Digital Journal of Clinical Medicine

Volume 5 | Issue 4 Article 4

1-1-2023

Rational use of blood and blood components in a Tertiary Care Hospital: A Crossectional study.

Rupali Chordia Dr
Dr RAjendra Gode Medical College, rupali.chordia3@gmail.com

Dr Himani Shemar Dr
DR Rajendra Gode Medical College, drhimani52@gmail.com

Recommended Citation

Chordia R Dr, Shemar D Dr. Rational use of blood and blood components in a Tertiary Care Hospital: A Crossectional study.. *Digital Journal of Clinical Medicine*. 2023; 5(4): 154-168. doi: https://doi.org/10.55691/2582-3868.1144

Rational use of blood and blood components in a Tertiary Care Hospital: A Crossectional study.

Abstract

Abstract:

Introduction: Blood transfusion is a life saving process and a complex phenomenon. Judicial use of blood and its components is the need of the hour. **Objectives:** The present study was planned with the objective to assess the appropriateness of blood transfusions in patients admitted in the hospital as per WHO guidelines. **Materials and Methods**: A crossectional study was conducted at tertiary care hospital for a period of one and a half years. Records of patients from blood bank were evaluated to collect data. MS Excel was used to enter the data and IBM SPSS Statistics for Windows (version 20.0) was used to analyse the data.

Results: Overall prevalence rate of appropriate use of blood component is 62.63%. **Conclusions:** Retrospective audits are effective tool to increase rational use of blood by identifying areas requiring intervention to change transfusion practice

Keywords

Blood transfusion, packed cell volume, Fresh frozen plasma, whole blood

Rational use of blood and blood components in a Tertiary Care Hospital: A Cross-sectional study.

Abstract:

Introduction: Blood transfusion is a life saving process and a complex phenomenon. Judicial use of blood and its components is the need of the hour. **Objectives:** The present study was planned with the objective to assess the appropriateness of blood transfusions in patients admitted in the hospital as per WHO guidelines. **Materials and Methods**: A cross-sectional study was conducted at tertiary care hospital for a period of one and a half years. Records of patients from blood bank were evaluated to collect data. MS Excel was used to enter the data and IBM SPSS Statistics for Windows (version 20.0) was used to analyse the data.

Results: Overall prevalence rate of appropriate use of blood component is 62.63%.

Conclusions: Retrospective audits are effective tool to increase rational use of blood by identifying areas requiring intervention to change transfusion practice

Keywords: Blood transfusion, packed cell volume, Fresh frozen plasma, whole blood

Introduction

Transfusion Medicine is a complex process that depends not only on the knowledge and skills of professions but also of entire team and efficiency of the system. Adverse events associated with blood transfusions is on rise and there are several factors which may contribute to in increasing the chances of patient suffering transfusion related complications. These factors include the type of component being transfused, the characteristics and final diagnosis of the patient, the use of inadequate equipment, inconsistent intravenous solutions, inadequate procedures and errors or omissions on the part of the team that provides care to the patient (clerical errors), in particular, in the identification of the patient and blood samples. [1] Majority of countries have specific legislations regulating transfusion medicine in their countries and regions to increase

the safety of blood transfusions like RDC 57/ANVISA [2] and ordinance 1353/MS [3] in Brazil, the British red blood transfusion guidelines in the United Kingdom [4], the council of Europe Resolutions, recommendations and Convention in the Cotton Market [5] and Blood Transfusion Safety of the World Health Organization.[6] These are all examples of recommendations and guidelines aimed at improving blood transfusion safely. The present study was planned with the objective to assess the appropriateness of blood transfusions in patients admitted in the hospital as per WHO guidelines.

Materials and Methods: A hospital based observational study was conducted at Tertiary care hospital for a period of one and a half years. The blood requisition forms collected from the records during the study period were used to record sociodemographic profile, clinical diagnosis of patients, complete blood counts before transfusion and component of blood transfused. The indication of transfusion of blood components was evaluated using WHO guidelines for blood transfusion. The following are the WHO guidelines[7] for transfusion of blood components.

Whole blood-

- Indicated only in massive bleeding.
- Exchange transfusions
- Where red cell concentrates are not available.

