



Research Paper

“An Audit Ofuse of Blood and Blood Components in Tertiary Care Hospital.”

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ABSTRACT

BACKGROUND: Blood is a valuable resource. When it comes to modern medical practice, this is especially important in developing country such as India. The demand for blood surpasses the blood supply in many countries with WHO stating that 87.5% of developing countries are able to collect less than half of blood and blood components as per requirements of their population. An understanding of trends in blood and its product usage profile and current usage can help predict future trends in demand and help to put efforts to reduce use in particular areas. This will also assist in understanding clinical demand, planning resource allocation and inventory management in the blood bank.

METHODS: It is a crosssectional observational prospective study conducted from October 2017 to September 2019, at blood bank attached to the Yenepoya Medical College Hospital. The sampling was being done from the pool of patients to whom blood and blood products were issued from the blood bank. All units of blood and blood components issued were included for study, and those issued for outside hospital and institutes were excluded.

RESULTS: The study covered 4286 patients for the period of October 2017 to September 2019 who requested for blood and blood products from the blood bank of institute. A total of 15000 components were dispatched during the study period from the blood bank. Total of 6445 units of packed red cells, 4808 units of fresh frozen plasma, 3716 units of platelets, 2 unit of cryoprecipitate and 29 units of whole blood were issued. 46.5% were issued to female patients and 53.5% for male patients in present study. Majority of the patients requested for the blood components was aged between 21-70 years of age. Common blood group of the blood component was O+ve with 5329 units, followed by B+ve with 4570 units. Highest request for blood components for transfusion was received from Medicine department and allied with 4547 units, followed with various Intensive care units (SICU, MICU, PICU, NICU etc) with 3358 units, oncology department with 2226 units. The most common diagnosis for patients requiring blood components was haematological causes or Bleeding (n=1164; 27.2%) followed by elective surgery (n=1121; 26.2%). Among all the indications for all the blood products or components taken together, anemia was the most common indication (n=6292 units, 41.9%) followed by elective surgery (n=4827 units, 32.18%).

CONCLUSION: Auditing the use of blood, its components and indications for their use by the various departments of the hospital has helped to finding the trend of number of blood and its components used, type of blood and its components used, indication for blood and its components used as well as the requirement from various departments.

KEYWORDS: Blood components, Transfusion, Packed Red cell, Fresh Frozen plasma, Whole blood

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I. INTRODUCTION:

Blood is a valuable resource. When it comes to modern medical practice, this is especially important in developing country such as India. The demand for blood surpasses the blood supply in many countries with WHO stating that 87.5% of developing countries are able to collect less than half of blood and blood components as per requirements of their population.⁽¹⁾

In an ideal situation, this scarce and valuable resource would be used in a proper time bound manner with strict rationale for their usage. This will ensure that wastage and outdated of blood and blood products

would not occur. Studies have shown that target intervention, adherence to strict guide lines and proper auditing can lead to a significant reduction in the wastage of blood components.⁽²⁾

Blood transfusion with hopes to benefit patients is an ancient practice and the available records date back to the thirteenth century, from then and till date transfusion of blood and blood components remain an important and indispensable part of patient management. Progress made in the field of medicine and the advent of new technology transfusion is safer than ever before, even then like all therapeutic interventions it involves many significant and often unwanted side effects and underestimated risks. This and the fact that blood is a very limited and precious resource and the attempts to come up with substitutes have not yielded any satisfactory results, the judicious and appropriate use of blood and its component becomes imperative. For surgical patients blood transfusion play a major role for resuscitation and management. And there is over ordering of blood for elective and emergency surgical procedures and it is usually common practice.⁽³⁾ Number of studies has started due to increase in demand for blood and its blood products with rising transfusion associated cost and morbidity to review appropriate utilization and usage of blood ordering practice.^(4,5) Health care expenses are increased due to inappropriate usage of medical technology and hence therefore inappropriate usage of blood is costly. Inappropriate use of transfusion adds additional cost to treatment of disease. Thus indication for ordering blood must be fully justified. Hence periodic review of blood components usage is essential to assess the blood utilization pattern in any hospital or health set up. An analysis of transfusion practices in a hospital set up can be of help to identifying key areas where there is a need to change policy and formulate strategies for clinician education.

II. OBJECTIVES OF THE STUDY:

- a. To evaluate the use of blood and blood components issued from the blood bank of tertiary care centre.
- b. To analyze the indications for the selection and use of specific blood products.

III. MATERIAL & METHODS:

The study was conducted in the Department of Pathology, Yenepoya Medical College Hospital from October 2017 to September 2019. Patient attended to YMCH, Mangalore who met the inclusion and exclusion criteria were included in this study. The sample included all the patients (only in-patient), to whom blood and blood components were issued from the blood bank attached to the Yenepoya Medical College Hospital during a period from October 2017 to September 2019 (about 15000 Units). Ethical clearance was obtained from the Institutional ethics Committee before the study was undertaken. The sampling was being done from the pool of patients to whom blood and blood products were issued from the blood bank attached to the Yenepoya Medical College Hospital, with the following inclusion and exclusion criteria.

Inclusion criteria:

All units of blood and blood components issued in Yenepoya Medical College Hospital.

Exclusion criteria:

All units of blood and blood components issued to outside hospitals and institutions.

IV. RESULTS:

The study covered 4286 patients for the period of October 2017 to September 2019 who requested for blood and blood products from the blood bank of institute. A total of 15000 components were dispatched during the study period from the blood bank. Our institute being a tertiary care health centre with a well-equipped blood bank facility, various blood components were available for the patient care.

