Blood Utilization and Quality Indicators - Trend at a Super Speciality Hospital in Northern India

Abstract

Blood components are a scarce and expensive resource. Therefore, there is a need to continuously monitor blood utilization and audit the transfusion practices to identify key areas of concern for blood usage. We assessed the transfusion data for the patients requiring blood transfusion at our hospital for a period of one year from January 2015 to December 2015 using patient transfusion requisition forms, crossmatch and issue records. A total of 2434 blood transfusion requisitions were received by the Department of Transfusion Medicine for 3621 (49.69%) packed red cells (PRBC) units, 2140 (27.59%) fresh frozen plasma (FFP), 1923 (24.80%) random donor platelet concentrates (RDP), 15 (0.19%) whole blood units and 55 (0.56%) single donor apheresis platelet concentrates (SDP). The overall average CT Ratio (1.57), Transfusion probability (79.0%) and Transfusion index (1.18) demonstrated that there is efficient blood utilization at our hospital.

Keywords: Blood components; Transfusion hemoglobin; Surgical specialties

Methodology

a) Study Period: January 2015 to December 2015 (one year), the data for quality indicators was analyzed from a representative first half of the year (January 2015 to June 2015) simulating the entire year’s issue of blood components.

b) Study design: Cross-sectional prospective study.

c) Inclusions: All the patients requiring blood component transfusion for various specialities of our hospital.

d) Modalities: Patient transfusion request forms, crossmatch and issue records.

e) Data Inclusions: Age, gender, blood group, consultant in charge, speciality where the patient was admitted, diagnosis and indication of transfusion, pre-transfusion hemoglobin/platelet count/coagulation profile, type and number of blood components requested.

The transfusion data information so obtained from the documents was fed into Microsoft excel sheet for future analysis. The data pertaining to the number of whole blood/packed red cells/fresh frozen plasma/random donor platelet concentrates/single donor apheresis platelet concentrates requested as well as crossmatch/issue data was collected and analyzed.

Result

During the study period, a total of 2434 (first half =1210 + second half =1224) transfusion requisitions were received for 7754 (first half=2632+second half =2935) blood components. The PRBC requisitions were 3621 (49.69%), 2140 FFP (27.59%), 1923 RDP (24.80%), whole blood requisitions were 15 (0.19%) and SDP contributed 0.56% (55) of all transfusion requisitions.
Table 1: Blood Component Wise Distribution.

<table>
<thead>
<tr>
<th>Type of Component</th>
<th>PRBC</th>
<th>FFP</th>
<th>RDP</th>
<th>SDP</th>
<th>WB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components Requested</td>
<td>3621</td>
<td>2140</td>
<td>1923</td>
<td>55</td>
<td>15</td>
</tr>
<tr>
<td>Issued</td>
<td>2301</td>
<td>1811</td>
<td>1396</td>
<td>45</td>
<td>13</td>
</tr>
</tbody>
</table>

Table 2: Quality Indicators for Blood Utilization.

<table>
<thead>
<tr>
<th>speciality</th>
<th>CT Ratio</th>
<th>Transfusion Probability (TP) (%)</th>
<th>Transfusion Index (TI)</th>
<th>MSBOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTVS</td>
<td>1.92</td>
<td>89.75</td>
<td>1.36</td>
<td>2.04</td>
</tr>
<tr>
<td>General Surgery</td>
<td>1.84</td>
<td>71.42</td>
<td>1.3</td>
<td>1.95</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>1.79</td>
<td>71.91</td>
<td>1.08</td>
<td>1.65</td>
</tr>
<tr>
<td>Onco surgery</td>
<td>1.6</td>
<td>80</td>
<td>0.85</td>
<td>1.27</td>
</tr>
<tr>
<td>Obstetrics &amp; Gynecology</td>
<td>1.43</td>
<td>81.08</td>
<td>1.3</td>
<td>1.95</td>
</tr>
<tr>
<td>Pediatric Surgery</td>
<td>1.42</td>
<td>100</td>
<td>0.7</td>
<td>1.05</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>1.37</td>
<td>57.36</td>
<td>1.95</td>
<td>2.92</td>
</tr>
<tr>
<td>Urology</td>
<td>1.3</td>
<td>84.2</td>
<td>0.37</td>
<td>0.55</td>
</tr>
<tr>
<td>Plastic Surgery</td>
<td>1.28</td>
<td>61.53</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Critical Care</td>
<td>1.46</td>
<td>89.5</td>
<td>1.75</td>
<td>2.62</td>
</tr>
<tr>
<td>Cardiology</td>
<td>1.46</td>
<td>80</td>
<td>0.87</td>
<td>1.3</td>
</tr>
<tr>
<td>Nephrology</td>
<td>1.15</td>
<td>92.85</td>
<td>1.13</td>
<td>1.69</td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>1.13</td>
<td>100</td>
<td>1.12</td>
<td>1.68</td>
</tr>
<tr>
<td>Medicine</td>
<td>1.02</td>
<td>97.61</td>
<td>1.12</td>
<td>1.68</td>
</tr>
<tr>
<td>Overall</td>
<td>1.57</td>
<td>79.00</td>
<td>1.18</td>
<td>-</td>
</tr>
</tbody>
</table>
Figure 1: Speciality Wise Distribution of Issue of Blood Components.

