



Research Article

Section: Transfusion Medicine

Quality Indicators in Department of IHBT: A One Year Retrospective Study

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ABSTRACT

Introduction: Quality indicators play a vital role in maintaining and improving healthcare services, particularly in critical areas like the Department of Immunohematology and Blood Transfusion (IHBT). Monitoring these indicators provides insights into the department's performance in areas such as blood collection, transfusion safety, and adherence to protocols. **Objective:** This study retrospectively evaluates key quality indicators within the IHBT at Victoria Hospital, Bangalore Medical College, over a one-year period (April 2022 to March 2023), with the aim of identifying trends, measuring performance, and providing recommendations for improvement. **Methods:** A retrospective study was conducted using data from the IHBT department's internal databases, patient records, and incident reports. Quality indicators were collected and analyzed monthly, covering metrics like transfusion reaction rates, blood wastage, donor deferral rates, and adherence to transfusion protocols. Statistical tools were used to identify trends and deviations from expected performance. **Results:** The study revealed a transfusion-transmitted infection (TTI) rate of 1.46%, an adverse donor reaction rate of 0.69%, and a donor deferral rate of 0.58%. The crossmatch-to-transfusion (C/T) ratio was 1.46, indicating efficient blood usage. A 3.93% discard rate was reported, with vasovagal syncope being the most common donor reaction (28 cases). Blood component discards were primarily due to insufficient collection, or damaged or expired blood bags. **Conclusion:** The findings underscore the importance of continuous monitoring of quality indicators in blood transfusion services. While the TTI and adverse reaction rates were low, improvements in blood collection practices and minimizing component discards are recommended. These measures can further enhance safety, efficiency, and the overall quality of care provided by the department.

INTRODUCTION

The pursuit of quality in healthcare is an ongoing effort that demands continuous evaluation, measurement, and improvement. In recent years, healthcare institutions around the world have recognized the growing importance of monitoring quality indicators as a critical method for assessing and enhancing patient care [1]. These indicators, which are quantifiable measures used to assess various aspects of healthcare services, offer valuable insights into a departments or institution's performance. In clinical laboratories, such as the Department of Immunohematology and Blood Transfusion (IHBT), these indicators are especially crucial [2].

They help ensure the accuracy, safety, and efficiency of services provided to patients, a necessity for a department as sensitive and critical as IHBT. This study takes a retrospective look at the quality indicators in the Department of IHBT over the course of one year [3]. Quality indicators play a fundamental role in healthcare, helping to monitor and guide the improvement of care. Generally, these indicators fall into three main categories: structural, process, and outcome indicators. Structural indicators evaluate the adequacy of resources, such as staff numbers, equipment, and infrastructure [4]. Process indicators focus on how care is delivered, assessing the adherence to procedures and the timeliness of services. Outcome

indicators are used to determine the effects of healthcare services, measuring patient outcomes, safety, and satisfaction [5]. In the IHBT department, where the precision and reliability of blood transfusion services are paramount, monitoring these indicators ensures the highest standards of patient safety. A lapse in quality could lead to serious consequences, including adverse reactions to blood transfusions. Monitoring key performance indicators such as transfusion reaction rates, blood wastage, protocol adherence, and donor deferral rates allows the department to maintain high standards of care and make data-driven improvements where needed [6].

The Department of Immunohematology and Blood Transfusion plays a pivotal role in healthcare, especially in hospitals that manage large volumes of surgeries, trauma cases, and patients needing regular transfusions. The department is responsible for overseeing the collection, testing, processing, and transfusion of blood and its components [7]. Additionally, it manages the recruitment and management of blood donors, ensuring that the blood supply meets strict safety standards. Quality assurance processes are woven into all aspects of the department's operations, from donor recruitment to blood storage and transfusion procedures [8]. When carefully monitored, quality indicators offer a continuous feedback loop, enabling staff to quickly identify and address any potential issues. For example, if there is an increase in transfusion reactions or an uptick in blood wastage, it serves as a signal to review the department's operations, whether the cause is linked to storage, screening procedures, or transfusion practices [9].

This retrospective study aims to evaluate the quality indicators within the Department of IHBT over the past year. By analysing data from this period, the study provides insights into how well the department is performing, focusing on essential indicators that are tied to both patient safety and operational efficiency. The key metrics examined include transfusion reaction rates, which assess the percentage of patients who experience adverse reactions post-transfusion [10]. This metric can reveal problems with blood compatibility, screening processes, or how transfusions are administered. Another important metric is blood wastage rates, which track how much blood or blood components are discarded due to expiration or contamination, pointing to potential inefficiencies in inventory management [11]. Donor deferral rates also provide insight into the department's recruitment and screening effectiveness, showing how many donors are deferred due to medical or other reasons. Additionally, the study evaluates the turnaround time for blood requests, which is critical for ensuring timely care in emergencies, and assesses compliance with established transfusion protocols to minimize risk [12].