Table 1: Units of blood components issued from blood bank

Components	Patients received	Total Units
No of Units issued	4286	15000
Packed red cells	3562	6445
Fresh frozen plasma	726	4808
Platelets	591	3716
Cryoprecipitate	1	2
Whole blood	26	29

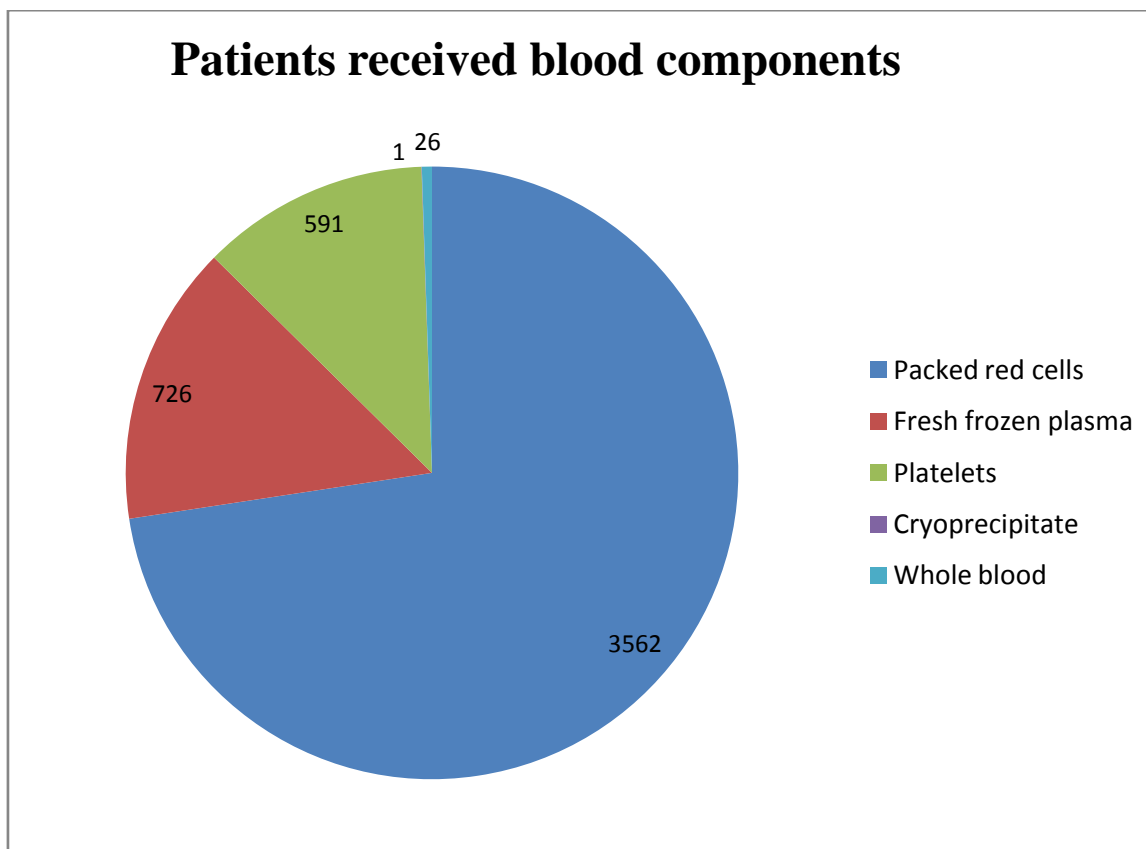


Figure 1: Number of Patients received various blood components

The total number of blood components issued from the blood bank of our institution during the period of study was 15000 units. Among them, the various components were as follows; 6445 units of packed red cells (PRC), 4808 units of fresh frozen plasma (FFP), 3716 units of platelets, 2 cryoprecipitate and 29 units of whole blood to different departments. (Table 1)

Table 2: Gender distribution of patients received blood components.