Hb trigger for Red Cell Concentrates-

- <7g/dl-if there are signs of impaired oxygen transport and lower thresholds in sickle cell anemia or iron deficiency
- 7-8g/dl- pre operative and for surgery associated with major blood loss.
- <9g/dl-in chronic transfusion regime or marrow suppresive therapy.

- <10g/dl-not appropriate unless specific indications acute blood loss>30-40% of blood volume.

Platelet count trigger for transfusion

- <10,000x10^3/µl -as prophylaxis in bone marrow
- <20,000x10^3/µl -BM failure with risk factors, fever, systemic hemostatic failure
- <50,000x10^3/µl- massive hemorrhage, pts undergoing surgery or invasive procedures, DIC
- <100x10^3/µl- -brain or eye surgery
- Any bleeding patient if thrombocytopenia is a major contributing factor
- Any platelet count in inherited or acquired platelet function disorders depending on clinical features and findings.

FFP trigger for transfusion

PT and PTT are more than 1.5 times the upper limit of normal range- DIC, warfarin overdose, bleeding and abnormal coagulation parameters, pts with liver disease or undergoing cardiac bypass surgeries.

The exclusion criteria for the study was as follows

1. The records from which detailed information was not obtained were excluded from the study.
2. The cases who were not admitted to our tertiary hospital were excluded from study

3. The following blood products were not be included in the study-leucocyte poor red cell concentrate, granulocyte concentrate, single donor plasma, cryo-poor plasma, albumin, factor VIII conc. factor IX, immunoglobulins.

MS Excel was used to enter the data and IBM SPSS Statistics for Windows (version 20.0) was used to analyse the data.

Results:

A hospital based cross sectional study was conducted to assess the rational use of blood and blood products in a tertiary care hospital. A total of 2630 records were selected for assessment as per exclusion criteria. Table 1 shows age gender wise and age wise distribution of study participants. There were more number of females i.e. 59.8% (1573) as compared to males (40.2%; 1057). Majority of the patients 1133 (43.1%) were in the age group of 21-40 years followed by 657 (24.9%) in the age group of 1-20 years, 508 (19.3%) in the age group of 41-60 years, 270 (10.2%) in the age group of 61-80 years, 32 (1.2%) in the age group of 80-100 years and 30 (1.14%) in < 1 year of age. Figure 1 shows distribution of study participants according to transfused blood components. Packed red blood cells were mainly used for transfusion 9009 (74.9%) while the usage of Whole Blood was 2180(18.1%). The usage of platelet concentrate was 22(0.18%), platelet rich plasma 317(2.63%) and fresh frozen plasma was 486 (4.04%).

Table 2 shows distribution of transfused bold components according to hemoglobin levels. Of the total 12,014 units of Transfused Components, Packed RBCs (6221) was maximally utilised in 55.2% patients who had <7 gm% of haemoglobin (1451) followed by whole blood in the same group of patients. 7-10 (gm%) Hb group consisted of 36.3% patients (955) who received mostly PRBCs. 10-13gm% Hb group included 7.8% (204patients) again received PRBCs maximum followed by 13-18gm%Hb group of 0.8% consisting of 20 patients also received PRBCs maximally. Mean Hemoglobin was of 6.8gm% in the study group.

Table 3 shows distribution of transfused blood components according to Hematocrit levels. Of the 12,014 units of Transfused Components, Packed RBCs followed by WB was used maximally in 47.6%of patients having <20% of hematocrit. 43.5% of patients had a hematocrit in the range of 21-40%, 0.3% in 41-60% and 0.6% patients in the range of 61-80%.7.9% of patients were not investigated.

Table 4 shows distribution of transfused blood components amongst preoperative patients. Of the 539 Pre-operative patients, 116 patients had Hb <7gm% and they received 428 units of Packed RBCs, 294 patients had Hb in the range of 7-10gm% and received 613 units of Packed RBCs . Patients in the range of 10-13gm% of Hb also received mostly 204 units of Packed RBCs.