The study employs a retrospective approach, meaning it uses data from past records gathered over a one-year period. The data come from multiple sources, including the depart-

ment's internal databases, patient records, blood bank software, and incident reports [13]. Through this analysis, the study aims to identify trends, pinpoint variations, and detect areas in need of improvement. Statistical tools will be used to determine the significance of any observed changes in the quality indicators, and root cause analyses will be conducted for any notable deviations from expected performance standards [14].

This study holds significant value for shaping future quality improvement initiatives within the Department of IHBT. By thoroughly understanding how the department performed in key areas over the past year, healthcare administrators and clinicians can create targeted interventions to boost performance [15]. Moreover, the findings of this study have broader implications for hospital-wide quality improvement efforts, as the IHBT department plays an essential role in ensuring patient safety and high-quality care. The use of quality indicators and data-driven approaches not only enhances the safety and effectiveness of blood transfusion services but also ensures that the department continues to meet and exceed patient care standards [16].

Quality indicators are indispensable tools for evaluating and improving performance in the Department of Immunohematology and Blood Transfusion. This retrospective study offers crucial insights into the department's operations, focusing on transfusion safety, blood management, donor services, and adherence to protocols [17]. By addressing these areas, the department can identify opportunities for further improvements, ensuring the continued delivery of safe, efficient, and high-quality care. The findings from this study will serve as a valuable resource for future quality enhancement efforts, benefiting both patients and healthcare providers alike [18].

This study aims to evaluate the quality indicators of the Department of Immunohematology and Blood Transfusion (IHBT) over a one-year period to assess performance, identify trends, and pinpoint areas for improvement. It focuses on analyzing transfusion reaction rates, blood wastage, donor deferral rates, turnaround times, and adherence to transfusion protocols. Based on the findings, the study seeks to provide recommendations to enhance the safety, efficiency, and overall quality of blood transfusion services within the department.

MATERIAL AND METHODS

The retrospective study was conducted in the Department of Transfusion Medicine at Victoria Hospital Blood Centre, Bangalore Medical College and Research Institute, Karnataka, India. Quality indicators (QIs) as outlined by the National Accreditation Board for Hospitals and Healthcare Providers (NABH) were documented monthly from April 2022 to March 2023, covering a one-year period. Ethical clearance for the study was obtained from the Institutional Ethical Committee (IEC), ensuring adherence to

ethical guidelines and protocols. The study aimed to assess these QIs to evaluate performance and identify areas for impr-

ovement in blood transfusion services during this period.

RESULT

Table 1: Distribution of Diseases Among the Study Subjects

Disease	Number of Cases	Percentage
TTI	109	50.00
HIV	30	13.76
HBV	55	25.23
HCV	22	10.09
SYP	1	0.46
MALRIA	1	0.46

The table presents data from a one-year retrospective study analyzing the prevalence of various infectious diseases as quality indicators in the Department of Immunohematology and Blood Transfusion (IHBT). Transfusion-transmissible infections (TTI) were the most prevalent, comprising 50% of the total cases, highlighting the importance of stringent donor screening to prevent transmission through blood products. Hepatitis B virus (HBV) infection was the second most common, accounting for 25.23% of cases, followed by HIV

at 13.76% and Hepatitis C virus (HCV) at 10.09%, indicating a significant burden of viral infections. Rare occurrences of syphilis (SYP) and malaria were also reported, each constituting 0.46% of cases, reflecting the comprehensive nature of testing to identify even uncommon infections. These findings emphasize the critical role of rigorous screening protocols to maintain blood safety and mitigate the risks associated with blood transfusion.

Table 2: Quality Indicators

Quality Indicator	Result
TTI %	1.46%
Adverse Donor Reaction Rate	0.69%
Donor Deferral Rate	0.58%
C/T Ratio	1.46
Discard Rate	3.93%
Quantity Not Sufficient (QNS)	2.05%

The table presents quality indicators related to blood donation processes. TTI percentage is 1.46%, indicating transfusion-transmitted infections. The adverse donor reaction rate is 0.69%, and the donor deferral rate stands at 0.58%. The C/T (Crossmatch to Transfusion) ratio is 1.46,

showing efficiency in blood crossmatching. The discard rate is 3.93%, while the rate of insufficient quantity (QNS) in donations is 2.05%. These metrics assess the overall quality and safety of blood collection.

