Original Research Article

Audit of blood and its components in a Tertiary Care Centre: A study of 10000 Units

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Abstract:

Introduction:

Blood transfusion has now shifted from use of whole blood to component therapy as it is a scarce and precious resource.

Aims and Objectives:

To study the indication for transfusion and to ascertain if appropriate transfusion was given in each situation according to accepted criteria.

Material and Methods:

The present study was a prospective audit of 10000 units of blood and its components that were transfused to patients admitted in wards of various Departments of Rajindra Hospital and Government Medical College Patiala. The appropriateness was estimated according to DGHS guidelines.

Results:

Out of all the transfusions maximum number of transfusions were of Packed red cells (n=3852/ 10,000) (p=0.004), whole blood (n=2760/ 10000)(p=<0.001) and least number of transfusions were of Platelets (n= 1222/ 10,000) which was not significant. FFPs accounted for 2166 out of total 10000 transfusions. 32.95% of the WB and PRC transfusions were inappropriate. 14.6% of the platelets and 37.7% % of the FFP transfusions were inappropriately indicated.

Key Words: Blood Transfusion, Red Cells, Platelets, Hematological, Thalassemic, Hepato-Pancreatic Disease.

Introduction:

Blood transfusion has come a long way starting from early 20th century when it was a cumber stone and risky procedure.[1] The emphasis has now shifted from use of whole blood to component therapy as it is a scarce and precious resource. Most of hospitals in India are functioning without a hospital transfusion committee which is supposed to review each blood transfusion, its indication and appropriateness. In these circumstances, it is appropriate and timely to do a study to evaluate how blood transfusion is being carried out in a tertiary care hospital, as clear cut guidelines have been laid down for transfusion to optimize utilization of blood or its components and avoid ad-hoc decisions. In addition, many studies from India have evaluated the use of component therapy partially because components are not available by most blood banks.

Adequate documentation of evidence to support a rationale for blood transfusion is considered an essential part of transfusion medicine. Complete and appropriate documentation enables more transfusion episodes assessement in an audit.[2,3]

Aims and Objectives:

Prospective audit of whole blood and its components in a total of 10000 transfusions given to patients admitted in indoor of various Departments in Rajindra Hospital Patiala with the aim

a) To study the indication for transfusion.
b) To ascertain if appropriate transfusion was given in each situation according to accepted criteria.

Material and Methods:

The present study was a prospective audit of 10000 units of blood and its components that were transfused to patients admitted in wards of various Departments of Rajindra Hospital and Government Medical College Patiala. The need for blood component requirement was assessed by clinical and laboratory parameters depending on the clinical situation. Data had included the Department requesting for blood and its components, patient's presenting problems, gender, reason for request, number of units transfused, causes of transfusion and relative number of units of various blood components transfused. Transfusions given to the thalassemic children were also included in the study. The appropriateness was estimated according to DGHS guidelines.

Observations:

Out of all the transfusions maximum number of transfusions were of Packed red cells (n=3852/10,000) (p=0.004), whole blood(n=2760/10000)(p=<0.001) and least number of transfusions were of Platelets (n= 1222/10,000) which was not significant. FFPs accounted for 2166 out of total 10000 transfusions.

Age of the patients receiving transfusions varied from newborn to 89 years. Recipients of packed cell transfusions and whole blood transfusions had a mean age of 32.09 and 44.5 years respectively. While the recipients of platelets and fresh frozen plasma has a mean age of 38.04 years and 40.8 years respectively.

There was a slight male preponderance in this study group (5279 males out of total 10, 000 transfusions). However, female preponderance was seen in packed red cells and whole blood transfusions being 3867 out of 6612 transfusions

The blood group distribution in the study group followed the general population blood group distribution with O+ blood group being the commonest and A- was being the least common.

Component transfusions such as PRC (n=1186/3852) were carried out mostly in Department of Obstetrics and Gynaecology whereas majority of WB(n=719/2760) and platelets transfusions (n=452/1222) occurred in Department of Medicine. FFPs were maximally used in the surgical specialties.(n=866/2166).

Indications of WB transfusions were mainly Hematological (n= 635) while least were surgical indications (n=166). WB transfusions due to Multi-organ failure were 607/2760, malignancy 386/2760, trauma 359/2760, gastroenterological causes 331/2760 and renal causes 276/2760

The major indication for packed red cells was seen in Department of obstetrics and gynaecology (n=1186) used in various conditions like anaemia in antenatal females followed by shock, operative and bleeding .It was followed by Department of Pediatrics which accounted for 1086 (28.19%) transfusions of which majority were used in treatment of anaemia and as a part of regular transfusion treatment therapy in thalassemic children. Department of Medicine used 764 (19.84%) packed red cells transfusions in conditions like anaemia, alcoholic liver diseases, renal, infections and gastroenterological cases. 510 (13.25%) packed red cells were used in Department of Surgery in pre/peri operative conditions, trauma, malignancy, burns, infections and others. In Orthopedics 231 (5.99%) of packed red cells were used in pre/peri-operative conditions and trauma.

916 (74.95%) of the total 1222 platelet transfusion indications were medical and the rest 306 (25.05%) were surgical indications. Hematological indications were the commonest in medical indications (n= 476) followed by infections and drug induced thrombocytopenia while in surgical indications most of the platelet transfusions occurred in peri/post-operative conditions((n=291).

