
- Lenet T, Baker L, Park L, Vered M, Zahrai A, Shorr R, et al. A systematic review and meta-analysis of randomized controlled trials comparing intraoperative red blood cell transfusion strategies. *Ann Surg*. 2022;275(3):456-466. <https://doi.org/10.1097/SLA.0000000000004931>
- Ueda A, Nakakita B, Chigusa Y, Mogami H, Ohtera S, Kato G, et al. Impact of efforts to prevent maternal deaths due to obstetric hemorrhage on trends in epidemiology and management of severe postpartum hemorrhage in Japan: a nationwide retrospective study. *BMC Pregnancy Childbirth*. 2022;22(1):496. <https://doi.org/10.1186/s12884-022-04824-7>
- Tyagi S. Blood transfusion practices in obstetrics and gynecology: study of indications as a measure to prevent maternal morbidity and mortality. *Int J Reprod Contracept Obstet Gynecol*. 2021;10(3):1000. <https://doi.org/10.18203/2320-1770.ijrcog20210723>
- World Health Organization. Guidance on ensuring a sufficient supply of safe blood and blood components during emergencies. World Health Organization; 2023.
- Maqbool M, Khalid L, Kausar Z, Farooq N, Aslam S, Zia Z. Utilization of Blood Products in Obstetric Patients at a Tertiary Care Hospital in Islamabad. *Indus J Biosci Res (IJBR)*. 2025;3(5):1-10. <https://doi.org/10.70749/ijbr.v3i5.1363>
- Barrie U, Youssef CA, Pernik MN, Adeyemo E, Elguindy M, Johnson ZD, et al. Transfusion guidelines in adult spine surgery: a systematic review and critical summary of currently available evidence. *Spine J*. 2022;22(2):238-248. <https://doi.org/10.1016/j.spinee.2021.07.018>
- Sano Y, Kasai M, Shinoda S, Miyagi E, Aoki S. The indicators for early blood transfusion in patients with placental abruption with intrauterine fetal death: a retrospective review. *BMC Pregnancy Childbirth*. 2022;22(1):847. <https://doi.org/10.1186/s12884-022-05187-9>
- Waheed U, Amanat ST, Jamal DN, Mengal MH, Saba N, Wazeer A, et al. National Guidelines on the Appropriate Clinical Use of Red Cell Concentrates in Pakistan. *Ann Pak Inst Med Sci*. 2024;20(Suppl. 2):885-908. <https://doi.org/10.48036/apims.v20iSuppl.%202.1285>