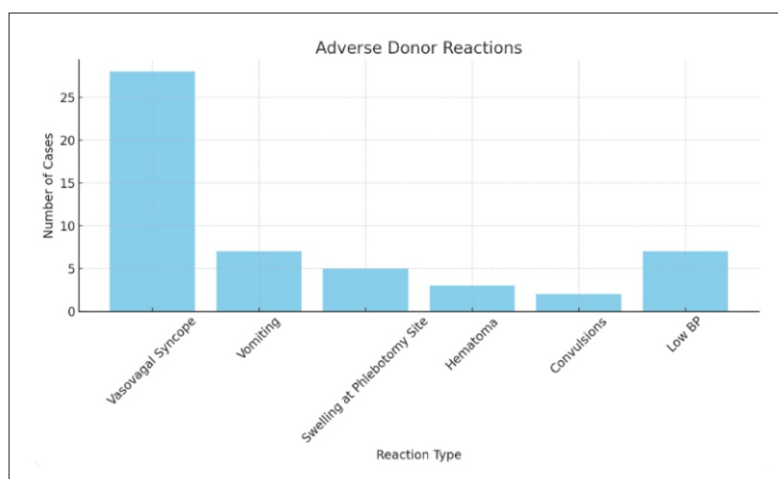


Figure 1: Adverse Donor Reactions

The bar chart illustrates the frequency of adverse donor reactions, with vasovagal syncope being the most common at over 25 cases. Other reactions include vomiting, swelling at

the phlebotomy site, hematoma, convulsions, and low blood pressure, each with fewer occurrences. Low BP also shows a relatively higher number compared to the other reactions.

Table 3: Adverse Donor Reactions

Reaction Type	Number of Cases	Percentage
Vasovagal Syncope	28	53.85
Vomiting	7	13.46
Swelling at Phlebotomy Site	5	9.62
Hematoma	3	5.77
Convulsions	2	3.85
Low BP	7	13.46

The table summarizes the adverse reactions experienced by donors, with vasovagal syncope being the most common, accounting for 53.85% of cases. This reaction, typically triggered by stress or anxiety, leads to a temporary loss of consciousness. Vomiting and low blood pressure (BP), each comprising 13.46% of cases, suggest transient physiological disruptions. Swelling at the phlebotomy site (9.62%) and

hematoma (5.77%) indicate localized complications likely caused by improper venipuncture or vascular injury. Convulsions were rare, occurring in 3.85% of cases, potentially linked to electrolyte imbalances or severe syncope. These data highlight that while most donor reactions are mild and manageable, careful monitoring and intervention are necessary to ensure donor safety.

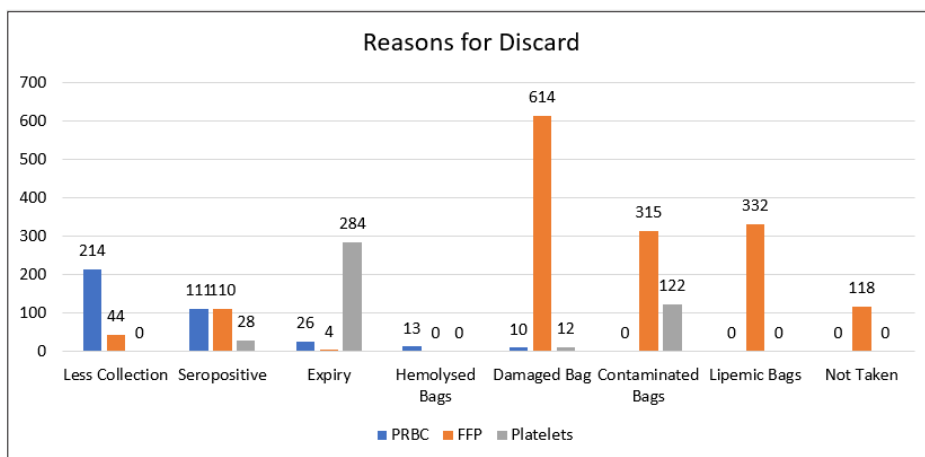


Figure 2: Reasons for Discard

The bar chart illustrates the reasons for discarding PRBC units. The most common cause is "Less Collection," followed by "Seropositive." Other causes include "Expiry," "Hemol-

ysed Bags," and "Damaged Bag," which occur less frequently. Categories like "Contaminated Bags," "Lipemic Bags," and "Not Taken" show no discards.