Table 5 shows distribution of transfused blood components amongst postoperative patients. Of the 124 Post-operative patients, 28 patients had Hb <7gm% and they received 72 units of Packed RBCs, 65 patients had Hb in the range of 7-10gm% and

received 125 units of Packed RBCs .28 Patients in the range of 10-13gm% of Hb also received mostly 58 units of Packed RBCs and 10 patients with Hb range of 13-18% received 24 units of Packed RBCs.

Figure 2 shows distribution of transfused blood components according to Prothrombin time. Of the 33 patients who were investigated with Prothrombin Time 19 were in the range of 15-24 secs, 14 were in the range of 25-34 secs and 2597 patients were not investigated. 198 units of Fresh frozen plasma was given in patients with the range of 15-24 sec followed by 147 units in patients with a range of 25-34sec. 41 and 22 units of platelet rich plasma was given in patients whose range was in 15-24sec and 25-34sec respectively.

Disussion:

In the present study there was maximum utilization of packed cell component (74.9%), which is comparable to findings from other studies like Ahmed M et al [8](74.5%); Alcantara JC et al[9] (78.2%); Sharma et al[10] (81.3%) but different from findings of Ambroise et al[11] (34.5%). The present study shows Packed Cell component transfusions having highest appropriateness followed by Fresh Frozen Plasma according to the WHO guidelines for Blood Transfusion[7] and these findings are comparable with the findings of the study of Gomathi G, et al[12]. High inappropriateness was found in Platelet concentrates .The reason for inappropriateness of Platelet concentrate maybe that although trigger values indicated platelet transfusion clinically but the patient did not have any episode of bleeding or was stable.

Regarding patients with decreased platelet counts maximum were given the diagnosis as anemia as they had lower hemoglobin levels also.

Patients diagnosed as anemia, having low platelet counts (range 10000/µl – 98000/ µl) were given Packed Red Blood Cells. The inappropriateness of Packed RBCs again may be due to the clinical condition of patient and not according to the trigger values for Hb%

The present study showed appropriate use of whole blood as 62% which is less than study of Sharma R et al[10] (80.35%) and Gomathi G et al[12] (91%).

Conclusion: It is concluded that there is increasing trend of usage of blood component instead of whole blood and overall prevalence rate of appropriate use of blood component is 62.63%. Retrospective audits are effective tools to increase rational use of blood by identifying areas requiring intervention to change transfusion practice. Each hospital must develop its own guidelines both for routine and emergency services on the basis of National policy and implement the same through the hospital transfusion committee to ensure effective blood utilization. Awareness program of rational use of blood should be conducted regularly.

References:

1. Ferreira O, Martinez EZ, Mota CA, Silva AM. Knowledge assessment on hemotherapy and transfusion safety of nursing professionals. Rev Bras Hematol Hemoter. 2007; 29 (2): 160-167.

2. Brazil. Ministry of Health. National Sanitary Surveillance Agency. RDC Nº 57, December 16, 2010. Determines the Health Regulations for Services that perform activities related to the human blood production cycle and transfusion components and procedures [Internet] Brasília: MS; 2010. [cited 2012 Jun 21]. Available from: http://bvsms.saude.gov.br/ bvs/saudelegis/ anvisa/2010/ res0057 16 12 2010.html

3. Brazil. Ministry of Health. Ordinance No. 1353, June 13, 2011. Approves the Technical Regulation of Hemotherapeutic Procedures [Internet] Brasília: MS; 2011. [cited 2012 Mar 21]. Available from: http://bvsms.saude.gov.br/bvs/saudelegis/gm/2011/prt1353_13_06_2011.html

4. British Committee for Standards in Haematology . Guideline on the Administration of Blood Components [Internet] London: British Committee for Standards in Haematology; [cited 2012 Nov 21]. Available from: http://www.bcshguidelines.com/documents/Admin_blood_components_bcsh_05012010.pdf.

5. Official Journal L - 33. London: The European Parliament and the Council of the European Union; Feb 08, 2003. [cited 2011 Oct 2]. Directive 2002/98/EC of the European Parliament and of the Council of 27 January 2003 setting standards of quality and safety for the collection, testing, processing, storage and distribution of human blood and blood components and amending Directive 2001/83/EC; pp. 30–40. Available from:

http://www.ema.europa.eu/docs/en_GB/document_library/Regulatory_and_procedural_guideline/2009/10/WC500004481.pdf.