Majority of the FFP transfusions were indicated in patients having hepato-pancreatic diseases(n=520/2166) while least number were seen in patients having gastrointestinal bleeding(n=87/2166). Others being traumatic bleed (n=433), infections(n=346/2166), drug induced bleeding (n=260/2166), and other surgical causes (n=520/2166)

32.95% of the WB and PRC transfusions were inappropriate. 14.6% of the platelets and 37.7% % of the FFP transfusions were inappropriately indicated. Out of all, FFP showed a maximum inappropriate usage, which is to be minimized. Platelets showed minimal inappropriate usage being 14.6%.

TABLE-1 **TOTAL APPROPRIATE/ INAPPROPRIATE TRANSFUSIONS (n=10000)**

Whole Blood/Blood Component	**Appropriate**	**Inappropriate**	**p value**	**Significance**
	No. of Units	**No. of Units**		
Whole Blood+ Packed Red Cell (n=6612)	4434(67.05%)	2178(32.95%)	<0.001	HS
Platelets (n=1222)	1044(85.4%)	178(14.6%)	<0.001	HS
Fresh Frozen Plasma (n=2166)	1350(62.3%)	816(37.7%)	<0.001	HS
Total (10,000)	6828	3172		
Chi-square value	**206.01**			

Estimation of laboratory parameters prior to the transfusions varied depending on whether single unit transfusion or multiple unit transfusion was carried out. 58.24% of the PRC transfusions and WB transfusions had their pre-transfusion estimation of hemoglobin and they were predominantly single unit transfusions. In FFP and platelet transfusions not all individual transfusions were preceded by estimation of parameters. However where multiple unit transfusions were used, haematological values were generally monitored.

Discussion:

Comparison of the appropriateness of WB and its components in different studies is shown in the following table:

Author	Year	WB/ PRC	PLT	FFP	TOTAL
Metz et al[4]	1995	84%	87%	76%	-
Schofield et al[5]	2003	-	67%	63%	-
Marti Carjaval et al[6]	2005	76%	52.6%	38.3%	61.5%
Makroo et al[7]	2007	-	-	69.8%	-
K. Saluja[8]	2007	-	88%	-	-
Wade et al[9]	2009	64.5%	93.5%	42%	83.1%
Sheikholeslami et al[10]	2010	84.3%	59.2%	65.9%	79.6%
Present study	2013	67.05%	85.4%	62.3%	68.28%

Each WB and its blood product will be discussed separately. Total appropriate usage of whole blood and its component in the present study was 68.28% which was slightly different than the studies done by Wade et al[9] (2009) and Sheikholeslami et al [10](2010) which showed 83.1% and 79.6% appropriateness. In the study done by Marti-Carjaval et al[7] (2005) the total appropriate usage was 61.5% . In many of the transfusions labelled inappropriate, there was documentation of deficiencies of PRC, platelets and/or coagulation factors, but the degree of deficiency did not meet the appropriateness criteria. This difference could be due to different indications of transfusions and different transfusion procedures were followed in these transfusions.

Appropriateness of WB and PRC in the present study(67.05%) was similar to the study done by Wade et al[9] (2009) which showed 64.5% and lower than Marti Carjaval et al[7] (2005) study (76% appropriateness) and Metz et al[4] (1995) (84% appropriateness). The reasons may be usage of a low hematocrit to determine a request for a transfusion of packed red cells. The correct approach is to combine the laboratory criterion and the symptoms of the patient. The indications of packed red cell and whole blood were hematological, malignancy, renal, surgical etc. Among them most common was anaemia seen majority in pediatric age group and in antenatal females. In the absence of cardiac dysfunction or critical coronary artery disease, a hemoglobin

concentration of 8 g/dl is adequate to meet the oxygen needs of most patients.[11] even Most tissues are adequately perfused and will not become ischemic with a low hemoglobin concentration as 7 g/dl.[12]

The appropriateness of fresh frozen plasma in the present study was lowest being 62.3% and its main indications were as plasma expanders, in chronic liver failure and in surgical bleeding patients. This observation was little lower than study done by Makroo et al[8] (2009) conducted in tertiary care centre in New Delhi which showed 69.8% appropriateness and was very much similar with the studies done by Schofield et al[6] (2003) and Sheikholeslami H et al [10](2010) showing 63% and 65.9% appropriateness respectively. Despite the fact that there is no evidence to justify the use of FFP as a volume expander, it was found to be an erroneous indication. This is a clear reflection of little knowledge about the rational use of this blood product, as FFP has many risks and the useage as volume expander is contraindicated in children. Determination of coagulation deficiency must be performed before requesting FFP. We found unnecessary transfusion of FFP.

Platelets use was the most judiciously used blood product in the present study being 85.4% appropriate and the most common indication for its use was bleeding. Results were similar with the studies done by K. Saluja et al[8] (2007) and Metz et al [4](1995) showing 88% and 87% appropriateness respectively. The pre-transfusion platelet count varied according to the indications for transfusion, e.g., cases of sepsis or patients undergoing minor surgical procedures. A significant finding in our studies was that a significant percentage (55%) of blood request forms were incomplete. Since a lot of these requests are marked as emergency, the blood bank personnel issue these blood products even in the absence of baseline investigations.

Conflict of Interest: None

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