Gender	Frequency	Percentage
Female	1992	46.5
Male	2294	53.5
Total	4286	100.0

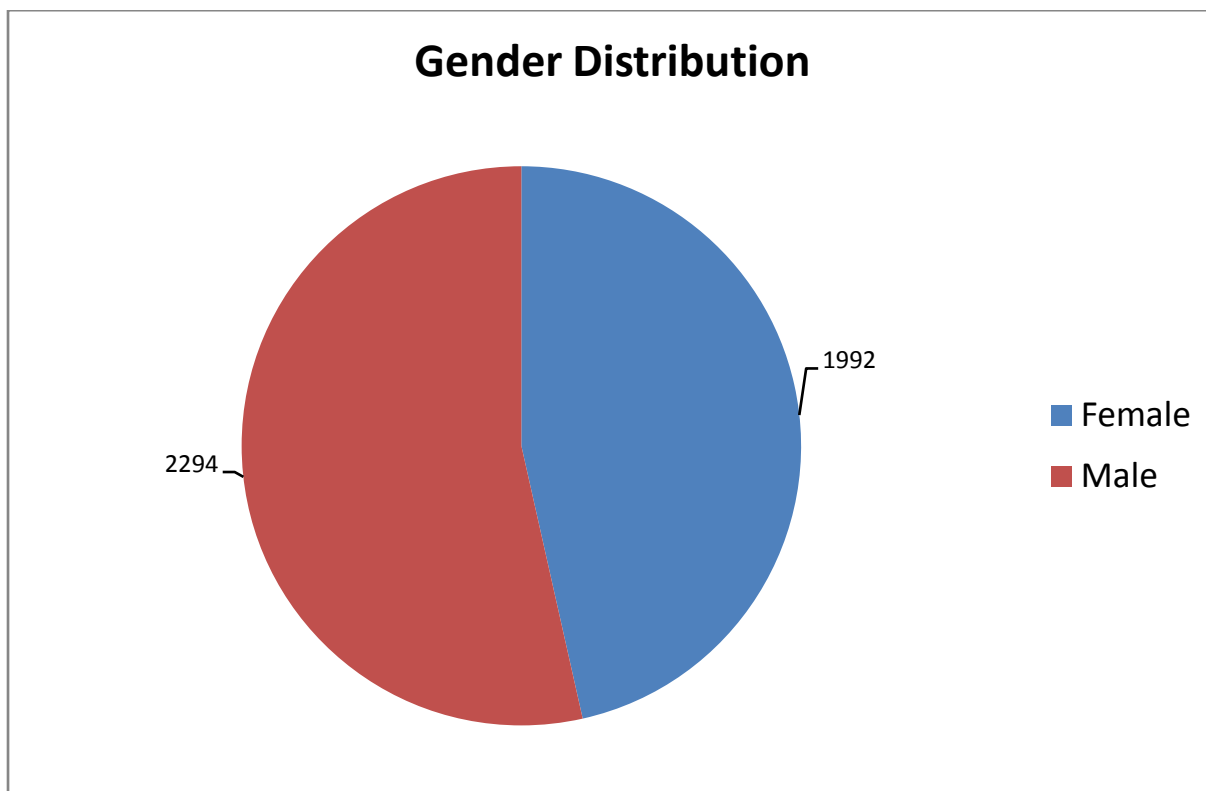


Figure 2: Gender distribution of the patients in study.

Table 3: Age group distribution of patients according to gender.

		Gender		Total
		Female	Male	
Age in Years	0-10 years	56	79	135
	11-20 years	104	117	221
	21-30 years	414	245	659
	31-40 years	367	378	745
	41-50 years	412	443	855
	51-60 years	297	465	762
	61-70 years	236	409	645
	71-80 years	84	131	215
	81-90 years	21	26	47
91-100 years	1	1	2	
Total		1992	2294	4286

Among the 4286 patients request for the blood components from the blood bank, 2294 were males and 1992 were female patients. In present study there was slight male preponderance with male to female ratio of 1.15:1. (Table 2).

The age wise distribution of the patients, the range of age was seen from neonates from the NICU to the geriatrics age above 91 years of age. Majority of the patients requested for the blood components was aged between 21-70 years of age. 855 patients belonged to the age group of 41-50 years of age. A good number of blood units for the paediatric age group also was observed in present study with issue of 356 patients aged 0-20 years of age. (Table 3)

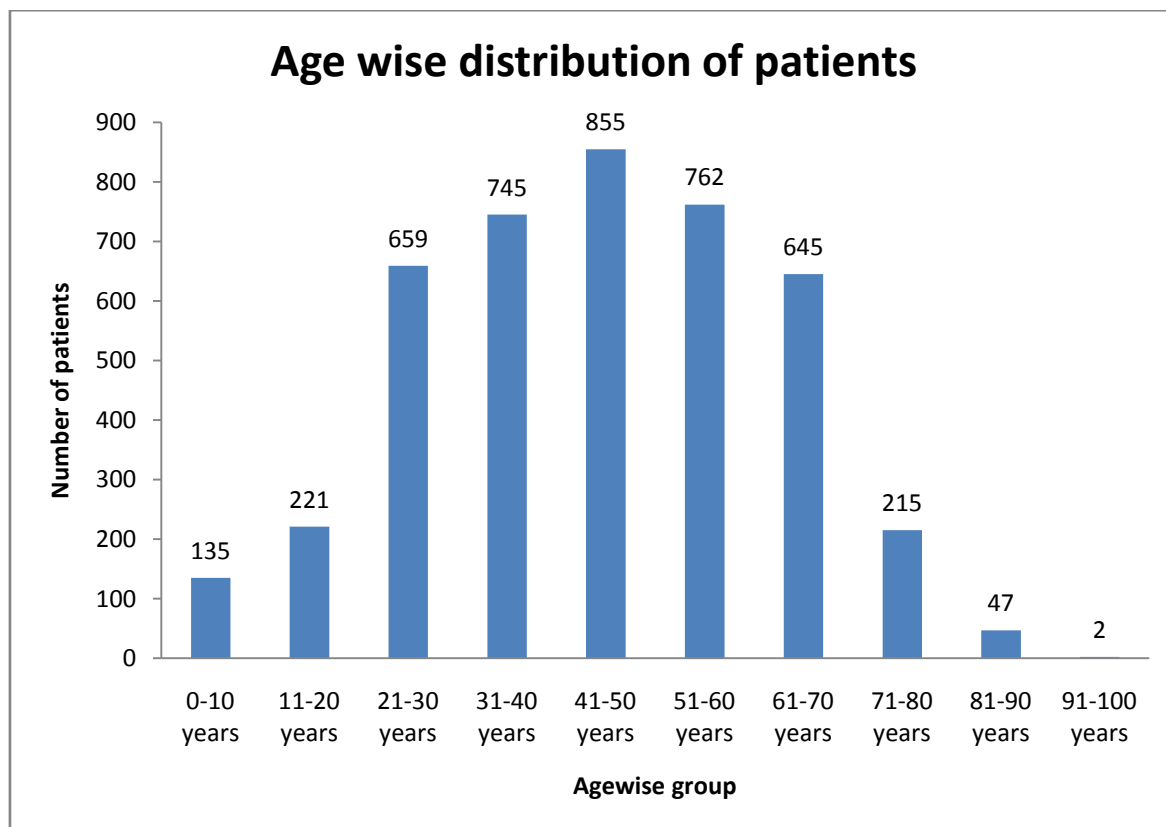


Figure 3: Age wise distribution of patients requested for blood components in study.

