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RESEARCH ARTICLE
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EVALUATION OF BLOOD ORDERING AND ITS UTILIZATION PRACTICES IN OBSTETRICS AND GYNECOLOGY AT A TERTIARY CARE HOSPITAL IN RAJASTHAN

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Abstract

Background: Blood transfusion is a vital component of clinical management in obstetrics and gynecology (OBG), where hemorrhage and anemia are significant contributors to maternal morbidity and mortality. However, inappropriate blood ordering leads to resource wastage and increased healthcare burden.

Objective: To evaluate the current blood ordering and transfusion practices in OBG patients at a tertiary hospital and assess efficiency using standardized transfusion indices.

Methods: This hospital-based, cross-sectional observational study included 1500 OBG patients over one year. Data on blood requisitions & transfusions were analyzed. Efficiency was measured using the crossmatch-to-transfusion (C/T) ratio, transfusion probability (T%), transfusion index (TI), and maximum surgical blood ordering schedule (MSBOS).

Results: Among 1500 patients, 723 (48.2%) received crossmatched blood. The most commonly used component was whole blood (71.23%), followed by PRBCs (24.76%). The overall C/T ratio was 1.04, T% was 95.2%, and TI was 1.25. The most blood requested group was 20–40 years (81.6%).

Conclusion: Blood utilization practices were moderately efficient. The use of whole blood was high despite component therapy being preferable. Adoption of MSBOS and promotion of rational blood use are recommended.

Keywords: Blood utilization, Obstetrics, Gynecology, Crossmatch-to-transfusion ratio, Blood ordering

Introduction

Blood transfusion plays a critical role in the management of maternal complications, particularly anemia and postpartum hemorrhage, which are leading causes of maternal mortality globally(1). In India, maternal anemia affects more than 50% of pregnant women(2), increasing reliance on blood and blood products. However, over-ordering of blood, especially in elective surgeries, creates unnecessary pressure on blood banks and results in resource underutilization(3). This can be mitigated through the implementation of transfusion indices and evidence-based guidelines like the Maximum Surgical Blood Order Schedule (MSBOS)(4). The efficiency of blood use can be assessed using indices such as the Crossmatch-to-Transfusion (C/T) ratio, Transfusion Probability (T%), and Transfusion Index (TI). A C/T ratio ≤ 2.5, T% $\geq 30\%$, and TI ≥ 0.5 suggest optimal utilization(5).
Despite these metrics, multiple studies show persistent over-ordering and poor utilization due to lack of awareness or protocol enforcement(6,7). This study aims to audit the blood ordering and utilization practices in obstetric and gynecological patients in a tertiary care hospital in Rajasthan using these indices.

Aims and Objectives

- To evaluate blood and component requisition and utilization patterns in obstetrics and gynecology.
- To calculate blood utilization indices: C/T ratio, T%, TI, and MSBOS.
- To compare findings with standard transfusion efficiency benchmarks.
- To recommend strategies for optimal blood utilization.

Methodology

Study Design: Prospective, cross-sectional hospital-based study.
Duration: One year (September 2023 – August 2024).
Setting: Department of Immunohaematology and Blood Transfusion, JLN Medical College and Associated Group of Hospitals, Ajmer.
Sample Size: 1500 obstetrics and gynecology patients for whom blood requisitions were raised, calculated based on expected transfusion prevalence and finite population correction.

Inclusion Criteria:

• Patients from OBG ward or the operation theatre with blood/component requisition.

Exclusion Criteria:

• Incomplete data or canceled requisitions without investigation.

Data Collection:

• Age, diagnosis, type of procedure
• Number of units requisitioned, crossmatched, issued, and transfused
• Pre-transfusion hemoglobin

Indices Calculated:

- **C/T Ratio** = No. of units crossmatched / No. of units transfused
- **T%** = (No. of patients transfused / No. of patients crossmatched) × 100
- **TI** = No. of units transfused / No. of patients crossmatched
- **MSBOS** = 1.5 × TI

Statistical Analysis:

- Data analyzed using SPSS v21. Descriptive statistics and chi-square tests were used; $p < 0.05$ considered significant.