Figure 2: Age Distribution of Patients.

Discussion

The transfusion of blood or blood components is one of the most significant part of delivery of healthcare services in a hospital setting [1]. It is quite challenging to maintain a balance between the ongoing blood demand and supply. Appropriate use of blood or blood components is an extremely cost-effective practice but holding blood units for elective surgery and then not transfusing the requested ones add to the testing cost for a patient, fritter away reagent and overburdens a blood bank. There is a great likelihood of low supply because of blood units kept on hold for 48-72 hours as per any institutional policy.

In the present study, the total blood utilization at our centre was observed to be 71.78% (n=5566/7754) whereas for the surgical specialities alone it was 59.42%. The utilization rate as studied by various centres worldwide for surgical patients varies from 13.6-43.6% [2-7]. At our hospital, which is a super speciality one, the maximum requisitions were received from cardiothoracic and vascular surgery (CTVS) unit followed by neurosurgery unit (NSU) and orthopedic unit. CTVS speciality contributed 41.7% of total blood units crossmatched among all surgical specialities. During the study period, 51.90% of the total packed red cell units crossmatched for the cardiac patients were transfused whereas the FFP utilization was higher as being 92.20%. It was found that 48.1% of the blood so crossmatched was unutilized for cardiac surgeries, 44.2% for NSU and 27.1% for orthopedic unit among the maximum blood ordering departments which is similar to the observations made by Subramanium et al. [8].

The maximum number of patients transfused were of the age group between 51 to 60 years followed by 61 to70 years while a study from South India and Saudi Arabia observed an average age of 35.12 ± 20.4 years [9,10]. As the majority of the patients requiring blood transfusion in our study were the cardiac patients admitted for elective surgery and hence the age corroborated with the same. The mean hemoglobin observed in our study for all the blood requests was 7.47g/dl which is similar to the observations made by Frank et al. [11] highlighting that higher number of requisitions for the blood transfusion at our centre were received for surgical (62.97%) indications than medical ones (37.03%).

A CT ratio of 2.5 or below, Transfusion probability of ≥30% and TI of more than 0.5 is considered indicative of efficient blood utilization as conceptualized by Boral et al. [12] & Mead et al. [13]. The overall CT ratio at the hospital was 1.57 and the highest being for CTVS as 1.92 followed by general surgery (1.84) and NSU (1.79) suggesting significant blood utilization in contrast to several other studies worldwide and in India, where the CT ratio was very high ranging from 14.16 to 41.4 [14-16]. The key issue remains an over ordering of blood units due to individualistic estimation of anticipatory excessive surgical blood loss and in view of the patient safety. Transfusion probability as low as 4.9% to 8.8% and 11.15% to 47% have been reported by many authors and the present study shows 79% indicating appropriate blood utilization [3,6,14-17]. The TI for the current study was 1.18 which is appropriate as per standards while other authors report TI as low as 0.06-0.11 [14-17]. Another study by Devi et al. [18] has reported even better utilization results than ours as CT ratio of 1.02, TP of 97.2% and TI of 0.97 highlighting significant blood utilisation and efficient blood transfusion practices at their centre [18].

Roger et al. [19] & Vrotsos et al. [20] observed a significant decline in CT Ratio from 3.21 to1.62 and 2.48 to 1.50 respectively when the later formed a Blood Utilization Committee as the already existing Hospital Transfusion Committee could not bridge the gap between transfusion services and other departments, nursing and clinicians on blood utilization aspect [19,20].

The highest MSBOS was observed with the Orthopedic unit (2.92) followed by CTVS (2.04), Obstetrics and Gynecology / general surgery (1.95) and neurosurgery unit (1.65) (Table 2). There is a great need to discuss type and screen approach vs crossmatched protocol at our centre which can further lower the resource wastage due to holding of blood units as reported by Jayarane et al. [21].

There are numerous factors which can affect the blood transfusion practices at a hospital including the blood conservation techniques being used by surgeons, level of training of technologists and nursings, sharing of blood utilization information with other departments [22]. The encouraging pattern of blood utilization at our centre reflects the positive impact of regular meetings of hospital transfusion committee where all the major blood consumer departments participate and discuss the data and transfusion practices. Any issues related to the turnaround time, availability of units in emergency and holding the crossmatched blood units are discussed and resolved if need there be. However, still there is a big scope of curbing the over ordering of blood units as per each surgical specialty and revise the existing MSBOS for such.

Conclusion

The study helped in assessment of the transfusion practices at our centre which is found to be encouraging. The CT ratio, transfusion probability and transfusion index demonstrated that there is significant blood utilization at our hospital. But excessive blood ordering for elective surgeries has been observed which leads to wastage of reagential resources, further adding extra cost to the patient. Therefore, the transfusion auditing should be made a common feature with hospital transfusion committee meetings wherein MSBOS can be modified and implemented progressively. Various measures to improve upon the safety and efficiency of blood supply should be put into practice including regular auditing of blood transfusion services at the centre, preparing and following evidence based blood transfusion guidelines and regular training of the clinical residents and the nursing staff.

References

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Citation: Kaur D, Kandwal M (2016) Blood Utilization and Quality Indicators - Trend at a Super Speciality Hospital in Northern India. Hematol Transfus Int J 2(3): 00037. DOI: 10.15406/htij.2016.02.00037