Table 4: Gender distribution for each type of blood component

Gender	Total No of Units issued	Packed red cells	Fresh frozen plasma	Platelets	Cryoprecipitate	Whole blood
Female	6574	2864	2042	1653	-	15
Male	8426	3581	2766	2063	2	14
Total	15000	6445	4808	3716	2	29

The distribution of individual blood component distribution among the male and female, the 8426 units were issued to male patients and 6574 units to female patients. 2 cryoprecipitate were requested for male patients. In every components of blood i.e. PRC, FFP, PT issued to male was more than to the female patients. (Table 4)

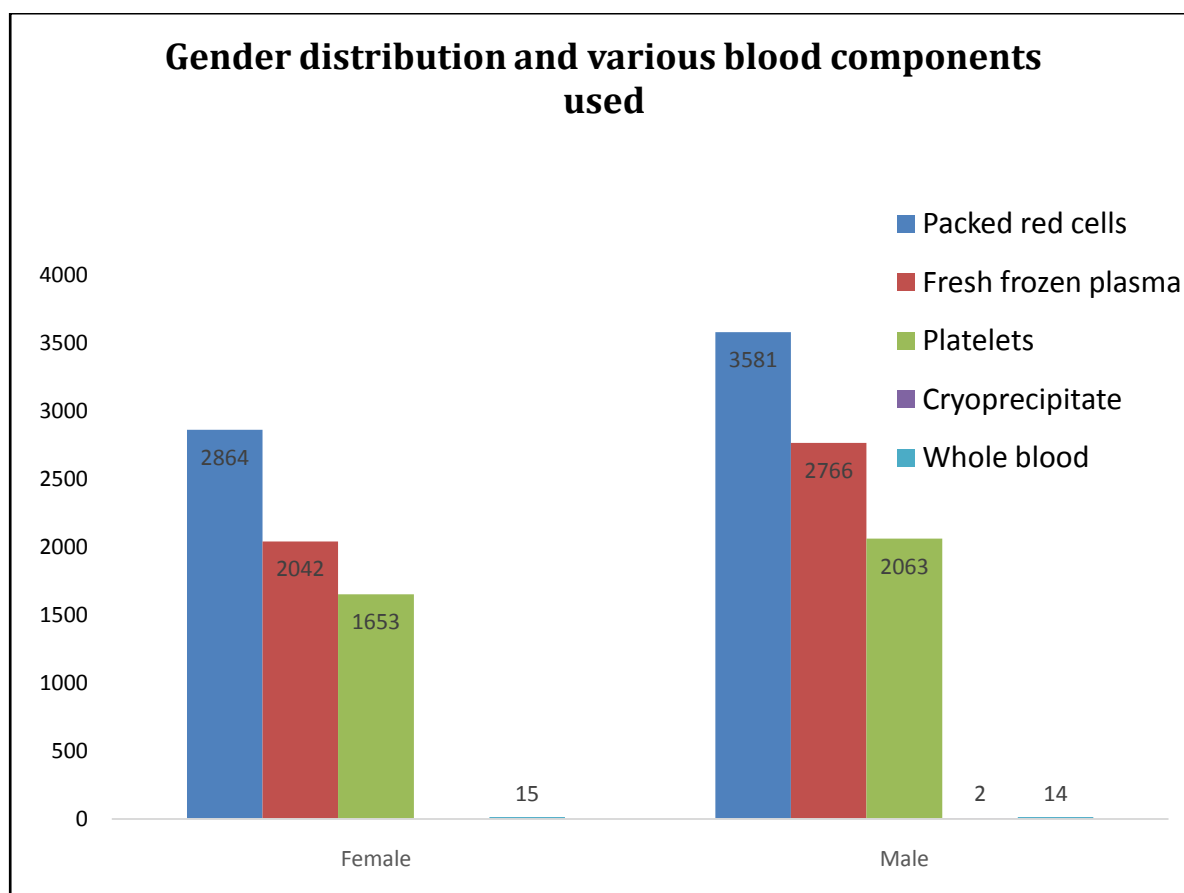


Figure 4: Gender distribution and various blood components issued.

Table 5 : Blood group distribution in study subjects.

Blood group	No of Units issued	Packed red cells	Fresh frozen plasma	Platelets	Cryoprecipitate	Whole blood
AB -ve	73	22	34	17	-	-
AB +ve	923	426	210	287	-	-
A -ve	162	89	34	37	-	2
A +ve	3533	1502	1216	808	-	7
B -ve	217	113	59	45	-	-
B +ve	4570	1858	1568	1136	-	8
O -ve	192	118	46	20	-	8
O +ve	5329	2317	1641	1365	2	4
BOMBAY	1	-	-	1	-	-
Total	15000	6445	4808	3716	2	29

Sum- Total No of particular blood component units issued; N- Number of patients' receiving blood components

Among 15000 units of blood, the common blood group of the blood component was O+ve with 5329 units, followed by B+ve with 4570 units, A+ve with 3533 units, AB+ve with 923 units. The Rh-ve blood components were less common, with AB-ve least with 73 units, A-ve with 162 units, B-ve with 217 and O-ve with 192 issued to patients. Only 1 Bombay blood group component was issued during the period of study. (Table 5)

