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PATIENT BLOOD MANAGEMENT (PBM): A PATIENT-CENTRIC APPROACH FOR OBSTETRIC AND GYNAECOLOGICAL PATIENTS AT A TERTIARY CARE HOSPITAL, JAMNAGAR

Immunohematology

Dr. Digeet P. Davad Assistant Professor, Department Of Immunohematology And Blood Transfusion (IHBT), Guru Gobindsingh Government Hospital And Shri M P Shah Government Medical College, Jamnagar, Gujarat, India.

Dr. Jay Nagda* Resident Doctor, Department Of Community Medicine, Shri M P Shah Government Medical College, Jamnagar, Gujarat, India. *Corresponding Author

ABSTRACT

Background: Patient Blood Management (PBM) is a multimodal, multidisciplinary approach aimed at optimizing haemoglobin levels, minimizing blood loss, and reducing the need for allogeneic transfusion. This study evaluates the implementation of PBM in obstetrics and gynaecology at a tertiary care hospital in Jamnagar. **Methods:** A retrospective analysis was conducted on patients admitted to the obstetrics and gynaecology ward between January 2023 and December 2023. Data on blood transfusion rates, haemoglobin optimization, and PBM strategies were analyzed. **Results:** A total of 24,739 blood transfusions were recorded, with obstetric and gynaecological patients accounting for 10,833 (43.79%). Among them, 9,783 patients required transfusion, primarily due to anaemia. Key PBM strategies included antenatal haemoglobin optimization, oral and IV iron supplementation, dietary interventions, and adherence to massive transfusion protocols. **Conclusion:** Implementing PBM strategies in obstetrics and gynaecology significantly reduced transfusion dependency and improved patient outcomes. Early diagnosis and management of anaemia remain critical in reducing transfusion-related risks.

KEYWORDS

Patient Blood Management (PBM), Haemoglobin Optimization, Blood Transfusion, Obstetric and Gynaecological Patients

INTRODUCTION

Anaemia in pregnancy remains a significant global health challenge, contributing to increased maternal morbidity and mortality. The World Health Organization (WHO) estimates that approximately 36.5% of pregnant women worldwide suffer from anaemia, with iron deficiency being the most common underlying cause (1). Pregnant women in low- and middle-income countries (LMICs) are disproportionately affected due to nutritional deficiencies, infections, and limited access to antenatal care (2). Severe anaemia during pregnancy is associated with preterm birth, low birth weight, postpartum haemorrhage (PPH), and increased maternal mortality, necessitating timely intervention.

Traditionally, blood transfusion has been the primary treatment for severe anaemia and acute haemorrhage in obstetric emergencies. However, transfusions come with inherent risks such as infectious disease transmission, transfusion reactions, alloimmunization, and limited blood supply, particularly in resource-constrained settings (3). To mitigate these risks and improve patient outcomes, Patient Blood Management (PBM) has emerged as a proactive, evidence-based approach that focuses on preventing anaemia, optimizing haemoglobin levels, and reducing unnecessary transfusions.

PBM was first endorsed by WHO in 2011 and has since been integrated into various medical specialties, including surgery, intensive care, and obstetrics and gynaecology (4). It is built upon three fundamental pillars:

1. **Optimizing Red Cell Mass –** early detection and management of anaemia using iron supplementation, erythropoiesis-stimulating agents (ESAs), and nutritional interventions.
2. **Minimizing Blood Loss –** strategies such as restrictive transfusion thresholds, uterotonic agents, intraoperative cell salvage, and point-of-care coagulation monitoring.
3. **Harnessing And Optimizing Patient-specific Physiological Reserves –** improving oxygen delivery and tolerance through judicious fluid management, hemodynamic optimization, and restrictive transfusion practices.

