

ORIGINAL ARTICLE

ANALYSIS OF BLOOD REQUEST FORM AND BLOOD UTILIZATION PATTERN IN A TERTIARY CARE SPECIALIZED HOSPITAL

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Abstract:

Background: The growing demands for blood products are vital resources to health care facilities. If requested blood is not transfused, this causes blood wastage. Minimal utilization of requested blood squanders technical time, reagent and imposes extra expenses on patients. This study was conducted to evaluate blood requisition and utilization pattern in a tertiary care hospital. **Methods:** This retrospective study was conducted in the transfusion medicine dept. of a tertiary care specialized hospital from 1 January 2017 to 31 December 2020. Blood request forms were reviewed and blood utilization indices were computed from blood bank registries. Blood utilization was calculated determining cross match to transfusion ratio (C:T), transfusion probability (%T), transfusion index (TI) and non-utilization pattern i.e. wastage. **Results:** A total of 9,841 recipients were requested to prepare cross match. A total of 13,965 units of blood were cross matched and among these 10316 units were transfused to 9,291 recipients. The overall C:T, %T, and TI were 1.35, 94.41% and 1.05 respectively. The wastage implying in this study was 26.13%. **Conclusion:** The overall blood utilization was encouraging, but excessive cross matching with minimal transfusion practice was observed implying wastage of blood. Blood transfusion services should adopt blood conserving policies.

Key words: Cross match to transfusion ratio, probability of transfusion, transfusion index, request form, wastage.

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Introduction:

Blood transfusion is an essential part of patient care, especially during resuscitation. Blood and blood products are the valuable resources that play a major role in health care settings. Judicious use of these limited resources is necessary and significant to preserve adequate supply.

Type and crossmatch are the routine protocol in Asian countries in contrast to electronic type and screen protocols followed in western countries. Type and crossmatch leads to the blood to be unavailable for the emergency patients for at least 48-72 hours.¹ This causes increased workload on the technicians,

reagent wastage, and added financial burden on the patient undergoing elective surgery.^[1] Increasing demand for blood and blood products together with rising cost and transfusion associated morbidity led to a number of studies that blood ordering and transfusion review.^{2,3}

Blood transfusion services should have important tasks to include continuous monitoring and improvement of blood transfusion safety as well as setting guidelines and policies aimed at efficient use of blood products. The ultimate goals are to provide safe blood, to have an adequate inventory, to reduce wastage of blood products, and to reduce unnecessary

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use of laboratory services without jeopardizing patient safety. It appears that physicians order crossmatched blood on the basis of habit or hospital routines and there is tendency in most surgical departments to request more units of blood than actually required.^[4]

One of the tools for the evaluation of blood reservation system is the determination of the crossmatch-to-transfusion (C/T) ratio, which was first used by Boral and Henry⁵ and is considered an appropriate index at the threshold of 2.5:1. The probability of blood transfusion (number of crossmatched patients/number of transfused patients × 100) for assessment and considered values >30 % to be desirable which was used by Mead et al.^[6]. Another criterion is the transfusion index, which is the ratio of the mean number of units used for the crossmatched patients (number of crossmatched patients/number of transfused units); the values >0.5 are considered appropriate for blood quality.^[2,5,7,8] Blood transfusion plays a vital role in the medical and surgical practices. This study was conducted to evaluate the blood transfusion requests and pattern of utilization at a tertiary care hospital with the aim of determining the transfusion practice.

Methods:

This was a retrospective study in a tertiary care specialized hospitals transfusion medicine department from 1 January 2017 to 31 December 2020. Details of blood requisition and transfusion of cases were collected and reviewed from blood bank records. Details of patient’s age, sex, number of units crossmatched and transfused, number of patient crossmatched and transfused were included. Blood utilization indices were computed with the following equation.

- a) C:T ratio = Number of units crossmatched/number of units transfused.
- b) TI = Number of units transfused/number of patients crossmatched.
- c) Transfusion probability (%T) = Number of patients transfused/number of patients crossmatched × 100.

- d) Wastage of blood= in current study blood was wasted when a patient failed to use his/her already prepared blood in any case.

C:T ratio of 2.0 and below, TI value of 0.5 or more and %T value of 30% and above were considered indicative of significant of blood usage. Excessive cross matching was considered when these indices were above thresholds for appropriate blood usage, i.e., CT ratio >2.0 and TI <0.5.

Using the Microsoft Excel 2010 software, the generated data was analyzed into percentages, C:T (Crossmatch/Transfusion) ratio, TI (Transfusion Index), %T (Transfusion Probability).

Results:

A total of 9841 recipients were evaluated over a period of four years with mean age of 48.10 ± 20.16 years. Male to female ratio of the recipients was 1:1.24 (4387 vs 5456). Most of the transfusion recipients were more than 46 years age (60.17%). [Table 1]. During this period 9841 recipients were cross matched and for them total 13965 units were crossmatched. Among the recipients 9291 were transfused with 10316 units of blood. Over all CT ratio was 1.35 implying that 26.13% of the blood crossmatched was not transfused i.e. this was wastage of blood. Transfusion Index (TI) and Transfusion Probability (%T) were 1.05 and 94.41 respectively. [Table II and Table III].

