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## BLOOD AND COMPONENTS USAGE IN A TERTIARY CARE HOSPITAL

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### ABSTRACT

**Background:** Availability of blood for transfusion, its need, quality and safety of blood transfusion depends on the geographical location as well as state of medical care in that area. Misuse or overuse of this naturally available resource has to be avoided. **Aim:** To review blood component usage and to assess the pattern of blood usage in a tertiary care hospital. **Materials and methods:** This study was conducted at a blood bank of a tertiary health care hospital. Details of the blood and component recipients in one representative month were recorded. **Results:** Supply of blood was found to be more in the surgical wards forming 57.36% (n=343/598) of total supply. The most common diagnosis for patients requiring blood transfusion was anemia (n=157, 26.25%). Anemia (353/620, 56.93 %) was also the most common indication for packed red blood cells (PRBCs) transfusion followed by surgery (194/620, 12.24%). Thrombocytopenia was the commonest indication for platelet transfusion (378/514, 23.85%). Highest number of fresh frozen plasma (FFP) units was utilized for patients with hypoproteinemia (79/166, 45.78%). Our audit shows that the use of PRBCs has largely replaced that of whole blood.

**Conclusion:** Appropriate guidelines need to be set to reduce the inappropriate transfusions of blood components like PRBCs, platelets, and FFP. The clinician should always bear in mind that transfusion can lead to serious complications and benefit/risk assessment must be taken into account before each transfusion.

**Keywords:** Blood utilization audit, transfusion appropriateness, transfusion practices.

### INTRODUCTION

Transfusion medicine has become one of the sophisticated medical technical discipline, that has eased modern medical therapy. Blood transfusion is done in all parts of the world. Availability of blood for transfusion, its need, quality, safety of blood transfusion depends on the geographical location as well as state of medical care in that area. As the supply of red blood cells continues there is an increasing demand for platelets. Since blood is considered

as a drug, it is regulated by Food and Drug Administration. As any other drug, blood transfusion may cause side effects like transfusion reactions, transmit infections etc., everyone must be aware of the potential risks of blood transfusion. Blood transfusion is considered as similar to tissue transplantation. Keeping in mind the graft versus host reaction, blood must be ordered and transfused only when it is absolutely necessary. Misuse or overuse of this naturally available resource has to be

avoided. Review of blood component usage has to be undertaken to assess the pattern of blood usage in any hospital. Hence the present was study was undertaken.

### MATERIALS AND METHODS

This study was conducted at a blood bank of a tertiary health care hospital. The number of all whole blood units and blood components supplied over a period of one year was recorded and their average was calculated. Data of one month, which was closest to the average blood supply in one year, was chosen as a representative month. All the details of the blood and component recipients in this representative month were recorded, including age, gender, ABO and Rhesus blood groups, address, consultant in-charge, ward/unit where patients were admitted, diagnosis along with indications for blood transfusion. History of previous and present illness, including any previous transfusions and transfusion reactions if any were noted. Reports of salient investigations like hemoglobin, platelet count and coagulation profile were recorded. Details of usage of blood

including the number and type of components transfused were noted and correlated with the clinical diagnosis and indications for transfusion.

### RESULTS

The total number of whole blood and components issued from our blood bank in one year (1<sup>st</sup> October 2009 to 30<sup>th</sup> September 2010) was 19,985 units, with a monthly average of 1665 units. The supply showed some seasonal variation, with lesser unit supplied around mid-year and peak during year ends (Table 1). For this study data was collected for a month (January 2010) the blood supply of which (n=1585 units) was closest to the calculated monthly average (n=1665 units), to account for seasonal variation in blood demand. In that representative one month the number of requests for blood products was from 598 patients, with many of these requests being more than one unit. The break-up supply for whole blood and various components showed that PRBC was the maximum utilized product followed by platelets, whole blood and FFP (Table 1).

**Table 1. Blood and components issued in one year**

Month	WB*	PRBC*	Platelet	FFP*	Cryoprecipitate	Total
October '09	94	960	998	160	0	2212
November '09	84	706	576	143	0	1509
December '09	135	825	715	212	0	1887
January '10	285	620	514	166	0	1585
February '10	340	398	287	157	1	1183
March '10	317	299	268	201	0	1085
April '10	332	498	240	236	4	1310
May '10	183	549	256	158	2	1148
June '10	178	597	471	133	3	1382
July '10	202	750	901	217	1	2071
August '10	103	898	1047	193	2	2243
September '10	140	1043	1043	143	1	2370
TOTAL	2393	8143	7316	2119	14	19985
Average	199	679	610	177	1	1665

\* WB-whole blood, PRBC-packed red blood cells, FFP-fresh frozen plasma

Supply of blood was found to be more in the surgical wards forming 57.36% (n=343/598) of total supply; maximum blood required for general surgery (n=82/343, 23.9%). Request for

medical wards constituted 42.64% (n=255/598) of all demands, with highest requirement in general medicine wards (n=180/255, 70.58%) (Table: 2).

