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TRANSFUSION PRACTICE IN NEONATAL INTENSIVE CARE UNIT OF A TERTIARY CARE HOSPITAL

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ABSTRACT
The transfusion of blood products to neonates is common. The main aim of blood bank is to provide safe and effective blood and blood components for these babies. This study is undertaken to analyze the pattern of usage of blood and blood components in patients admitted to neonatal intensive care unit (NICU) of a tertiary care hospital. A total of 279 units were transfused to 143 patients in the NICU. Usage of fresh frozen plasma (44.8%) was more compared to platelet, packed red blood cells and whole blood. Most common disease for which blood and blood products were anemia (42%) and thrombocytopenia (40%) followed by bleeding disorders, and sepsis. It is essential to review the transfusion practice in various departments which helps the blood bank to assess the demand and to arrange for the timely supply of the same.

KEYWORDS: Transfusion, Blood Component Therapy, Packed Red Cells, Platelets, Fresh Frozen Plasma, New Born

INTRODUCTION
Sick neonates are one of the most heavily transfused groups of patients in modern medicine. Older infants and those with problems after premature birth require transfusions quite often. Preterm neonates constitute the highly transfused group of patients. About 85% of extremely low birth weight babies receive transfusion by the end of the hospital stay. The prevalence rate of transfusion varies between countries and regions. Pediatric patients are more likely to be long term survivors, thus determining the indications, benefits and risks are of great importance as long term complications have to be given greater consideration.
The leading causes of neonatal morbidity and mortality in the developing countries include mechanical and chemical birth injuries, infections, and jaundice. These conditions may be associated with hemolysis, disorders of coagulation or accumulation of potential toxins. Blood transfusion replaces volume and constituents of blood which play significant roles in oxygen carriage, immunity, and clotting. Therefore, blood transfusion is required to maintain life by increasing the cardiac output and oxygen delivery to tissues and removing toxins like bilirubin from the body.

The main aim of blood bank is to provide safe and effective blood and blood components that is needed for these babies. Blood and blood components are considered as drugs by the Food and drug administration (FDA). Knowledge of common indications for blood requirement would result in more rational use of these scarce resources in blood banks and also to reduce inappropriate transfusion of blood and blood components. This study is undertaken to analyze the pattern of usage of blood and blood components in patients with various diseases admitted to neonatal intensive care unit (NICU) of a tertiary care hospital.

**MATERIAL AND METHODS**

Data for the present study was obtained from the records of SS blood bank which is attached to SS Institute of Medical Science and Research Centre in Davangere district, Karnataka. Details of blood and blood products transfused to recipients admitted to NICU over a period of 8 months from January to August 2012 was obtained from the blood bank register along with other relevant data viz age, gender, blood group and underlying medical condition. All these data was analyzed and correlated with the disease for which they were hospitalized.

**RESULTS**

During the study period, 143 patients suffering from various diseases admitted to NICU were transfused with blood and blood products. Youngest recipient was one day old and oldest was 36 days. Of these, 98 were males (68.53%) and 45 (31.47%) were females.

Majority of the patients were Rh positive (n=130, 90.9%) and O group (n=45, 31.5%) and B group (n=42, 29.4%) are the common groups who received transfusion.
The ABO and Rh blood groups of 143 patients are shown in table 2. Patients belonged to O positive were highest in number and the lowest belonged to AB negative (2.09%).

Table1: ABO and Rh blood group patients.

<table>
<thead>
<tr>
<th>Blood group</th>
<th>RH Positive</th>
<th>RH Negative</th>
<th>No of patients</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>30</td>
<td>4</td>
<td>34</td>
<td>23</td>
</tr>
<tr>
<td>B</td>
<td>39</td>
<td>3</td>
<td>42</td>
<td>29.4</td>
</tr>
<tr>
<td>AB</td>
<td>20</td>
<td>2</td>
<td>23</td>
<td>16.1</td>
</tr>
<tr>
<td>O</td>
<td>41</td>
<td>4</td>
<td>45</td>
<td>31.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>130</td>
<td>13</td>
<td>143</td>
<td>100</td>
</tr>
</tbody>
</table>

The most common cause for transfusion was anemia (n=61, 42%) followed by thrombocytopenia (n=41, 28%) which includes a case of dengue. Thirteen (13) patients had both anemia and thrombocytopenia. Other diseases which required transfusion are shown in table 2.

Table2: Diagnosis of patients requiring blood transfusion (n=143)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anemia</td>
<td>60</td>
<td>42</td>
</tr>
<tr>
<td>Dengue</td>
<td>1</td>
<td>0.06</td>
</tr>
<tr>
<td>Anemia + thrombocytopenia</td>
<td>13</td>
<td>9.2</td>
</tr>
<tr>
<td>Prematurity</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Birth asphyxia</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Septicemia</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>Bleeding</td>
<td>1</td>
<td>0.06</td>
</tr>
<tr>
<td>Exchange transfusion</td>
<td>8</td>
<td>5.7</td>
</tr>
<tr>
<td>Meconium aspiration syndrome</td>
<td>1</td>
<td>0.06</td>
</tr>
<tr>
<td>Respiratory distress syndrome</td>
<td>1</td>
<td>0.06</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>40</td>
<td>28</td>
</tr>
<tr>
<td>Surgery</td>
<td>6</td>
<td>4.2</td>
</tr>
<tr>
<td>Total</td>
<td>143</td>
<td>100</td>
</tr>
</tbody>
</table>
Total units of blood and whole blood products transfused for 143 patients were 279. Usage of FFP (n=125, 44.8%) was more when compared to platelets, whole blood and PRBC’S.

