Original Research Article

Utilization pattern of blood and its components in a tertiary care super speciality hospital

Anjali Handa, Sunita Bundas*, Ashok Pal

Department of Immuno Haematology and Transfusion Medicine, SMS Medical College and Attached Hospitals, Jaipur, Rajasthan, India

Received: 24 August 2020
Revised: 12 October 2020
Accepted: 13 October 2020

*Correspondence:
Dr. Sunita Bundas,
E-mail: drsunitabundas@yahoo.in

ABSTRACT

Background: Blood is the most precious gift for human life. Blood transfusion services play a vital role in managing health care services. There is no substitute for blood and its components till date, therefore blood donation drive is very crucial. The primary responsibility of blood transfusion services is to provide safe, sufficient and timely supply of blood and blood products. There has been shift for usage of blood and blood components from the use of whole blood so that maximum utilization of this precious resource could be done. Aim and objectives was to study pattern of utilization of blood and blood components in a super speciality hospital with the indications for transfusions for different components during the study period.

Methods: This retrospective study for 12 months (January 2019- December 2019) on pattern of utilization of blood components was carried out in the department of immunohaematology and transfusion medicine in a super speciality hospital.

Results: There were total of 90237 transfusions which were carried out during the study period of 12 months. During the study period, 366 stored whole blood units, 55300 Packed RBC units, 19111 FFP units, 14298 Random Donor Platelet units, 1119 single donor platelets and 43 cryoprecipitate units were issued for use in patients admitted to our hospital.

Conclusions: Periodic review and audit of blood component usage becomes essential to assess the blood utilization pattern in any hospital.

Keywords: Audit, Blood components, Blood transfusions, Utilization pattern

INTRODUCTION

Blood transfusion services aims to supply safe, uninterrupted and timely blood and blood components such that there is minimum wastage of this precious drug.1 Blood must be transfused cautiously because blood and its components have the propensity to cause immunomodulation in the recipient.2 Transfusion of donated blood remains the main stay of treatment in various clinical conditions as there is no substitute for this precious drug.3 Periodic review of blood component usage is essential to assess the blood utilization pattern in any hospital.4

Nowadays, good clinical practice guidelines make sure transfusion therapy is given specifically for well-established indications and there should be use of blood components rather than whole blood.5 With this background, the present study was designed to evaluate use of blood components in our institution.
METHODS

This retrospective study was done in our 2500-bedded tertiary care superspeciality teaching hospital in North western India. In the present study, all the requests for various blood products from January 2019 to December 2019 were evaluated retrospectively.

Data was collected retrospectively for all patients who had been issued stored whole blood, packed red blood cells (PRBCs), fresh frozen plasma (FFP), platelets and cryoprecipitate. All transfusions included in the study were allogenic. The clinical data and transfusion details of all transfusion’s requests were obtained from blood bank records, request forms and computerized patient registration information. The data included age, gender, type and numbers of each blood component issued, diagnosis requiring transfusion. The International Classification of Diseases (ICD-10) version was used for classification of the diagnoses requiring transfusion of blood products. The most likely diagnosis requiring transfusion was selected.

All transfusion requests within the hospital were included in the study. Transfusion requests from any other outer hospital were excluded from the study.

The data were analysed for the pattern of blood and blood component usage by different specialties, for different indications in different patients. The results obtained were tabulated and pattern of utilization was noted.

Statistical analysis

Statistical analysis was done using SPSS software version 20.0. Charts and tables were prepared in Microsoft excel sheet. Mean (± Standard Deviation (SD)) was used for normally distributed continuous data. The study does not contain any patient identifiers and has been carried out as per ethical guidelines of the institute.

RESULTS

During the study period, there were total 90237 transfusions which were carried out during the period of 12 months. Whole blood and component utilization were calculated in all these transfusions.

366 stored whole blood units, 55300 packed RBC units, 19111 FFP units, 14298 random Donor Platelet units, 1119 single donor platelets and 43 cryoprecipitate units were issued for use in patients admitted to our hospital. We excluded cryoprecipitate and whole blood from further analysis since the total number of units was markedly less compared to other blood products (Figure 1).