Table 1
Showing age group wise recipient’s profile.

Age group	Frequency	Percentage
1 – 15 years	679	6.90%
16 – 30 years	1389	14.11%
31 – 45 years	1852	18.82%
46 – 60 years	3102	31.52%
61 – 75 years	2023	20.56%
76 – 90 years	796	8.09%
Total	9841	100.00 %

Table II
Showing C:T ratio, TI, %T and Wastage indices.

C:T ratio = Number of units crossmatched/number of units transfused.	1.35
TI = Number of units transfused/number of patients crossmatched.	1.05
Transfusion probability (%T) = Number of patients transfused/number of patients crossmatched × 100.	94.41
Wastage of blood= Blood was wasted when a patient failed to use his/her already prepared blood in any case.	26.13

Table III
Showing year wise crossmatch and transfusion performance.

	No of units cross-matched	No of units transfused	No of patients transfused	No of patients cross matched
2017	3,822	2,811	2,509	2,688
2018	3,961	2,861	2,572	2,710
2019	3,784	2,807	2,569	2,699
2020	2,398	1,837	1,641	1,744
Total	13,965	10,316	9,291	9,841

Discussion:

Blood transfusion plays vital role in medical and surgical practices. In order to achieve these, blood transfusion has to be appropriate and judicious.^[9] In this study we found that age of the transfusion recipients were 48.10 ± 20.16 years which was similar to the study done by Yazdi AP et al.¹⁰ Sex distribution was 1:1.24 (4387 vs 5456) which was lower than study done by 1: 1.40 (166vs232)¹⁰ and 1:2.5 (554 vs 1404) by Aliyu I et al.¹¹ Maximum of the transfusion recipients were in 46 years and more age group (60.17%) which is lower than study done by Mangwana S et al.^[1] where they found 51 years and more (79.56%).

The appropriate use of blood and blood products has been the subject of debate, since the introduction of blood transfusion in clinical practice. Therefore, it is essential that the usage of blood and blood products should be rationalized and saved for crisis situations. In this study the C:T ratio was 1.35 which is similar to Mangwana S et al.¹ study. This is much lower compared to other developing countries like India (4.3), Iran (3.71), Ethiopia (2.3), Nigeria (3.3), Sri Lanka (6.6).^{7, 10, 12-14}

Regarding TI, a value of 0.5 or more is indicative of efficient blood usage and appropriateness of number of units transfused.² The TI reported in current study was 1.05. This TI 1.05 is higher than the study conducted by Vibhute (0.35) Yadzi et al. (0.31), Belayeneh et al. (0.77), Ho and Bo (0.63) and Gamage et al. (0.2).^{7,10,12-14} Mangwana S et al.¹ found higher TI (1.22) than the current study.

Probability of transfusion (%T) which was suggested by Mead et al^[6] which indicates appropriateness blood usages. Accordingly, a value 30% and above indicates significant use of blood and appropriateness of number of units of blood cross matched. The results of the present study revealed an overall %T of 94.41%, which is indicative of appropriate utilization compared to unit cross matched. This finding is higher than

the studies of India (83.07%), Iran (16.83%), Ethiopia (47%), Nigeria (34.29%), Sri Lanka (14.6%).^{1, 10, 12-14}

Now a day's wastage of blood is a common problem in hospitals. The current study revealed that 26.13% cross matched blood was unutilized. This finding is comparable to study done by Mangwana S et al.¹ where 25.60% cross matched blood was unutilized. But it was relatively low compared to a study done in India (76.8%), Nigeria (69.7%), Nepal (86.4%), and Egypt (74.8%).^[7, 13, 15, 16] Though the wastage of blood in the present study is considered to be optimal as compared to the above studies, the majority of blood was not utilized by the patient. BashawariLA⁴ study showed that a high percentage (66.02%) of transfusions were cancelled after cross matching. Musa AU et al.¹⁷ found a total of 116 accounting for 17.29% of the issued out units (671) were returned to the blood bank unutilized. Developing a blood ordering policy can decrease over ordering of blood thereby reducing unnecessary compatibility testing, returning of unused blood and wastage. Many other reports have stressed the fact that if the blood ordering habits by clinicians were rationed, savings could be made without causing harm to patients.^{18,19}

Conclusion:

The present study showed that C:T ratio, TI and %T were 1.35, 1.05 and 94.41% were respectively which is indicative of good blood utilization. But wastage of blood is 26.13 which probably showed one fourth is not utilized. In conclusion, although blood transfusion is a life saving measure for many patients, it should be restricted to patients who are in real need. The overall ratio of C/T, %T and TI index were considered to be optimal as compared with the standard figures; even though majority of the cross matched blood was not utilized by the patient. For non-utilization of blood, blood transfusion services need to adopt blood conservation policies. For continued improvement of transfusion practice, continuous surveillance of utilization pattern is needed.

Conflict of Interest:

The author stated that there is no conflict of interest in this study

Funding:

No specific funding was received for this study.

Ethical consideration:

The study was conducted after approval from the ethical review committee. The confidentiality and anonymity of the study participants were maintained

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