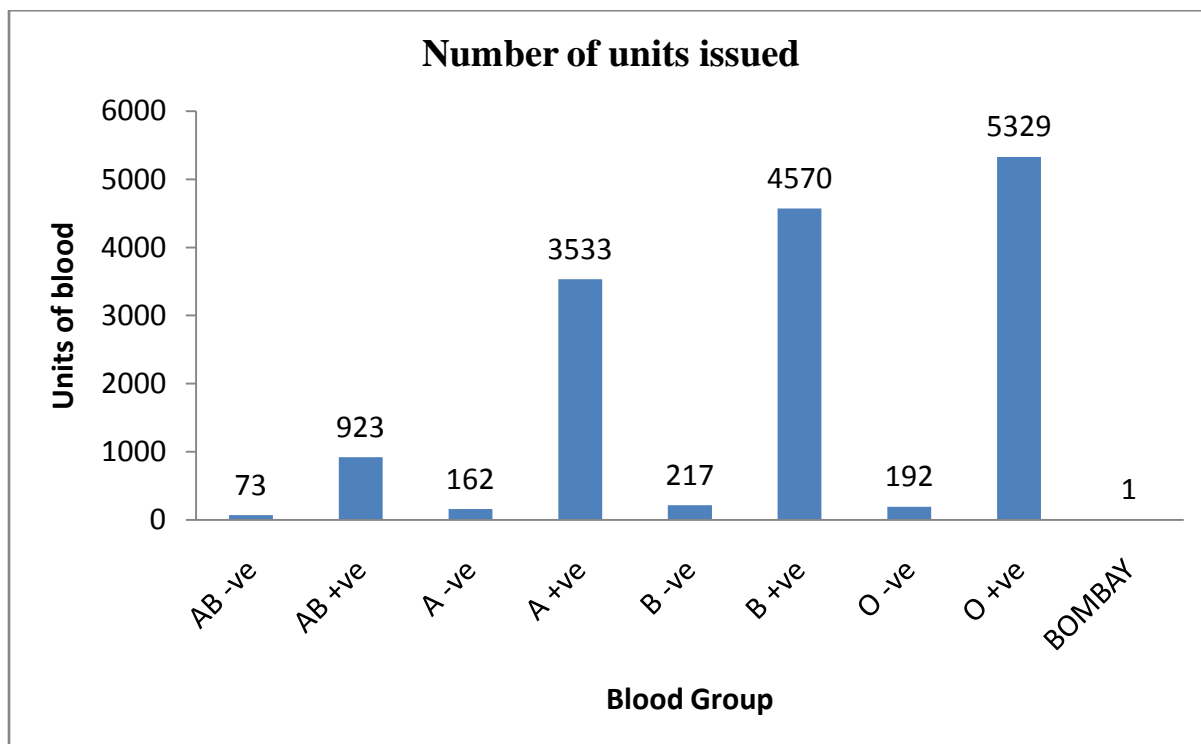


Figure 5: Blood group and Rh type of blood components issued.

Table 6: Department wise distribution of blood component request.

Department ordered	No of Units issued	Packed red cells	Fresh frozen plasma	Platelets	Cryo-precipitate	Whole blood
Medicine	4547	1839	1471	1235	-	1
Surgery	340	253	29	57	-	
OBG	1381	773	451	155	-	2
Paediatrics	142	55	34	52	-	1
Orthopaedics	936	640	127	169	-	
ICU's	3358	924	1526	892	2	14
Oncology	2226	884	498	838		6
Total	15000	6445	4808	3716	2	29

The request for the blood from various departments was observed. Highest request for blood components for transfusion was received from Medicine department and allied with 4547 units, followed with various Intensive care units (SICU, MICU, PICU, NICU etc) with 3358 units, oncology department with 2226 units, OBG with 1381 units, orthopaedics with 936 units and surgery with 340 units of blood. Paediatric department with least request for blood transfusion of 142 units of blood components, among which request for PRC (55 units) and PT (52 units) was more than the FFP. Cryoprecipitate was requested in very low number with only 2 units issued to ICU. (Table 6)

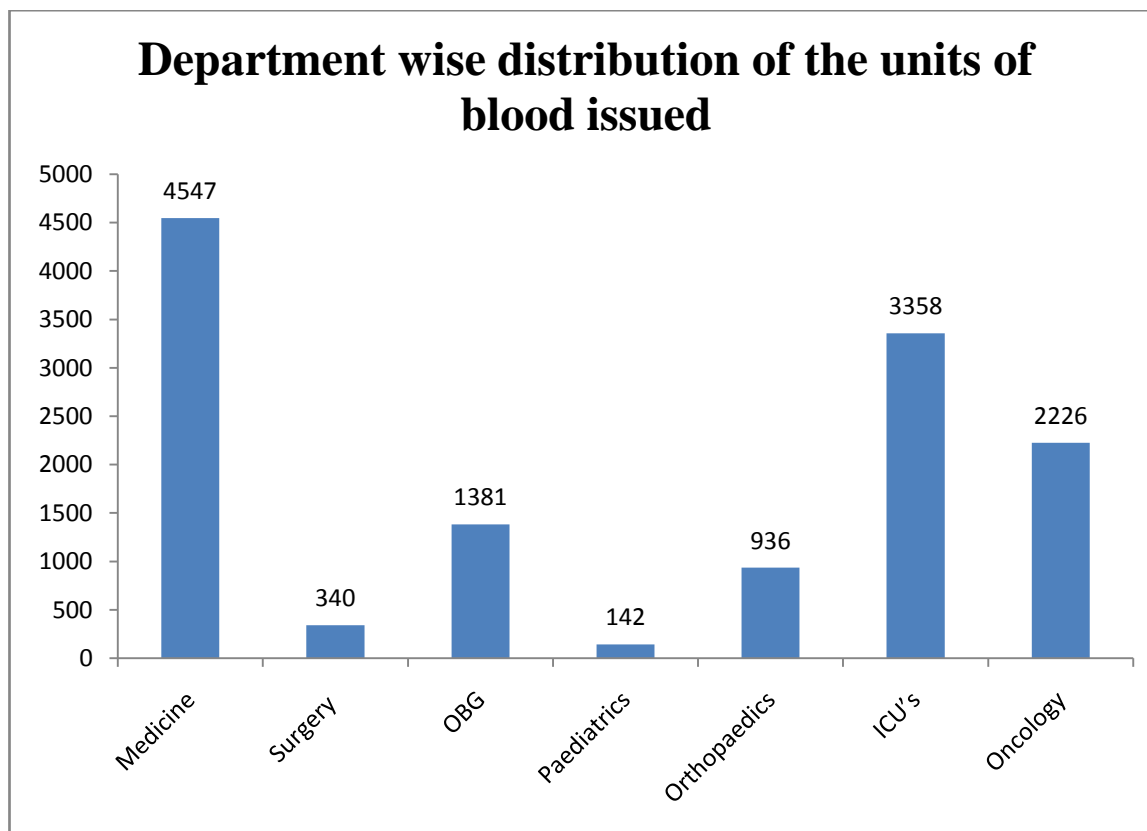


Figure 6: Department wise distribution of the units of blood issued.