The Six PBM Bundles provide a structured approach to optimizing blood management in obstetric and gynaecological care. They include antenatal anaemia management through iron therapy, optimized peripartum haemostasis with coagulation assessment and TXA, minimizing blood loss via AMTSL and uterotonics, restrictive transfusion protocols with clear haemoglobin thresholds, postpartum anaemia treatment using iron and ESAs, and continuous healthcare provider training (5). These bundles ensure comprehensive patient care from antenatal to postpartum periods, reducing transfusion dependence while enhancing patient safety.

Despite its established benefits, PBM implementation remains inconsistent, particularly in resource-limited settings where access to diagnostic tools, trained personnel, and alternative anaemia management strategies is restricted.

This study aims to evaluate the application of PBM strategies in obstetrics and gynaecology at a tertiary care hospital in Jamnagar and assess their impact on blood transfusion rates and maternal health outcomes.

METHODS

Study Design And Setting

A retrospective observational study was conducted at a Guru Gobindsingh Government Hospital in Jamnagar, Gujarat, India. The study analyzed medical records of obstetric and gynaecological patients admitted between January 2023 and December 2023.

Study Population

The study included all obstetric and gynaecological patients who received blood transfusions during their hospital stay.

Inclusion Criteria

- Were admitted to the Obstetrics and Gynaecology Department within the study period.
- Received at least one unit of allogeneic blood transfusion during hospitalization.
- Had complete medical records detailing transfusion indications and clinical outcomes.

Exclusion Criteria

Patients with incomplete medical records or those receiving transfusions for non-obstetric and non-gynaecological indications were excluded.

Data Collection

Patient data were retrieved from hospital electronic medical records (EMR) and blood bank transfusion records.

Data Analysis

Statistical analyses were conducted using IBM SPSS Statistics (Version 28.0, IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as mean ± standard deviation (SD) for continuous variables and frequency (%)for categorical variables.

Ethical Considerations

This study was approved by the Institutional Ethics Committee (IEC) of M P Shah Government Medical College & GGG Hospital, with a waiver of informed consent due to its retrospective nature, ensuring patient confidentiality through data de-identification before analysis, in compliance with the Declaration of Helsinki (2013) and institutional

guidelines.

AI Declaration

In preparing this manuscript, we used AI language models (ChatGPT, OpenAI, San Francisco, California) and Claude (Anthropic, San Francisco, California) solely to improve language and readability. These tools assisted with grammar and text fluency only. All scientific content, methodology, and conclusions are entirely our own work. AI tools are not listed as authors.

RESULTS

A total of 24,739 blood transfusions were recorded between January 2023 and December 2023 at Guru Gobindsingh Government Hospital and Shri M.P. Shah Government Medical College, Jamnagar. Of these, 10,833 patients (43.79%) were admitted to the Obstetrics and Gynaecology Department. Notably, 9,783 patients (90.3%) required at least one blood transfusion during hospitalization. The mean age of the patients was 28.4 years, with an age range of 18 to 45 years. The majority of cases were obstetric (97.0%), while only 3.0% were gynaecological. The overall mean haemoglobin level before transfusion was 8.2 g/dL, with 59.07% of patients diagnosed with iron deficiency anaemia and 19.8% presenting with severe anaemia (Hb <7 g/dL). **(Table 1)**

Table 1: Demographic Characteristics of Patients at GGG Hospital, Jamnagar, Gujarat, India.

Characteristic	Value
Total Patients	10,833
Age Range	18-45 years
Mean Age	28.4 years
Obstetric Cases	10,507
Gynaecological Cases	326
Patients Requiring Transfusion	9,783
Haemoglobin Level (Mean)	8.2 g/dL
Iron Deficiency Anaemia Cases	6,400 (59.07%)
Severe Anaemia Cases (<7 g/dL)	2,150 (19.8%)

The primary indication for blood transfusion was anaemia in pregnancy, accounting for 64.66% (n=6,326) of all transfusions. Postpartum haemorrhage (PPH) was the second most common cause, necessitating transfusion in 11.71% (n=1,146) of cases, followed by surgical bleeding in 16.60% (n=1,624). Other causes, including ectopic pregnancy rupture, abruption placentae, and placenta previa, contributed to 7.02% (n=687) of transfusion cases. **(Table 2)**