**Table: 2 Supply of blood to different wards (n=598)**

Ward	Number of patients	%	No. of supplied blood units	%
<b>I. Surgical wards</b>	<b>343</b>	<b>57.36</b>	<b>759</b>	<b>47.89</b>
General surgery	82	23.9	195	25.69
Orthopedics	52	15.16	105	13.83
Obstetrics	46	13.41	93	12.25
Gynecology	60	17.49	110	14.49
Oncosurgery	33	9.62	70	9.22
Pediatric surgery	11	3.20	18	2.37
Plastic surgery	18	5.24	57	7.51
Urology	5	1.45	9	1.18
Neurosurgery	20	5.83	67	8.82
Cardio thoracic surgery	12	3.49	27	3.55
Maxillofacial surgery	3	0.87	5	0.65
Otolaryngology	1	0.29	3	0.39
<b>II. Medical wards</b>	<b>255</b>	<b>42.64</b>	<b>826</b>	<b>52.11</b>
General medicine	180	70.58	644	77.96
Pediatrics	57	22.35	151	18.28
Nephrology	18	7.05	31	3.75
<b>Total</b>	<b>598</b>	<b>100</b>	<b>1585</b>	<b>100</b>

Youngest recipient of blood unit was one day (two males and one female neonate) and the oldest was 95 year old male. Largest number of

patients were in the age group 21-60 years (n=404/598, 67.55%) (Table 3). Male to female ratio was 0.89:1 (Table 4).

**Table 3. Age group in 598 recipients of blood**

Age	Number of patients	%
Less than 1 year	21	3.51
1-5 years	35	5.85
6-10 years	13	3.15
11-20 years	44	7.35
21-30 years	140	23.42
31-40 years	100	16.72
41-50 years	94	15.72
51-60 years	70	11.70
61-70 years	48	8.02
71-80 years	24	4.01
>80 years	9	1.50
<b>Total</b>	<b>598</b>	<b>100</b>

**Table 4. Gender distribution of recipients of blood and components**

Sex	No. of patients	%
Male	282	47.16
Female	316	52.84
<b>Total</b>	<b>598</b>	<b>100</b>

The ABO and Rh blood groups of 598 patients are shown in table 5. Most patients belonged to blood group O positive (34.28%) and the least blood group was AB negative (7.69%).

**Table: 5 ABO and Rh blood group of patients**

Blood group	Rh positive	Rh negative	No. of patients	Total %
A	146	8	154	25.76
B	165	16	181	30.26
AB	44	2	46	7.69
O	205	12	217	36.29
<b>Total</b>	<b>560</b>	<b>38</b>	<b>598</b>	<b>100</b>

The most common diagnosis for patients requiring blood components was anemia (n=157, 26.25%); followed by elective surgery (n=86, 14.38%) and dengue-like illness/viral fever (n=70, 11.7%) (Table 6).

**Table: 6 Diagnosis of patients requiring blood transfusion (n=598)**

Diagnosis	n	%
Anemia	157	26.25
Dengue/dengue like illness/viral fever	70	11.7
Elective surgery	86	14.38
Obstetric cases	41	6.86
Gynecology cases	58	9.7
Trauma	53	8.86
Malignancy	33	5.51
Hepatic disease	14	2.34
Renal disease	16	2.67
Bleeding disorder	12	2.0
Burns	8	1.33
Infections	11	1.84
Hypoproteinemia/edema	7	1.17
Anemia with thrombocytopenia	30	5.01
Anemia with hypoproteinemia	2	0.33
<b>Total</b>	<b>598</b>	<b>100</b>

Among the indications for all blood components taken together, anemia was the common indication (n=491, 30.98%) followed by thrombocytopenia (405, 25.56%) and elective surgery (353, 22.27%) (Table 7)

**Table: 7 Indication for which blood products were issued**

Indication	WB	PRBCs	Platelet	FFP	Total	Percentage
Anemia	123	353	0	15	491	30.98
Surgery	126	194	16	17	353	22.27
Thrombocytopenia	11	9	378	7	405	25.56
Bleeding	6	7	1	13	27	1.7
Hypoproteinemia	2	14	0	79	95	5.99
Anemia + thrombocytopenia	13	33	119	17	182	11.49
Anemia + hypoproteinemia	4	10	0	18	32	2.01
<b>Total</b>	<b>285</b>	<b>620</b>	<b>514</b>	<b>166</b>	<b>1585</b>	<b>100</b>

Among the 1585 units supplied to 598 patients, PRBCS was the maximum issued component (620/1585, 39.11%), followed by platelets (514/1585, 32.42%), whole blood (285/1585, 17.98%) and FFP (166/1585, 10.47%). Anemia (353/620, 56.93 %) was most common indication for PRBCs transfusion followed by surgery (194/620, 12.24%). Thrombocytopenia was the commonest indication for platelet transfusion (378/514, 23.85%) followed by anemia with thrombocytopenia and surgical procedures. Surgical procedures (126/285, 44.21%) were the commonest indication for whole blood transfusions followed by anemia (123/285, 43.15%). Highest number of FFP units was used for patients with hypoproteinemia (79/166, 45.78%).