Table 7: Department wise distribution of blood components issued in detail

Department ordered	No of Units issued	Packed red cells	Fresh frozen plasma	Platelets	Cryo-precipitate	Whole blood
CARDIOLOGY	1	1	-	-	-	-
DERMATOLOGY	1	1	-	-	-	-
DIALYSIS	3	3	-	-	-	-
EMERGENCY	2	2	-	-	-	-
ENT	10	10	-	-	-	-
ICU	402	187	119	96	-	-
KTU	4	4	-	-	-	-
MEDICINE	3706	1291	1275	1139	-	1
MICU	2020	483	1091	444	2	-
NEPHROLOGY	778	542	140	96	-	-
NEUROLOGY	58	1	56	-	-	1
NEUROSURGERY	13	1	4	8	-	-
NICU	83	10	13	49	-	11
OBG	1381	773	451	155	-	2
ONCOLOGY	2226	884	498	838	-	6
OPHTHOMOLOGY	4	2	-	2	-	-
ORTHOPEDIC	936	640	127	169	-	-
PAEDIATRIC	142	55	34	52	-	1
PICU	164	34	43	86	-	1
PLASTIC SURGERY	10	10	-	-	-	-
POR	43	27	10	6	-	-
SICU	683	204	260	217	-	2
UROLOGY	260	203	15	41	-	1
Total	15000	6445	4808	3716	2	29

Sum- Total No of particular blood component units issued; N- Number of patients' receiving blood components.

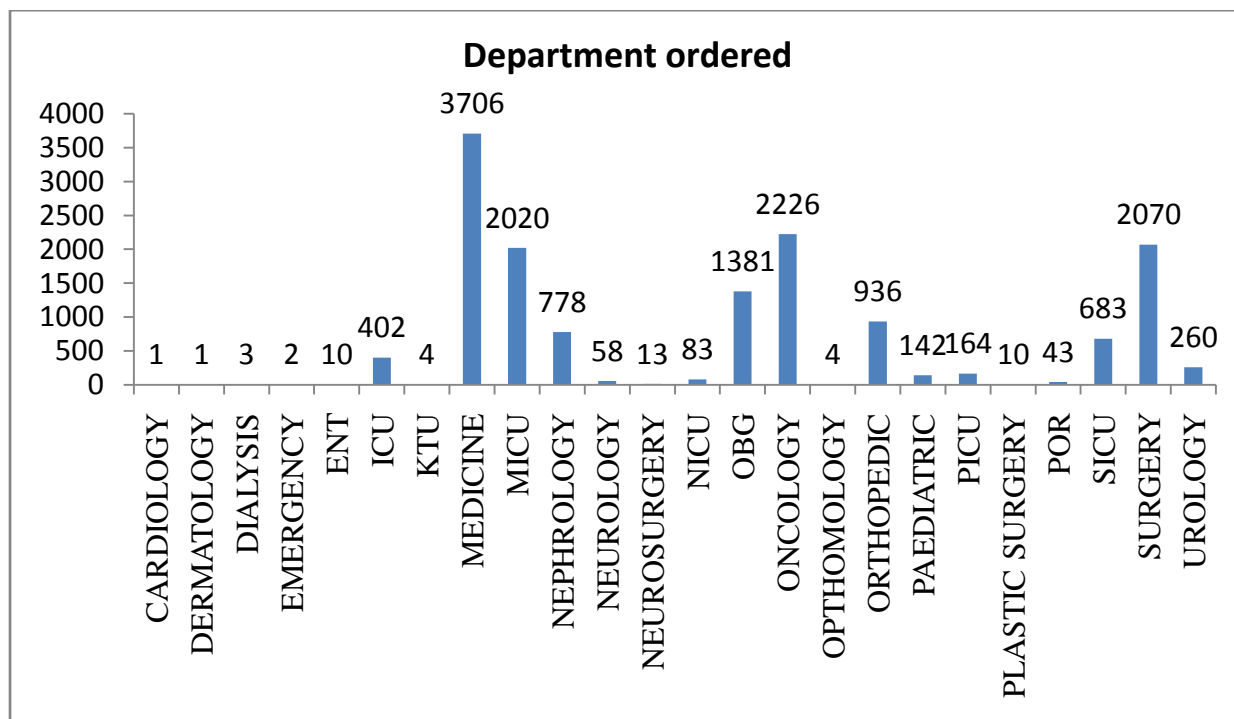


Figure 7: Department wise distribution of blood type issued in detail.