6. World Health Organization . Global Database on Blood Safety. Report 2004-2005. Geneva: WHO; 2005. [cited 2011 Aug 21]. Available from: http://www.who.int/bloodsafety/global_database/GDBSReport2004-2005.pdf.
7. The Clinical Use of Blood - World Health Organization Report 2002. Available from: www.who.int/bloodsafety/clinical_use/en/Handbook_EN.pdf
8. Ahmed M, Save S. Blood Component Therapy in Pediatric Intensive Care Unit in Tertiary Care Center: An Audit. International Journal of Contemporary Medical Research 2016;3(5):1506-10.
9. Alcantara JC, Opina AP, Alcantara RA. Appropriateness of Use of Blood Products in Tertiary Hospitals. International Blood Research and Reviews 2015;3(2):54-65.
10. Sharma R, Jain C. An Audit of Appropriate use of blood components in a tertiary care hospital. International Journal of Medical Science and Education 2015;2(3):96.
11. Ambroise M, Ravichandran K, et al. A study of blood utilization in a tertiary care hospital in South India. Journal of Natural Science, Biology and Medicine 2015;6(1):106-9.
12. Gomathi G and Varghese RG. Audit of use of blood and its components in a tertiary care center in South India. Asian J Transfus Sci 2012;6(2):189.

Table1: Sex and age-wise distribution of study participants

GENDER	NUMBER OF PATIENTS	PERCENTAGE
MALE	1057	40.2%
FEMALE	1573	59.8%
TOTAL	2630	100%
AGE GROUPS (YEARS)	**NUMBER OF PATIENTS**	**PERCENTAGE**
<1 YEAR	30	1.14%
1-20	657	24.9%

21-40	1133	43.1%
41-60	508	19.3%
61-80	270	10.2%
81-100	32	1.2%
TOTAL	2630	100%

Table:2 Distribution of blood components according to levels of Haemoglobin

HB RANGE (total patients-2630)	WB	PRBCs	PLC	PRP	FFP	TOTAL
<7gm%(1451)	1464	6221	10	16	78	7789
7-10gm%(955)	580	2431	0	163	309	3483
10-13gm%(204)	129	324	12	138	99	702
13-18gm%(20)	07	33	0	0	0	40
TOTAL	2180	9009	22	317	486	12,014

Table 3: Distribution of transfused blood components according to Hematocrit range

HCT RANGE (No. of patients investigated- 2421)	WB	PRBCs	PLC	PRP	FFP	TOTAL
<20%(1252)	1160	5086	10	125	177	6558
21-40%(1145)	805	3307	12	192	309	4625
41-60%(8)	0	35	0	0	0	35
61-80%(16)	0	49	0	0	0	49

Table4: Distribution of transfused blood components amongst preoperative patients.

	<7gm% 116 pts	7-10gm% 294 pts	10-13gm% 137 pts	13-18gm% 7pts	TOTAL
WB	188	242	106	7	543
PRBCs	428	613	204	0	1245
PLC	0	0	0	0	0
PRP	0	0	87	0	87
FFP	0	0	0	0	0
TOTAL	616	855	397	7	1875

Table5: Distribution of transfused blood components amongst postoperative patients

	<7gm% 28pts	**7-10gm% 65 pts**	**10-13gm% 28pts**	**13-18gm% 10 pts**	**TOTAL**
WB	39	71	6	7	123
PRBCs	72	125	58	24	279
PLC	0	0	0	0	0
PRP	0	0	0	0	0
FFP	0	69	48	0	117
TOTAL	111	265	112	31	519

Fig 1. Distribution of study participants according to transfused blood components