### DISCUSSION

Blood and blood components are no longer considered to be a low or no risk procedure, and consequently an increasing need for stricter guidelines for transfusing blood products has been recognized, not just to check infections, but also to minimize other side effects of transfusion.<sup>1</sup> Whole blood and blood components are considered as drugs by the Food and Drug Administration (FDA) and the main aim of any blood bank is to provide safe and effective blood and blood components to the patients.<sup>2</sup>

To fulfill the demands of the blood, we need to know about the trends of blood usage and the ordering pattern in the hospital. Also it helps us to set policies in place to improvise the transfusion services.

In our audit we found that blood components utilized in the hospital showed a ratio of PRBC: platelet: whole blood: fresh frozen plasma as 3.1:2.57:1.425:0.83 and whole blood: PRBCs was 3.77:1.11 which is different from most of the other studies that show whole blood to PRBC ratio as 1:3 or less.<sup>2</sup>

The utility or demand of blood and blood components was higher in patients admitted to surgical wards (57.36%) compared to medical wards (42.64%). Similar observation is reported from many other studies.<sup>2</sup> Higher utility in surgical wards was probably because, blood and blood components are often ordered due to anticipated blood loss rather than actual blood loss, thereby leading to overuse of blood and unnecessary exposure of patients to antigens and infections.

Another reason for increased usage of blood in surgical wards could be for the correction of anemia detected prior to surgery in patients requiring surgeries. According to studies, there is mounting evidence that some of the blood that is transfused is not always clinically indicated.<sup>3</sup> Among all 598 patients who required transfusion, anemia was found to be the

commonest indication (26.25%) similar to other studies.<sup>2</sup>

Of the 1585 units issued to 598 patients, PRBC was the maximum utilized component (39.11%) in our audit which is dissimilar to other studies that indicate more utilization of whole blood.<sup>2,4</sup> Unnecessary transfusion of PRBCs could be avoided by alternative means like appropriate diet and hematinic therapy wherever possible. In both Medical and Surgical wards, it is necessary to correlate the clinical condition of the patient and the trigger values of hemoglobin and hematocrit in blood transfusion in anemic patients.

Platelets were the second most commonly used blood component for transfusion 32.42% (514/585). The most common indication for platelet transfusion in our audit was thrombocytopenia (25.56%) possibly because Davangere happens to be an endemic area for dengue and dengue like illness.

Indications for platelet transfusion are a count of  $< 20,000 /\text{mm}^3$  or among patients requiring surgery in less than 12 hours, a platelet count of  $< 50,000 /\text{mm}^3$  could be the trigger level. Some studies indicate that platelet count of up to 10,000/cu.mm could be safe and platelet transfusion could be avoided.<sup>5</sup>

Indication for whole blood transfusion are patients with acute bleeding, trauma (large volume blood loss  $> 25\%$ ) and surgical patients, cardiac surgery and exchange transfusion in infants.<sup>4</sup> In our audit, use of whole blood was 17.98%, maximum use was in patients undergoing surgery (126/285, 44.21%) followed by patients with anemia (123/285, 43.16%). The utilization of whole blood in the latter case could be replaced by PRBC wherever possible.

FFP was the least used component (10.47%) in our audit, commonest indication for its transfusion being hypoproteinemia (45.78% 79 out of 166). Though least used, some of the transfusions of FFP were also found to be

inappropriate. It is often used as a volume expander and a source of albumin.<sup>6</sup> FFP should not be used for intravascular volume expansion, correction/ prevention of protein malnutrition, and when specific factor concentrates are available; alternative products that have undergone viral inactivation through complex manufacturing processes are preferable.<sup>7</sup>

In case of FFP, it is recommended to transfuse 5-6 units to correct the haemostatic defect due to clotting factor deficiency. Many times only one or two units are transfused. Many reports show inappropriate use of FFP at various centres.<sup>8,9,10,11,12</sup>

### CONCLUSION

With the availability of blood component treatment, the clinicians are posed with a wide variety of choices. Inadequate and variable level of knowledge about transfusion practices among doctors increases the potential for misuse of blood. Though the transfusion trends in our audit may not be representative of other hospitals, assessment of local transfusion practice is essential. Our audit shows that the use of PRBCs has largely replaced that of whole blood. More attempts must be made through frequent seminars and clinical meets to educate clinicians to limit the use of whole blood to only cardiac patients and acute trauma patients. Appropriate guidelines also need to be set to reduce the inappropriate transfusions of blood components like platelets, and FFP. The clinician should always bear in mind that transfusion can lead to serious complications and benefit/risk assessment must be taken into account before each transfusion.

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