Table 1 describes the utilization of blood components as per different speciality /superspeciality departments in this hospital.

| Ward                      | PRBCs | WB  | FFP | RDP | SDP | Cryoppt | Total |
|----------------------------|-------|-----|-----|-----|-----|---------|-------|
| Medicine department        | 7503  | 9   | 5664| 5952| 477 | 12      | 19617 |
| General surgery department | 6449  | 5   | 6166| 2172| 33  |         | 14825 |
| Thalassemia ward           | 11091 | 203 | 250 | 349 |     |         | 11893 |
| Ctv's department           | 6820  | 298 | 2570| 2953| 34  | 20      | 12695 |
| Neurosurgery department    | 6133  | 4   | 949 | 461 | 21  |         | 7568  |
| Nephrology department      | 3911  | 5   | 552 | 99  | 4   |         | 4571  |
| Medical oncology department| 1173  | 1   | 114 | 1368| 155 |         | 2811  |
| Plastic surgery department | 2192  | 340 | 71  |     |     |         | 2603  |
| Gastroenterology department| 1491  | 728 | 129 |     | 11  |         | 2359  |
| Urology department         | 2102  | 3   | 161 | 81  | 3   |         | 2350  |
| Orthosurgery department    | 1695  | 2   | 282 | 90  | 1   |         | 2070  |
| Radiotherapy department    | 1598  | 3   | 148 | 292 | 9   |         | 2050  |
| Cardiology department      | 934   | 12  | 253 | 191 | 7   |         | 1397  |
| ENT department             | 799   | 0   | 45  | 43  |     |         | 887   |
| Neurology department       | 172   | 8   | 430 | 23  | 1   |         | 634   |
| Surgical oncology department| 384  | 0   | 185 | 40  |     |         | 609   |
| Gastroenterology department| 473   | 1   | 87  | 31  | 16  | 0       | 608   |
| Trauma                     | 274   | 221 | 43  | 9   |     |         | 547   |
| Pmr department             | 45    | 2   | 7   | 3   |     |         | 57    |
| Skin department            | 30    | 11  | 6   | 1   |     |         | 48    |
| Endocrinology department   | 25    | 1   | 5   |     |     |         | 31    |
| Eye department             | 6     | 1   |     |     |     |         | 7     |
| Total                      | 55300 | 366 | 19111| 14298| 1119| 43       | 90237 |
Variation in the usage of blood and its components over the 1-year study period is summarized in Figure 2. It shows variable usage of PRBCS throughout the year. Random donor platelet and Single Donor Platelet demand increases during months of October and November which indicates peak dengue season. FFP utilization was variable throughout the year. Donor platelet and Single Donor Platelet demand increases variable usage of PRBCS throughout the year. Random donor platelet and Single Donor Platelet demand increases variable usage of PRBCS throughout the year.

Table 2. Blood group wise distribution of various components supplied.

| Blood group | PRBCs | FFP | PLC | SDP | WB | CRY-OP |
|-------------|-------|-----|-----|-----|----|--------|
| A+          | 11725 | 4414| 3077| 250 | 63 | 10     |
| B+          | 18898 | 6476| 4890| 325 | 97 | 20     |
| O+          | 16237 | 5606| 4669| 335 | 60 | 10     |
| AB+         | 4742  | 1487| 1054| 105 | 39 | 3      |
| A-          | 908   | 256 | 122 | 25  | 22 | 2      |
| B -         | 1439  | 452 | 279 | 34  | 22 |        |
| O -         | 1045  | 333 | 175 | 41  | 55 |        |
| AB -        | 306   | 87  | 32  | 4   | 8  |        |
| Total       | 55300 | 19111| 14298| 11198 | 366 | 43     |

Table 3: Distribution of blood products used in the diagnosis groups (ICD-10 headings).

| Diagnosis               | PRBCs | FFP | RDP | SDP |
|-------------------------|-------|-----|-----|-----|
| Infection (A00-B99)     | 2500  | 2000| 4000| 377 |
| Neoplasm (C00-D48)      | 3384  | 446 | 1700| 166 |
| Blood (D50-89)          | 12091 | 203 | 1202| 349 |
| Nervous (G00-99)        | 6305  | 1379| 484 | 22  |
| Circulatory (I00-99)    | 7954  | 2823| 3144| 41  |
| Digestive (K00-K93)     | 7913  | 6981| 2203| 33  |
| Skin/subcutaneous       | 2222  | 346 | 79  | 8   |
| Musculoskeleton (M00-M99)| 1740 | 282 | 90  | 2   |
| Genitourinary (N00-N99) | 6013  | 161 | 180 | 7   |
| Injury/poising          | 2778  | 3664| 1000| 109 |
| Others (eye/ent)        | 2400  | 826 | 216 | 5   |

Figure 2: Trend of different components throughout the year.

Distribution of various components according to blood group is given in Table 2. B Positive was the most common blood group supplied followed by O positive. Distribution of blood products used in the diagnosis groups (ICD-10 headings) is represented in Table 3.

DISCUSSION

The total number of whole blood and its components issued from our blood bank in 1 year (1st January 2019 to 31st December 2019) was 90237 units; with a monthly average of 7519 units. The supply showed some seasonal variation, with lesser units supplied near year ends and peak observed around mid-year (Figure 2).

A breakup of the supply for whole blood and various components (n=90237) showed that packed red cell (n=55300) was the maximum utilized product followed by fresh frozen plasma (n=19111) and then random donor platelet units (n=14298), 1119 single donor platelets and 43 cryoprecipitate units (Table 1).