Table 8: Various diagnosis and blood components issued

Diagnosis	Frequency	Percent
Fracture/trauma	37	0.86
Carcinoma	742	17.3
Renal disease	391	9.1
Hepatic disease	295	6.9
Haematological cause/ Bleeding	1164	27.2
Obstetric cause	418	9.8
Infections	118	2.8
Elective Surgery	1121	26.2
Total	4286	100

The most common diagnosis for patients requiring blood components was haematological causes or Bleeding (n=1164; 27.2%) followed by elective surgery (n=1121; 26.2%). Other common diagnosis in patients was carcinoma (n=742; 17.3%) and obstetric causes (n=418; 9.8%) which include the labour and LSCS. Others included renal disease (n=391), hepatic disease (n=295), infections (n=118). (Table 8)

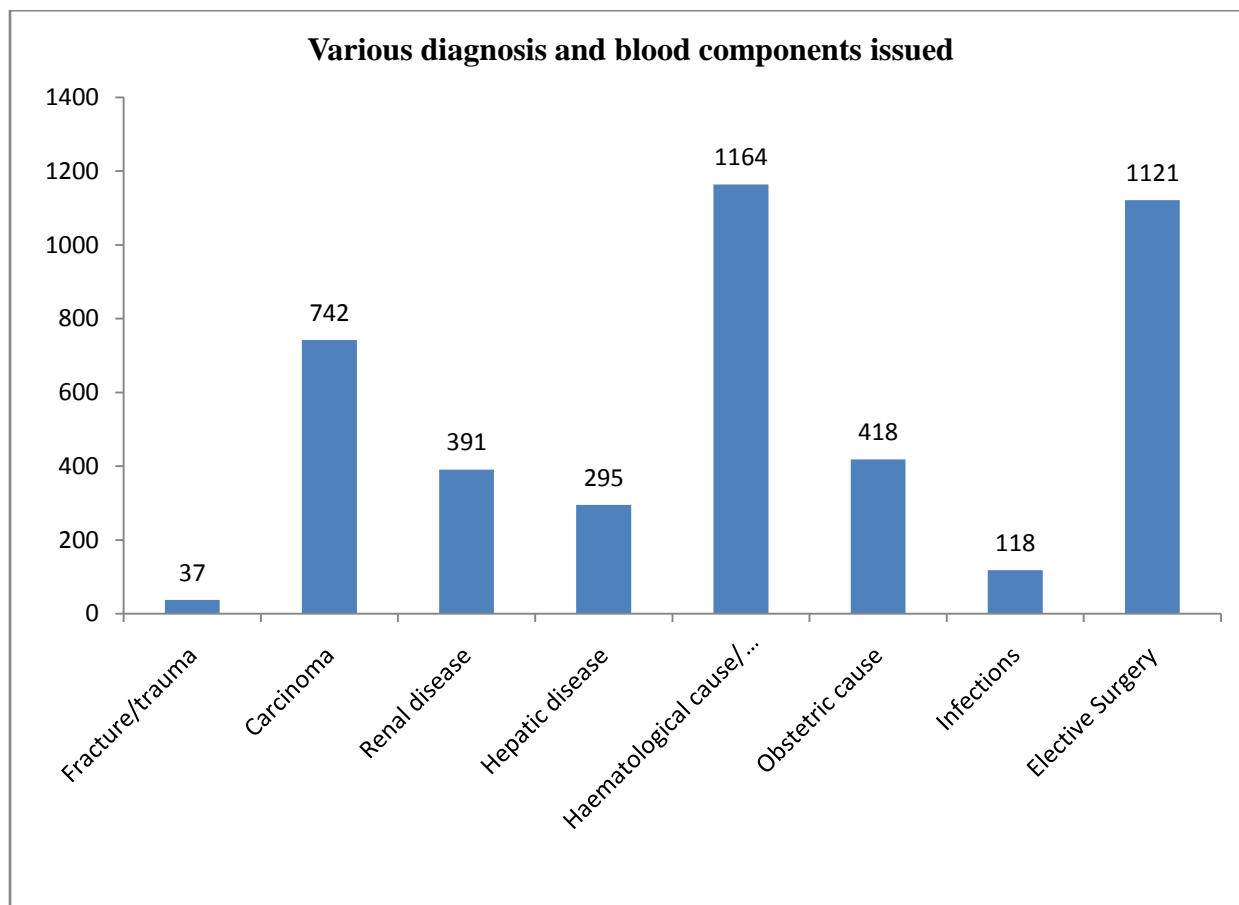


Figure 8: Various diagnosis and blood components issued

Table 9: Indication for the issue of blood components.

Transfusion Indication		No of Units issued	Packed red cells	Fresh frozen plasma	Platelets	Cryoprecipitate	Whole blood
Anemia	Sum	6292	3096	1976	1205		15
	N	1855	1647	270	173		14
Bleeding	Sum	633	172	357	104		
	N	112	82	57	15		
Carcinoma	Sum	172	56	66	50		
	N	41	35	8	4		
Delivery	Sum	26	23	3			
	N	15	15	2			
Thrombocytopenia	Sum	2177	177	347	1650		3
	N	327	75	73	271		2
Surgery	Sum	4827	2726	1444	649	2	6
	N	1836	1640	284	117	1	6
Sepsis	Sum	16	2	3	11		
	N	4	2	1	3		
Plasmapheresis	Sum	613	14	580	19		
	N	28	4	28	2		
Dialysis	Sum	224	178	18	28		
	N	62	61	2	6		
Poisoning	Sum	14		14			

	N	1		1			
Others	Sum	5					5
	N	5					5
Total	Sum	15000	6445	4808	3716	2	29
	N	4286	3562	726	591	1	26

Other include: snake bite, Hypokinesia, Hyperbilirubinemia, Exchange transfusion.