Results

Table 1: Age Distribution of Blood Requisitioned Patients

Age Range (Year)	Number of patients															
	Blood & Blood Component Cross Matched & Supplied					Type Only					Cross Match Cancelled					Grand Total
	WB	PRBC	FFP	PLT	Total	WB	PRBC	FFP	PLT	Total	WB	PRBC	FFP	PLT	Total	
< 20	7	2	0	0	9	18	8	0	0	26	1	0	0	0	1	36
20 - 40	415	125	8	2	550	475	166	0	0	641	26	7	0	0	33	1224
41 -60	84	51	12	6	153	41	23	0	0	64	1	1	0	0	2	219
61 - 80	9	1	1	0	11	8	2	0	0	10	0	0	0	0	0	21
Total	**515**	**179**	**21**	**8**	**723**	**542**	**199**	**0**	**0**	**741**	**28**	**8**	**0**	**0**	**36**	**1500**

The majority of patients requiring blood and blood components belonged to the 20–40years age group (81.6%), reflecting the reproductive age group in obstetrics and gynecology, which commonly involves conditions like postpartum hemorrhage, anemia, and cesarean sections. This group also had the highest number of type-only requests (641 out of 741; 86.5%) and crossmatch and supplied cases (550 out of 723 ; 76.07%), indicating a high demand for transfusion services in this population. The highest usage was seen for whole blood (415 patients; 75.45%) and packed red blood cells (125 patients; 22.73%), with relatively lower usage of platelets and FFP.In contrast, the <20 and >60 age groups had significantly fewer transfusion-related activities. 36 patients (2.4%) had their crossmatches cancelled, most commonly in the 20–40 years group (26 patients), suggesting possible clinical recovery or overordering. A total of741 patients were typed onlywithout any crossmatching.

Table 2: GYNAE/OBS DISTRIBUTION

Gyn/Obs	Number of patients															
	Blood & Blood Component Cross Matched & Supplied					Type Only					Cross Match Cancelled					Grand Total
	WB	PRBC	FFP	PLT	Total	WB	PRBC	FFP	PLT	Total	WB	PRBC	FFP	PLT	Total	

Gynae	142	74	18	8	242	69	35	0	0	104	0	3	0	0	3	**349**
Obs	373	105	3	0	481	473	164	0	0	637	28	5	0	0	33	**1151**
Total	**515**	**179**	**21**	**8**	**723**	**542**	**199**	**0**	**0**	**741**	**28**	**8**	**0**	**0**	**36**	**1500**

Blood ordering and utilization showed higher demand in obstetrics (1,151 patients; 76.73%) than gynecology (349 patients; 23.26%). In obstetrics, 481 patients (41.8%) were transfused, mainly whole blood (373; 77.55%) and PRBCs (105; 21.83%), reflecting frequent acute blood loss and anemia management. In gynecology, 242 patients (69.3%) received transfusions, also predominantly whole blood and PRBCs.

Among all blood groups, B+ had the highest number of transfused cases (263; 36.37%), followed by O+ (203 ; 28.08%) and A+ (165 ; 22.82%), indicating that these are the most prevalent and frequently utilized blood groups in obstetrics and gynecology patients.

Table 3: CLINICAL DIAGNOSIS

Clinical Diagnosis	**Number of patients**		
	Crossmatched &Supplied	**Type Only**	**Cross Match Cancelled**
Abortion	4	1	0
Abruptio Placentae	1	1	0
Pregnancy with Anemia	405	603	32
Anemia	2	7	0
APH	29	11	0
AUB-O	33	20	0
AUB-A	45	22	0
AUB-E	19	9	0
AUB-L	69	29	3
AUB-M	4	0	0
AUB-C	2	0	0
AUB-P	20	0	0
Ectopic pregnancy	10	7	1
Endometriosis	3	0	0
Placenta Previa	15	7	0
PPH	17	7	0
Uterine Fibroid	10	5	0
UV Prolapse	35	12	0
Total	723	741	36

The majority of transfused patients (405 out of 723; 56.02%) were diagnosed with pregnancyrelated anemia, making it the most common indication for blood or blood component therapy. Second most

common indication is AUB with 192 out of 723(26.56%) patients. AUB-L contributed 69 out of 723(9.54%), followed by AUB-A 45 out of 723(6.22%), AUB-O 33 out of 723(4.56%), and APH 29 out of 723(4.01%). Other significant contributors included UV prolapse (35 out of 723; 4.84%), PPH (17 out of 723; 2.35%), and Placenta previa (15 out of 723; 2.07%).