**Table 3. Distribution of blood and blood products according to diagnosis**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Whole blood</th>
<th>Packed RBC’S (PRBC)</th>
<th>Fresh frozen plasma(FFP)</th>
<th>Platelet</th>
<th>TOTAL</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anemia</td>
<td>14</td>
<td>23</td>
<td>47</td>
<td>0</td>
<td>84</td>
<td>30.1</td>
</tr>
<tr>
<td>Dengue</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1.1</td>
</tr>
<tr>
<td>Anemia + thrombocytopenia</td>
<td>2</td>
<td>9</td>
<td>14</td>
<td>15</td>
<td>40</td>
<td>14.2</td>
</tr>
<tr>
<td>Preterm</td>
<td>1</td>
<td>3</td>
<td>11</td>
<td>1</td>
<td>16</td>
<td>5.7</td>
</tr>
<tr>
<td>Septicemia</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>12</td>
<td>4.3</td>
</tr>
<tr>
<td>Asphyxia</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>3</td>
<td>1.1</td>
</tr>
<tr>
<td>Bleeding</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1.1</td>
</tr>
<tr>
<td>Respiratory distress syndrome</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Exchange transfusion</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>12</td>
<td>4.2</td>
</tr>
<tr>
<td>Meconium aspiration syndrome</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>2.2</td>
</tr>
<tr>
<td>Surgery</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>0</td>
<td>9</td>
<td>3.3</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>7</td>
<td>4</td>
<td>32</td>
<td>47</td>
<td>90</td>
<td>32.3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>34(12.2%)</strong></td>
<td><strong>50(18%)</strong></td>
<td><strong>125(44.8%)</strong></td>
<td><strong>70(25%)</strong></td>
<td><strong>279</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Amongst the 279 units supplied, whole blood constituted 12.2% (34 units), out of which 14 units were used for anaemia, 6 for exchange transfusion and 7 for thrombocytopenia. Out of the 50 PRBC’s, 23 units were used for anemia.

**DISCUSSION**

Transfusion of blood and blood products are an integral part of medical treatment in neonates where common illness are usually related to blood destruction or blood loss. To fulfill the demands we need to know about the trends of blood usage and ordering pattern in the hospital. It also helps to set policies to improve transfusion services.
In the present study, a total of 279 units were transfused in the NICU. Usage of fresh frozen plasma (44.8%) was more compared to platelet, packed red blood cells and whole blood. Blood transfusion was done for anemia, bleeding disorders, thrombocytopenia and sepsis.

Anemia was the commonest indication for transfusion (42%) for which PRBC’s, FFP and whole blood were used. None received platelets. Other studies showed anemia as the second common indication for transfusion in neonates. Anemia of prematurity is a physiological phenomenon which is related to the inadequate maternofetal transfer of iron and poor postnatal production of endogenous erythropoietin in infants. Although replacement therapy with synthetic erythropoietin is a common practice in the developed world, blood transfusion is used in parts of developing world, where recombinant erythropoietin is unavailable.

Erythrocytes are transfused to restore circulating blood volume to increase oxygen carrying capacity or to replace blood removed for laboratory tests. The indications for transfusion of erythrocytes to neonates include shock, a loss of 10% or more of the blood volume within 72 hours when further blood sampling is expected, a hemoglobin level of less than 130 g/L in neonates with cardiorespiratory disease who require increased oxygen carrying capacity and a hemoglobin level of less than 80 to 100 g/L in neonates with tachypnea, tachycardia, recurrent apnea, poor feeding or failure to gain weight. The attending physician should consider these indications along with clinical judgment to ensure safe and effective erythrocyte transfusion. Pre-conceptional counseling, proper antenatal check-ups and improving nutrition and awareness will reduce the prevalence of anemia in mothers and consequently in neonates.

Thrombocytopenia was the second most common indication for transfusion (28%) for which platelets were mainly used, followed by FFP. In few cases PRBC and whole blood were also used which is similar to other studies. Thrombocytopenia has been observed in 1-5% of newborns and in NICU there is a higher incidence up to 22-35% of all babies admitted. Significant proportion (20%) of episodes of thrombocytopenia is severe. Thus, a large number are at risk for bleeding disorders in NICU. There is need to develop guidelines for platelet transfusion in different group of sick neonates. Anemia with thrombocytopenia (9.2%), prematurity (5%), exchange transfusion (5.7%), birth asphyxia (2.1%), and septicemia (1.4%) were other indications for use of whole blood and blood components. The need for transfusion in neonates may occur...
due to physiological and pathological cause.\textsuperscript{5} Anaemia in acute or critical illness may be exacerbated by numerous factors including blood loss (due to hemorrhage or sampling), reduced RBC production (due to nutritional deficits, inflammatory processes or low erythropoietin levels) and increased RBC turnover due to haemolysis.\textsuperscript{10}

CONCLUSION

Goal of transfusion medicine is to provide safe and appropriate blood and blood product so as to help the patients to improve their condition. Diagnosis and clinical condition of the patient determine the type of blood and blood products required. It is essential to review the transfusion practices in various departments which helps the blood bank to assess the need or demand and thus to arrange for the timely supply of the same.

REFERENCES