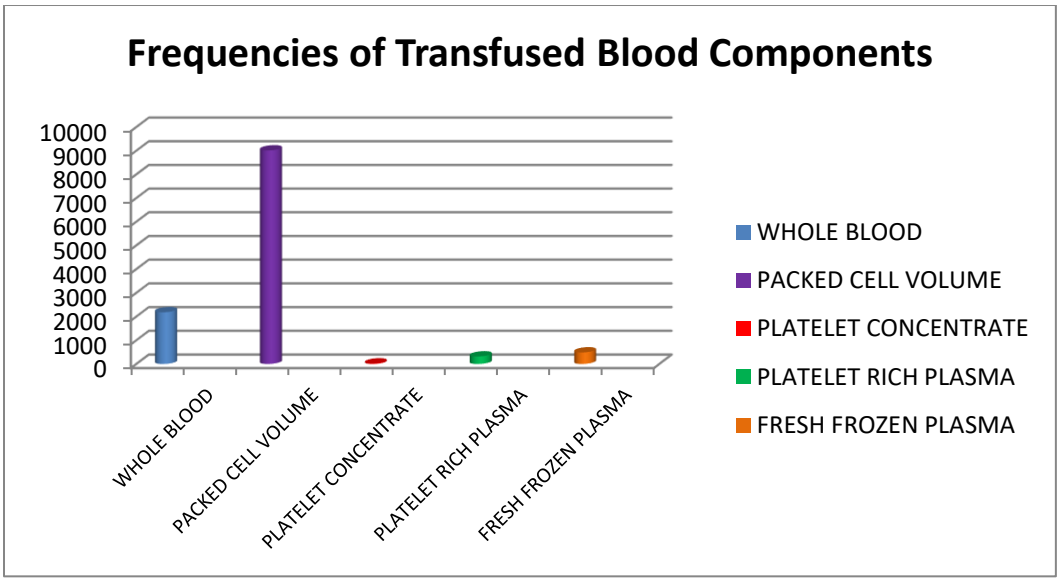
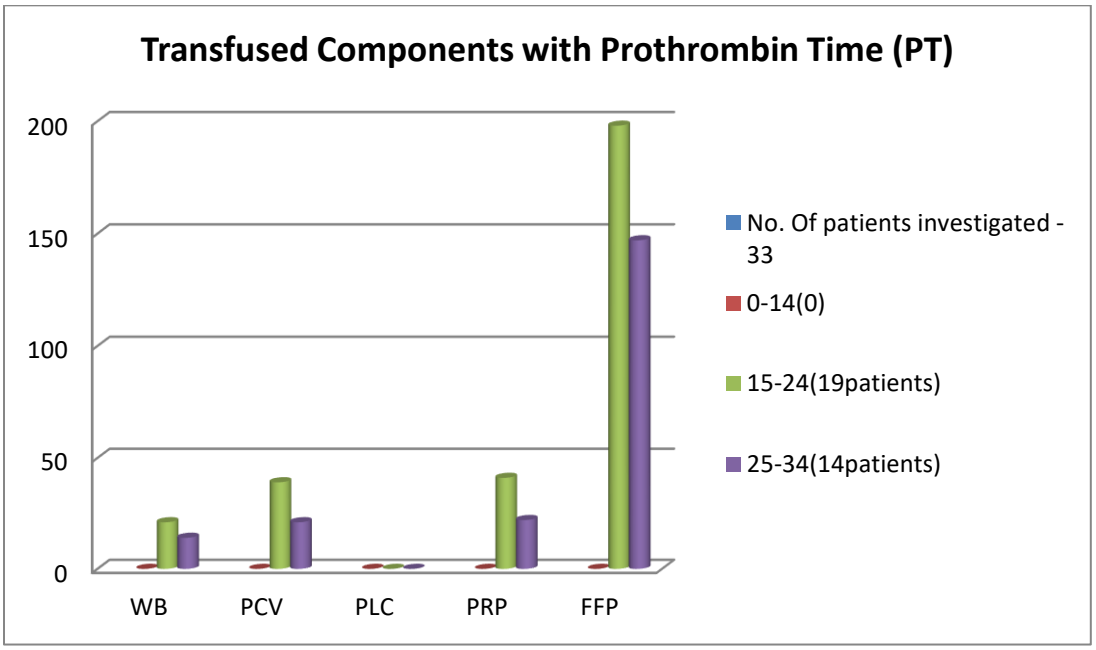


Fig 2 : Distribution of transfused blood components according to Prothrombin time


Transfused Components with Prothrombin Time (PT)
200
150
100
50
0
WB
PCV
PLC
PRP
FFP
No. Of patients investigated - 33
0-14(0)
15-24(19patients)
25-34(14patients)