

Blood Utilisation Practices and Quality Indicators at a Tertiary Care Hospital in South Delhi-A Retrospective Study

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ABSTRACT

Introduction: Blood transfusion services have an essential role in the resuscitation and management of patients undergoing elective surgeries and are an integral part of the healthcare system all over the world. Crossmatch to Transfusion Ratio (C:T) is an important national quality indicator used to estimate the appropriate use of services offered by the transfusion laboratory.

Aim: To assess blood utilisation practices by analysing Cross Match to Transfusion Ratio (C:T).

Materials and Methods: A seven years retrospective and cross-sectional study was carried out in a tertiary teaching hospital located in South Delhi catering to low socioeconomic population; study was conducted in the Blood bank of Department of Pathology from January 2012 to December 2018. The department wise utilisation of blood and its components C:T ratio, Transfusion probability (T%) and index (TI) were calculated.

Results: Out of the 3952 units prepared, 2850 (72.1%) units were transfused and rest 1102 (27.8%) were prepared but not

transfused. Thus, only 72.1% of total blood cross matched was utilised, leaving 27.8% of the units cross matched but not transfused to the patient. Department of medicine had the highest number of patients cross matched, 1297 (32.8%), as well as with number of units transfused 1122 (86.5%) with only 175 (13.5%) units left non-transfused. Obstetrics and Gynaecology department had second highest number of patients cross matched 1137 (28.7%) with number of transfused units being 545 (48%) and 592 (52%) non-transfused. In present study, the overall C:T ratio was 1.4. The T% and TI values obtained were 68.3% and 1.2 respectively.

Conclusion: The overall ratio of C:T, T%, and TI index are considered to be optimal as compared with the standard values though majority of the cross matched blood was not utilised. Developing a blood ordering policy, a guide to normal blood usage for surgical and other elective procedures, can reduce extra ordering of blood, unnecessary compatibility testing, returning of unused blood, and wastage due to expiry of components, allowing a more efficient management.

Keywords: Transfusion index, Transfusion medicine, Transfusion probability

INTRODUCTION

Blood transfusion services have an essential role in the resuscitation and management of patients with elective surgeries. They are an integral part of the healthcare system all over the world. The pre-operative requisition of blood units especially in elective surgeries are mostly of the time based on worst case pre-supposition leading to demand of large quantities of blood or overestimating the blood loss and out of which minimal is used [1]. The tendency of over ordering of blood leads to additional workload to the blood bank and financial burden for each patient resulting in exhaustion of valuable supplies, resources, time and manpower especially on those with limited resources.

C:T is an essential national quality indicator used to measure the appropriate use of services offered by the transfusion laboratory service [2]. The C/T ratio is often the criteria used in measuring efficient blood utilisation within the hospital blood transfusion service. The role of quality in transfusion practice depends on three contexts i.e., the blood collection centre, the transfusion service and clinical practice. All these indicators are used in maintaining and monitoring quality performance and also help in ensuring safety and integrity for the donor, recipient and blood bank staff. American Association of Blood Banks (AABB) suggests a C/T ratio of less than 2.0 is favourable, and value above denotes over-ordering and cross-matching of blood [3].

The aim of present study was to evaluate the blood requisition, utilisation, and its management by analysing the C:T. The hospital caters to semi-urban population in south of Delhi. Hence a need for this study was felt necessary to check on the number of blood units and its components used and wasted for conservation of resources and manpower as well as financial burden to the patients.

MATERIALS AND METHODS

A seven years retrospective and cross-sectional study was carried out from January 2012 to December 2018 in a tertiary teaching hospital located in South Delhi catering to low socioeconomic population, study was conducted in the Blood bank of Department of Pathology. The required data from clinical units and blood bank were collected and analysed. The total number of patients whose transfusion requests were made, units cross matched, units issued, units transfused, and units unutilised were evaluated. The requisition forms were analysed for relevant details. Implied consent was obtained while collecting the blood sample. The department wise utilisation of blood and its components, T%, C/T ratio, and TI were analysed.

Blood utilisation indices were derived from the following equations [2]:

- 1. Crossmatch transfusion ratio (C/T ratio)** = Total number of units cross matched/total number of units transfused. Value 2.5 and below indicates significant blood usage.
- 2. Transfusion probability (T%)** = Total number of patients transfused /total number of patients cross matched × 100. Value 30% and above indicates significant blood usage.
- 3. Transfusion index (TI)** = Number of units transfused/number of patients cross matched. A value of 0.5 or more is indicative of significant blood utilisation.