Table 4: TRANSFUSION INDICES FOR BLOOD AND BLOOD COMPONENT

Diagnosis	Cross matched		Transfused		C/T Ratio	%T	TI	Blood Maximum Order (TI x 1.5)
	Patients	Units	Patients	Units				
Abortion	4	5	4	5	1.00	100	1.25	1.88
Abruptio Placentae	1	1	1	1	1.00	100	1.00	1.50
Pregnancy with Anemia	437	551	405	516	1.07	92.68	1.18	1.77
Anemia	2	2	2	2	1.00	100	1.00	1.50
APH	29	37	29	37	1.00	100	1.28	1.91
AUB-A	45	50	45	50	1.00	100	1.11	1.67
AUB-E	19	24	19	24	1.00	100	1.26	1.89
AUB-L	72	102	69	99	1.03	95.83	1.38	2.06
AUB-M	4	5	4	5	1.00	100	1.25	1.88
AUB-C	2	2	2	2	1.00	100	1.00	1.50
AUB-O	33	37	33	37	1.00	100	1.12	1.68
AUB-P	20	28	20	28	1.00	100	1.40	2.10
Ectopic pregnancy	11	14	10	12	1.17	90.91	1.09	1.64
Endometriosis	3	3	3	3	1.00	100	1.00	1.50
Placenta Previa	15	20	15	20	1.00	100	1.33	2.00
PPH	17	61	17	61	1.00	100	3.59	5.38
Uterine Fibroid	10	11	10	11	1.00	100	1.10	1.65
UV Prolapse	35	35	35	35	1.00	100	1.00	1.50
Grand Total	**759**	**988**	**723**	**948**	**1.04**	**95.26**	**1.25**	**1.87**

The table shows transfusion indicators by clinical diagnosis among 750 patients for whom blood was crossmatched. Overall, the Crossmatch to Transfusion (C:T) ratio was 1.04, indicating efficient blood ordering practices, as a C:T ratio ≤2.5 is considered acceptable. A high transfusion probability (%T) of 95.2% further reflects that most crossmatched patients required transfusion. The Transfusion Index (TI), which indicates the average number of units transfused per patient crossmatched, was 1.25, and the Maximum Blood Order (MBO) based on TI × 1.5 was 1.87.

Among individual conditions, Postpartum Hemorrhage (PPH) had the highest transfusion index (TI = 3.59), warranting inclusion in high-blood-need categories with an MBO of 5.38 units. Other diagnoses with elevated TI and MBO values included AUB-P (1.40), AUB-L (1.38), and Placenta Previa (1.33). Conditions such as Pregnancy with Anemia, though high in volume (437 crossmatched patients), showed a relatively moderate TI (1.18). Diagnoses like Endometriosis, Anemia, and UV Prolapse had low TI (1.0), indicating minimal transfusion needs despite crossmatching. The uniform 1.00 C:T ratio in most conditions also suggests optimal use of crossmatched blood without excessive wastage, reinforcing a patient-specific, diagnosis-driven blood management strategy.

Discussion

The present study found that 81.6% of patients belonged to the 20–40 years reproductive age group, closely matching findings by Sarkar *et al.* (8) who reported 74.5% in the 21–30 years group, Singh *et al.* (9) with 78.6% in the 21–40 years bracket, and Singh S*et al.* (10) who reported 86% in reproductive age, confirming high transfusion demand among younger women.

Blood group B+ was most prevalent (34.6%), in line with Singh S *et al.* (10) (37.2%) and Singh *et al.* (9) (40.79%), followed by O+ and A+, indicating the need for adequate group-specific inventory. Pregnancy with anemia was the most common indication (56.02%), similar to Singh *et al*. (9)(57.25%), Sarkar *et al.* (8) (51.5%), and Rathod *et al.* (11) (50.81%).Abnormal uterine bleeding (AUB) followed with 26.56%, also in line with Singh et al.(9) (36.84%).

In the present study, whole blood usage was higher in obstetric patients (373 out of 481; 77.55%) and gynecologic patients (142 out of 242; 58.68%) compared to PRBC usage (105 out of 481; 21.83% and 74 out of 242; 30.58%, respectively), indicating continued reliance on whole blood. This pattern aligns with Lawani *et al.* (12), who reported 70% whole blood and 30% PRBC usage in obstetrics, and Singh S *et al.* (10) , who noted 82% whole blood usage across both obstetric and gynecologic cases.In the present study, obstetric cases comprised 66.53% (481/723) of transfusions and gynecologic cases 33.47% (242/723), a pattern similar to Kawthalkar et al. (13) who reported 62.7% and 37.3%, respectively.

In the present study, a C/T ratio of 1.04, %T of 95.2%, and TI of 1.25 were observed, each pointing to highly efficient and justified blood utilization. The values from Sutrakar *et al.* (14) and Sarkar *et al.* (8)—C/T ratios of 1.52 and 1.65 and TI values of 1.06 and 1.39, respectively—are also within acceptable limits and comparable to the present study.. Nonetheless, MSBOS implementation and clinician education could further streamline ordering practices.Regular transfusion audits, as done in this study, are essential for quality assurance and rational use. They should be incorporated into institutional policy.

Conclusion

The study concludes that blood ordering and transfusion practices in obstetrics and gynecology at this institution are moderately efficient. Most transfusions occurred in the reproductive age group, with whole blood still being the primary component used.While the transfusion indices indicate satisfactory practice, targeted efforts to reduce unnecessary ordering and promote component therapy are essential. Periodic transfusion audits and strict adherence to MSBOS guidelines can optimize utilization.

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