Table 2 : Indications for Blood Transfusion in Obstetric and Gynaecological Patients

Indication	Number of Cases (n=9,783)	Percentage (%)
Anaemia in Pregnancy	6,326	64.66%
Postpartum Haemorrhage (PPH)	1146	11.71%
Surgical Bleeding	1624	16.60%
Other Causes	687	7.02%

Analysis of transfusion timing revealed that intra-partum blood transfusions were the most frequent, accounting for 40.9% of all transfusions. Pre-partum transfusions were required in 25.5% cases, primarily for antenatal anaemia correction. Post-partum transfusions accounted for 30.6% cases. **(Figure 1)**

Figure 1: Distribution of Blood Transfusion Needs Across Pre-Partum, Intra-Partum, and Post-Partum Periods

DISCUSSION

Anaemia during pregnancy and postpartum remains a significant maternal health concern, often necessitating blood transfusions, which pose risks such as transfusion reactions, alloimmunization, and infection transmission (6). The implementation of patient blood management (PBM) strategies in obstetric and gynaecological care has proven effective in reducing transfusion dependency. Studies have shown that PBM measures, including preoperative anaemia management and restrictive transfusion protocols, can reduce transfusion rates by up to 40% in surgical patients (7). In obstetric practice, antenatal iron optimization programs have demonstrated significant success in lowering transfusion rates and improving maternal outcomes (8).

Optimizing haemoglobin levels during pregnancy is essential for reducing maternal morbidity and adverse outcomes associated with anaemia. Research indicates that early iron supplementation and controlled third-stage labor management contribute to a decreased incidence of haemorrhagic complications (9). The emphasis on proactive anaemia management aligns with broader PBM principles, which prioritize early intervention over reactive blood transfusion strategies. By incorporating comprehensive PBM protocols, healthcare providers can enhance maternal health while minimizing reliance on blood transfusions.

Key clinical recommendations for optimizing PBM in obstetric care include routine antenatal screening for the early detection and treatment of anaemia using oral iron supplementation. In cases of severe iron deficiency or intolerance to oral iron, parenteral iron therapy should be considered (10). Dietary modifications, such as encouraging the consumption of iron-rich foods alongside folic acid supplementation, are crucial in preventing and managing anaemia during pregnancy. Additionally, adopting restrictive transfusion protocols helps minimize unnecessary transfusions and associated risks, reinforcing the importance of evidence-based anaemia management.

Emergency haemorrhage management remains a critical component of PBM strategies in obstetric care. Strict adherence to massive transfusion protocols in cases of obstetric haemorrhage ensures rapid and appropriate intervention while mitigating the risks of over-transfusion (9). As maternal healthcare continues to evolve, integrating PBM strategies into routine obstetric practice can significantly enhance patient safety and improve clinical outcomes.

Limitations

While this study demonstrates the effectiveness of PBM strategies, certain limitations exist. Being a retrospective analysis, it lacks control over confounding variables. Additionally, patient adherence to iron supplementation outside the hospital setting was not assessed.

Recommendation And Future Direction

Future research should focus on prospective, randomized studies with larger sample sizes to validate existing findings. Moreover, developing standardized, evidence-based guidelines for PBM in obstetrics is essential to ensure consistent and effective patient care. Collaboration among medical, obstetric, and anaesthetic societies may facilitate the harmonization of transfusion and PBM guidelines, ultimately improving maternal outcomes.

CONCLUSIONS

The integration of PBM strategies in obstetric and gynaecological care significantly reduces transfusion dependency, enhances patient safety, and optimizes resource utilization. Early diagnosis and management of anaemia remain critical in reducing maternal morbidity. Further research is warranted to explore the long-term impact of PBM on maternal health outcomes.

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