

## Department-Wise Analysis of Blood Supply and Demand Patterns in a Private Tertiary Care Hospital in south india : A Retrospective Observational Study

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### ABSTRACT

**Background:** Blood is an adequate and timely supply that has lifesaving interventions in all departments of the hospital. Understanding department-specific demand and utilization trends facilitates optimal blood inventory management, minimizes waste, and ensures availability during emergency situations.

**Objectives:** The objectives are to analyse the department-wise demand and supply of blood and its components; identify the most frequently required blood groups; and determine case patterns that require transfusion in different clinical departments.

**Methods:** A retrospective cross-sectional study was conducted using data from the hospital blood bank over a period of 10 months. The records were analysed for department-wise requisition, type of blood component, blood group distribution, and indication for transfusion. Data were entered in Microsoft Excel and statistically analysed using SPSS version 25.0. Descriptive statistics, frequency distributions, and Chi-square tests were applied.

**Results:** The demand for blood was highest in the Medicine Department (57%) among blood requests analyzed, followed by Obstetrics & Gynecology (13%), Orthopedics (11%), General Surgery (9%), Pediatrics (4%), Oncology (4%), and emergency (2%). B positive (33.5%) was the most requested blood group, followed by O+ (32%), A+ (21%), AB+ (7.5%), B- (2.3%), O- (2.17%), A- (1%), and AB- (1%). Whole blood and packed red cells constituted the majority of the transfused components. Indications included postpartum hemorrhage, trauma, anemia, and major surgeries.

**Conclusion:** There is considerable variation in blood demand across the departments, reflecting underlying clinical patterns. Continuous monitoring, departmental audits, and data-driven inventory planning are important components in ensuring transfusion safety with minimum shortages in tertiary care centers..

**KEYWORDS:** Blood Transfusion, Blood Demand, Blood Group Distribution, Hospital Audit, Department-wise Analysis..

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### INTRODUCTION

Blood transfusion is one of the cornerstones in modern medicine, indispensable for managing obstetric hemorrhage, trauma, anemia, and surgical procedures.<sup>1</sup> Despite its importance, many hospitals face challenges in having enough adequate and safe blood.<sup>1</sup>

Demand for blood is not uniform, it has fluctuations among departments based on case load and clinical nature<sup>3,5</sup>. For example, General medicine often requires transfusion for CKD anemia; Obstetrics and Gynecology often require emergency transfusions for postpartum hemorrhage, while Surgical units ask for steady supplies in relation to operative cases.<sup>3-5</sup>

Department-wise utilization trends will help the hospital in planning inventory, donor recruitment, and preventing the wastage of perishable components such as platelets and plasma.

The present study will analyze the pattern of blood demand and supply across different departments of the hospital, identify the most frequently demanded blood groups, and correlate transfusion needs with the underlying clinical indications.

## OBJECTIVES

1. To assess the department-wise demand and supply of blood and its components.
2. To find out the blood groups most in demand.
3. To categorize the types of cases requiring transfusions department-wise.
4. Assess whether the requisition and availability of blood are adequately balanced.
5. To recommend strategies for improving blood bank efficiency and clinical transfusion practices.

Swiss Feed Database.

## MATERIALS AND METHODS

### Study Design

This is a retrospective observational study conducted at the Sri Lakshmi Narayana Institute of Medical Sciences, a tertiary care teaching institution.

### Study Period

Data collected over 10 months (January–October 2025).

### Study Setting

The hospital blood bank and transfusion department, which caters to inpatients and emergency cases from all clinical departments.

### Data Source

Registers for blood requisition and issue, component preparation, and transfusion are maintained by the hospital blood bank.

### Inclusion Criteria

- All blood and component requisitions from the various hospital departments during the period of study.

### Exclusion Criteria

- Record incompleteness or duplication.

Emergency requests cancelled before issue.

### Variables Studied

- Department: obstetrics, surgery, medicine, etc.
- Indication for transfusion-PPH, trauma, anemia, malignancy
- Blood group requested and issued
- Type of component: Whole blood, PRBC, FFP, Platelets, Cryoprecipitate
- Units crossmatched, issued, and returned

### Statistical Analysis

Data were entered into Microsoft Excel and later analysed using SPSS version 25.

- Descriptive statistics: mean, percentage, and frequency distribution.
- Department vs. blood component type: tested for significant association using Chi-square test;  $p < 0.05$  taken as significant.
- Graphs and tables used to illustrate trends.

## RESULTS

### Total Blood Requisitions

- Total requests: 635

Total issued units: 635

Department-Wise Blood Demand

Department	C/T ratio	% of total requests	Most Common Indications
Medicine	1.4	57%	Severe anemia, chronic renal failure, dengue shock,ckd
Obstetrics & Gynecology	1.3	13%	Postpartum hemorrhage, ruptured ectopic, cesarean section
Orthopedics	2.1	11%	Fracture fixation, joint replacement
General Surgery	1.6	9%	GI bleeding, splenectomy, trauma laparotomy
Pediatrics	1.5	4%	Neonatal exchange transfusion, thalassemia
Oncology	1.3	4%	Chemotherapy-induced anemia
Emergency	1.1	2%	Polytrauma, DIC

Blood Group Distribution

Blood group	%Demand
A+	21%
A-	1%
B+	33.5%
B-	2.3%
AB+	7.5%

AB-	0.17%
O+	32%
O-	2.17%

#### Component Utilization

component	%usage	Common indications
PRBC	75%	Anemia, surgery,Ckd
FFP	15%	DIC, liver disease
Platelets	8%	Dengue,platelets disorder
Cryoprecipitate	2%	Coagulopathy

#### Blood Return and Wastage

Units returned unutilized: 4%

- Units Expired: 2%
- Reasons: Over-ordering, surgery cancellation, mismatch in demand and issue.

### DISCUSSION

The current study highlighted that the demand for blood is maximum in the GENERAL MEDICINE Department, mostly in cases of CKD ANEMIA.

B positive was identified as the most in-demand blood group, which reflects its prevalence in the Indian population. Regular availability of O<sup>-</sup> is also crucial in emergency and pediatric cases.

A higher C/T ratio in some departments points to over-ordering or conservative transfusion practices. Regular departmental audits can be used in minimizing unnecessary crossmatches and preserving resources.

Component therapy rather than whole blood transfusion was stressed, and this was in line with the WHO and NACO policies on the promotion of rational use of blood.

### CONCLUSION

- Obstetrics & Gynecology and Medicine are the biggest consumers of blood.
- Most demanded blood group is B+.
- PRBCs remain the most issued components.
- Decrease in demand from surgical departments

Data-driven planning and interdepartmental communication may help in optimizing blood utilization and reducing blood wastage.

### RECOMMENDATIONS

1. Perform periodic departmental transfusion audits<sup>1,2,5</sup>.

2. Strengthen voluntary donor recruitment for commonly required groups<sup>1</sup>.
3. Form a blood utilization committee for demand and supply monitoring<sup>2</sup>.
4. Promote the rational use of components instead of whole blood<sup>1,2</sup>.
5. Integrate real-time blood inventory software for effective management.

## LIMITATIONS

- Single-center retrospective study.
- Omitted assessment of patient post-transfusion.

Data is limited to a 10-month period, with seasonal variations not explored.

Conflict of Interest: None declared.

Funding: None.

Author Contributions: SSA conceptualized and designed the study, extracted data, performed analysis, and drafted the manuscript.

Ethical Approval: Not required for secondary data analysis.

Availability of Data and Materials: All data generated or analyzed during this study are included in this published article and its supplementary information files. The raw data are available upon reasonable request from the corresponding author.

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