Similar findings were seen by studies done by Garg et al and Qureshi et al. A rarely used component was cryoprecipitate (0.04%). This is comparable with the study done by Qureshi et al. Supply of PRBCs in the surgical departments was 48.90% (n=27047/55300) of total supply. Requests for supply of PRBCs to medical wards constituted 51.09% (n=28253/55300) of all demands, with highest requirement from thalassemia ward (n=11091). A study done by Agrawal et al also shows similar results (44.13%) for medicine department.

Fresh frozen plasma was mainly used in surgical departments followed by medicine department which clearly shows the demand increases in case of any bleeding during surgeries. Random donor platelets and single donor platelets were mainly used in medicine department followed by thalassemia patients specifically in transplant patients.
B Positive was the most common blood group supplied followed by O positive which was similar to the distribution of most common blood group in the area. Among the indications as ICD 10 classification for all blood products taken together, Blood (D50-89) was the most common indication followed by Circulatory (I00-99).

Among blood components PRBCs were used frequently for blood disorders (21.86%), circulatory disorders (14.38%), digestive diseases (14.30%), neurological diseases (11.04%), genitourinary diseases (10.87%), neoplasms (6.11%) and injury and poisoning conditions (5.86%) respectively.

Infectious and parasitic diseases (27.97%) were the most important indication for use of platelets transfusion followed by circulatory diseases (21.98%), disorders of blood (15.40%), neoplasms (11.88%), injury and poisoning (6.99%). FFP was used commonly for disorders of the digestive system (36.50%), injury and poisoning (19.17%), infectious and parasitic diseases (10.40%) followed by circulatory diseases (14.77%). FFP was mainly used to treat bleeding and to treat coagulation disorders.

However, the utilization of whole blood is currently very minimal in our institute. The total demands for whole blood were 366 units out of 90237 units (0.40%). The most common indication for whole blood was surgical procedures mainly in CTVS department. Usage of whole blood has been replaced mostly by blood components. The pattern of usage of blood products reflects the frequency of varied diseases conditions. Infectious diseases are more prevalent in developing countries.

Usage of PRBCs is quite significant in thalassemia patients which shows the increase burden on transfusion services to arrange for blood in these patients.

**Limitations**

There was separate hospital for trauma and obstetrics and gynecology which has separate blood banks, therefore that data is not included in this study.

**CONCLUSION**

The pattern of utilization of blood and blood components is significant for quality management of blood transfusion services, do the cost analyses for planning of local and regional blood donation camps so that demand can be met. Our study provides data regarding requirement of blood and blood component use in this teaching super speciality hospital. To avoid wastage and shortage. It has become necessary to study the different component requirement so that component separation could be well managed. Judicial usage of blood should be ultimate goal for any blood transfusion services therefore regular meetings of hospital transfusion committee should be made and strict monitoring regarding over usage and wastage should be done.

**Funding:** No funding sources  
**Conflict of interest:** None declared  
**Ethical approval:** Not required

**REFERENCES**

1. Ramani KV, Mavalankar DV, Govil D. Study of blood-transfusion services in Mahararashtra and Gujarat States, India. J Health Popul Nutr. 2009;27(2):259-70.
2. Garraud O, Cognasse F, Tissot JD. Improving platelet transfusion safety: biomedical and technical considerations. Transfus. 2016;14(2):109-22.
3. Giriyan SS, Chethana HD, Sindhushree N, Agarwal A, Nirala NK, et al. Study of utilization of blood and blood components in a tertiary care hospital. J Blood Lymph. 2017;7:169.
4. Hulwan AB, Kanetkar SR, Jagtap SV, Kale PP. Pattern of utilization of blood and blood components in a teaching hospital. J Datta Meghe Inst Med Sci Univ. 2019;14:61-6.
5. Basu D, Kulkarni R. Overview of blood components and their preparation. Indian J Anaesth. 2014;58:529-37.
6. Garg R, Aggrawal R, Falleiro JJ, Lakhani D, Garg S, Jasani J. An audit of the blood and component transfusion requests and utilization pattern in a tertiary care hospital, current trends. IJDDMR. 2013;1:82-5.
7. Qureshi MZ, Sawhney V, Bashir H, Sidhu M, Maroof P. Utilisation of blood components in a tertiary care hospital. Int J Cur Res Rev. 2015;7:1-7.
8. Agrawal VP, Akhtar M, Mahore SD. A retrospective clinical audit of blood transfusion requests in tertiary care hospital. Int J Biomed Adv Res. 2013;4:657-60.
9. Ambrose MM, Ravichandran K, Ramdas A, Sekhar G. A study of blood utilization in a tertiary care hospital in South India. J Nat Sci Biol Med. 2015;6(1):106-10.