Table 4: Reasons for Discard

Reason for Discard	PRBC	FFP	Platelets
Less Collection	214	44	-
Seropositive	111	110	28
Expiry	26	4	284
Hemolysed Bags	13	-	-
Damaged Bag	10	614	12
Contaminated Bags	-	315	122
Lipemic Bags	-	332	-
Not Taken	-	118	-

The table outlines reasons for discarding PRBC (Packed Red Blood Cells), FFP (Fresh Frozen Plasma), and platelets. The most common reason for discarding PRBC is less collection (214 bags), while damaged bags are the main issue for FFP(614). Platelets are mostly discarded due to expiry (284 bags). Seropositive donations led to discards across all components. Additional reasons include homolysed, contaminated, lipemic, and "not taken" bags, impacting different components at varying levels.

DISCUSSION

Our findings, with a TTI rate of 1.46%, align with studies by Samje M et al. (2021) and Zulfikar A et al. (2012), both of which highlight the reduction of seropositivity rates for transfusion-transmissible infections (TTIs) like HIV, HBV, HCV, and syphilis among blood donors. Blood safety initiatives by organizations such as WHO and CDC have contributed to this decline through education and assessments. Samje M et al. reported higher TTI seroprevalence in replacement donors (3.71%) compared to voluntary donors (1.75%), with voluntary donors (83.02%) considered safer, reflecting a critical indicator in our study. Zulfikar A et al. also emphasized the importance of routine testing for TTIs and noted a higher seroprevalence for syphilis in donors aged 26-35 years, correlating with our emphasis on safety through C/T ratios, discard rates, and adverse reaction monitoring. These findings underscore the significance of screening, voluntary donation, and demographic factors in improving blood safety [19, 20].

Our findings, showing vasovagal syncope as the most frequent reaction, align with studies by Zulfikar A et al. (2012), which highlight mild to severe reactions during blood donation. Mild reactions, like dizziness or fainting, are often linked to anxiety, while moderate reactions include nausea and vomiting, commonly due to low blood volume or stress. Hematoma, a local reaction, may occur but typically resolves without issue. Rare severe reactions, such as convulsions or significant drops in blood pressure, though uncommon, are observed. These results confirm the prevalence of vasovagal reactions and the importance of donor safety monitoring [20].

Our findings show a TTI prevalence of 1.46%, higher than the 0.93% reported by Zulfikar A et al. and 0.82% by Varshney L et al. This discrepancy could be attributed to differences in donor demographics or screening methods. Both authors highlighted the importance of routine testing and safe donation practices in lowering TTI rates. Zulfikar A et al. emphasized voluntary donation and its link to reduced infection risk, while Varshney L et al. focused on strict screening protocols. Our study aligns with their findings but suggests a higher prevalence in our donor population, warranting further investigation into local factors [20, 21].

Our findings indicate that an integrated strategy for blood safety is crucial to eliminate TTIs and ensure safe, adequate blood transfusion services. Key components include

collecting blood from voluntary, non-remunerated donors, comprehensive screening for TTIs, and minimizing unnecessary transfusions. In our study, the adverse donor reaction rate is 0.69%, with vasovagal syncope being the most common, followed by vomiting. This rate aligns with Kumar et al.'s findings of 0.93% and is lower than the 2.03% reported by Abhishek et al. Both studies emphasize the importance of donor safety and the need for continuous monitoring and education to reduce reaction rates and improve overall blood safety in transfusion services [22, 23].

Our study, showing a C: T ratio of 1.46%, closely aligns with the findings of Novis DA et al., who reported a ratio of 1.5. The C:T ratio is a key indicator of blood ordering efficiency, with desirable values typically between 2 and 3. A lower ratio, as seen in both studies, suggests effective blood utilization, reducing unnecessary crossmatching and minimizing wastage. These results emphasize the importance of efficient blood management protocols to ensure that blood is ordered and used appropriately, contributing to better resource allocation and patient care in transfusion services [24].

CONCLUSION

The presented data highlights key quality indicators and challenges in blood donation processes. A low TTI percentage (1.46%) and donor deferral rate (0.58%) reflect safe practices, while a discard rate of 3.93% suggests room for improvement. Vasovagal syncope is the most common adverse donor reaction (28 cases), followed by vomiting and low blood pressure (7 cases each). For blood component discards, less collection was the primary reason for PRBC, damaged bags for FFP, and expiry for platelets. These findings underscore the importance of improving collection practices and minimizing component discards to enhance efficiency.

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