STATISTICAL ANALYSIS

The data was analysed using percentages and ratio and was presented in tabular and appropriate diagrammatic forms.

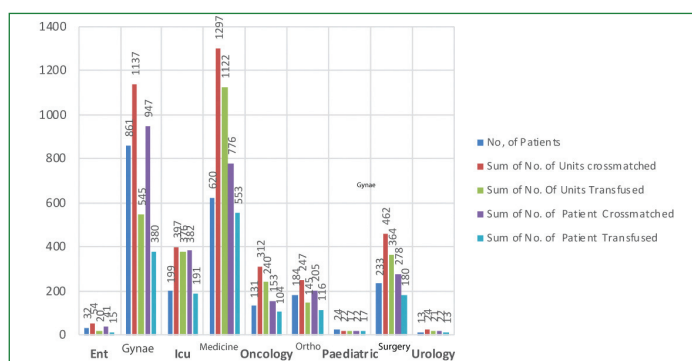
Department	No. of patients	Sum of No. of units cross matched	Sum of No. of units transfused	Sum of No. of patient cross matched	Sum of No. of patient transfused	C/T ratio of patients	T%	TI
Ear Nose Throat	32	54	20	32	15	2.7	46.9	0.6
Gynaecology	861	1137	545	861	380	2.1	44.1	0.6
Intensive Care Unit	199	397	376	199	191	1.1	96.0	1.9
Medicine	620	1297	1122	620	553	1.2	89.2	1.8
Oncology	131	312	240	131	104	1.3	79.4	1.8
Orthopaedics	184	247	145	184	116	1.7	63.0	0.8
Paediatric	24	22	17	24	17	1.3	70.8	0.7
Surgery	233	462	364	233	180	1.3	77.3	1.6
Urology	13	24	21	13	13	1.1	100.0	1.6
Grand Total	2297	3952	2850	2297	1569	1.4	68.3	1.2

[Table/Fig-1]: Department wise cross-matching and utilisation of blood units.

RESULTS

During the study, a total of 3952 units were prepared by hospital blood bank of which 2297 patients underwent major elective and emergency surgical procedures [Table/Fig-1]. Out of the 3952 units prepared, 2850 (72.1%) units were transfused and remaining 1102 (27.8%) were prepared but remained untransfused.

Department of medicine had the highest number of patients cross matched followed by Obstetrics and Gynaecology department which had second highest number of patients [Table/Fig-2]. The majority of the patients were females and overall male:female ratio was 0.5:1 [Table/Fig-3]. In the present study, the overall C:T ratio was 1.4.



[Table/Fig-2]: Department wise cross-matching and utilisation of blood units.

Department	Female	Male	Grand total	Male: female ratio
Ear Nose Throat	3	29	32	9.6:1
Gynaecology	857	4	861	0.004:1
Intensive Care Unit	91	108	199	1.2:1
Medicine	309	311	620	1:1
Surgical Oncology	71	60	131	0.8:1
Orthopaedics	106	78	184	0.7:1
Paediatric	13	11	24	0.8:1
Surgery	103	130	233	1.3:1
Urology	3	10	13	3.3:1
Grand total	1556	741	2297	0.5:1

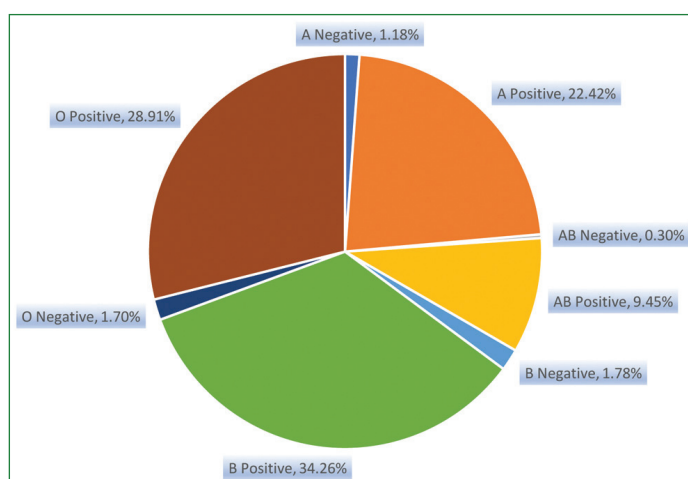
[Table/Fig-3]: Department wise male female and total numbers and ratio.

The T% and TI obtained were 68.3% and 1.2 respectively. Thus, this study indicates efficient blood usage [Table/Fig-1].

Most common blood group of patients was B positive of all the patients cross matched followed by O positive and least AB positive blood group patients [Table/Fig-4].

DISCUSSION

Effective use of blood and its components with high quality and minimum wastage are the main goals of blood utilisation



[Table/Fig-4]: Blood group wise total, distribution in number of patients and percentage of patients.

management system [4] and constant monitoring helps supply safe blood and blood products to the patients who are in need preventing over-utilisation of this scarce resource [5].

Various quality indicators in transfusion medicine have been identified as per WHO such as C/T ratio, T% and TI keeping a check on the gross over-ordering of blood [6,7]. The C:T ratio is often used as a measure of the effectiveness of blood ordering practice [8]. Boral Henry first suggested the use of C:T ratio in year 1975 [9].

The C:T ratio should be ideally 1.0 but a ratio of 2.5 and below is considered to be indicative of efficient blood usage. C:T ratio >2.0 means that <50% cross matched units are transfused [10]. Hence, the primary goal of present study was to estimate the blood requisition, utilisation, and its management by analysing C:T ratio.

In this study, 3952 blood and blood components requests were received and 2850 were issued and transfused after proper cross matching and screening (72.1%). Overall, the C:T ratio of 1.4 was recorded in present study which was quite lower than that reported from other studies conducted in Egypt (3.9), Malaysia (5.0), India (2.5), Nigeria (2.2), and Saudi (2.96) [1,9,10,11]. A C:T ratio of 1 or less than 2.5 indicates efficient usage of blood [12]. The variation in CT ratio may be due to various transfusion policies at different hospitals.

Indications of blood transfusion depends on clinical status of every patient and their treating clinicians. Lack of clinical audits, blood ordering policies and lack of co-ordination between clinicians and Head of Department of Blood Transfusion Medicine is the most common cause of high C:T ratio [13]. Mead JH et al., first studied the transfusion probability denoted as T% [14]. A value of 30% was considered appropriate signifying the appropriateness of number of units cross matched [15].

The overall T% is higher than in studies of Iran (16.83%), Ethiopia (47%), Nigeria (34.29%), and Sri Lanka (14.6%) which was indicative of considerable significant blood usage [1,5,19,16].

T% for patients in this study (68.3%) was more as compared to the study by Ibrahim SZ et al., (54.2%) [10]. Different studies conducted by Devi KM et al., and Kaur D and Kandwal M, have also reported efficient utilisation with C/T ratio, TI and T% which are comparable with present study [Table/Fig-5] [17,18,19].

Studies	C/T ratio	TI	T%
Devi KM et al., [17]	1.02	0.97	97.2
Kaur D and Kandwal M [18]	1.57	0.79	79.0
Tadesse B et al., [19]	2.3	0.77	47.0
Present study	1.4	1.2	68.3

[Table/Fig-5]: Quality indicators for blood utilisation among different studies [17-19].

However, in a study by Tadesse B et al., the overall ratios of C/T, %T, and TI showed excessive crossmatching and minimal transfusion practice was observed in elective surgical patients [19].

Hence, various measures have been developed to monitor the inappropriate use of blood and its components which includes the guidelines as well as surveilling of transfusion practice, education and self-audit by the clinicians.

Limitation(s)

There were few limitations to the present study. The pre-operative data including haemoglobin level, co-morbidities and antiplatelet therapies and intra-operative data including amount of blood loss and duration of surgeries are very essential to correlate the results but due to some logistic issue; such data could not be obtained. Also the present study was from a tertiary care hospital thus limited patients were studied and exact comparison with other bigger studies was not possible.

CONCLUSION(S)

The overall ratio of C/T, T%, and TI were optimal compared with the standard values, though majority of the cross matched blood was not utilised. Crossmatching and preparation are not necessary in majority of elective surgical procedures. In an era of cost reduction to increasing health-care cost, decrease reimbursement, and pressure to reduce unnecessary investigation and procedures, optimising the practice of blood ordering is an important aspect in a tertiary care setting. C/T ratio of elective patients in each department

showed inefficient utilisation of ordered blood. Blood ordering policy development, can decrease overordering of blood, unnecessary compatibility testing, returning of unused blood, and wastage due to expiry of components, allowing a more efficient management.

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