Among all the indications for all the blood products or components taken together, anemia was the most common indication (n=6292 units, 41.9%) followed by elective surgery (n=4827 units, 32.18%). Other indication in the study was thrombocytopenia (n=2177 units, 14.5%), followed by bleeding (n=633 units) and plasmapheresis (n=613 units). Other indication for the blood transfusion was dialysis (n=224units), sepsis (n=16 units), carcinoma (172 units), poisoning (14 units) and delivery (26 units). (Table 9)

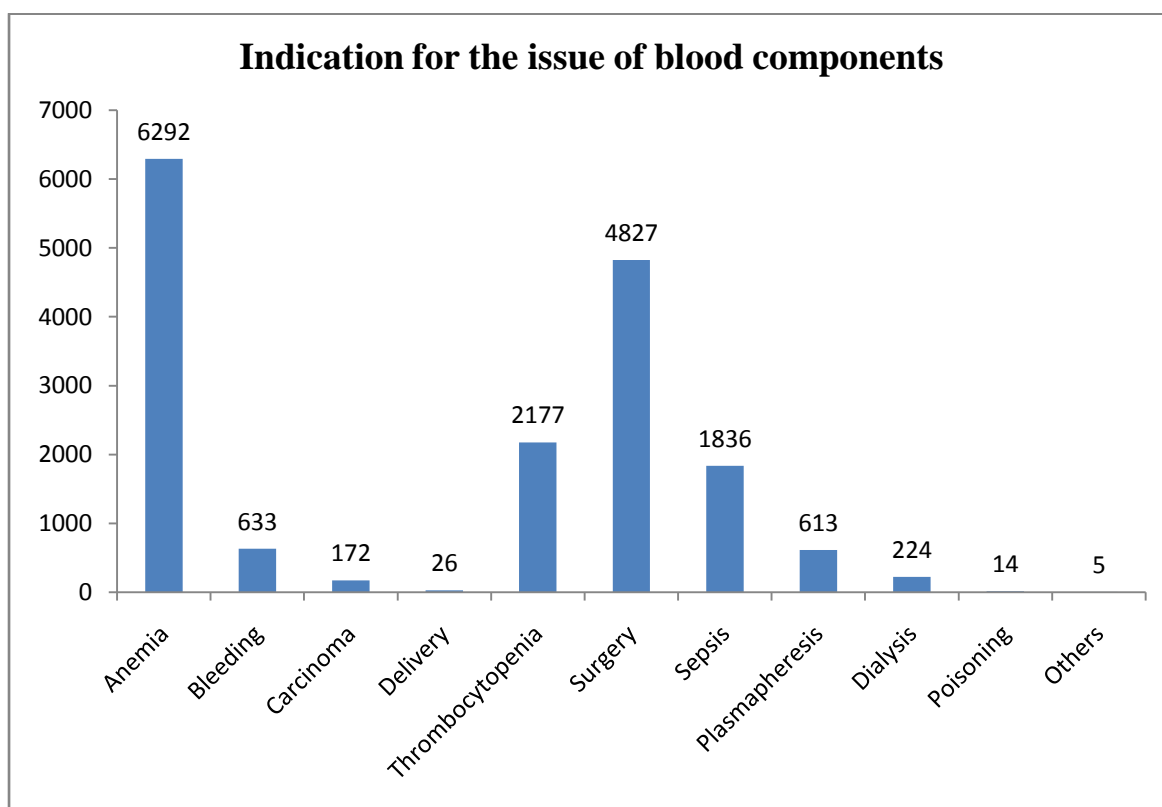


Figure 9: Indication for the issue of blood components

Transfusion reactions:

Out of 15000 transfusions, 26 cases of transfusion reactions were noted. Out of 26 cases, 25 cases were noted to have mild febrile non hemolytic reaction. Anaphylaxis was noted in one rat poisoning patient. There were no major transfusion reactions seen in our study. Out of 26 cases, nine were males and seventeen were females.

Table 10: Transfusion reactions.

Transfusion reaction	No. of cases	Male	Females
Mild Febrile non hemolytic reaction	25	9	16
Anaphylaxis	1	0	1

V. DISCUSSION:

Internal audit is an integral part of the quality control program in a blood bank, like in any other organisation or laboratories. Sole purpose of this quality assurance programme here is to provide a safe and effective blood products to the patients. Whole blood and its components are considered as drugs by the food Drug Administration (FDA) as their use is meant to produce therapeutic benefits to the patients. Thus FDA emphasizes on the quality of blood and its products by applying pharmaceutical industry standards to the collection, testing, storage and supply of safe blood.

Components that are derived from blood are packed red blood cells, fresh frozen plasma, platelet rich concentrates and cryoprecipitate, cryosupernatant (remnant plasma after the production of cryoprecipitate and bank plasma (plasma that was never frozen). Products are primarily those derived on through pharmaceutical process from plasma such as factor concentrates, albumin and Immunoglobulin's. The FDA regulates on the quality of blood and its product by applying standards of pharmaceutical industry on collection, storage, testing and supply of safe blood.⁽⁶⁾ Rational use of blood is intended to ensure that blood is used like a lifesaving drug – when essential. Besides, this it also ensures that there is adequate inventory to utilize for patients in need. Therefore, it is necessary for every blood bank besides ensuring quality of this life saving product, to monitor, assess and evaluate the existing trends and appropriateness of blood ordering. As it is lifesaving drug every attempt should be made to prevent any misuse of these products. Internal audit of utilization of blood components can act as integral part of quality control programme similar to any other organization. Overuse or misuse can lead to shortage of blood specially the rare blood groups and sometimes it is really not available for patient who is in life threatening situation.

It is important to do the regular internal audits and educational campaigns for proper utilization of blood components for patients and to avoid inappropriate usage. Over a period of time indication for usage of blood components has been defined. Post-world war II blood transfusion usually given for every patient whose haemoglobin is less than 10 g/dL.⁽⁶⁾ But due to developing strategies for transfusion, transfusion threshold, transfusion triggers and restrictive strategies for transfusion currently appropriate usage of blood is promoted globally. Usually retrospective audits are very efficient in finding out the areas where there is a need to change transfusion practice. Different studies have assessed the utilization trends of blood components with proper feedback to clinicians. Overall, when all red cells and components are considered, the Clinical demand to utilization ratio in our study is 59.8 %. While utilization ranging from 13.6% to 23.14% has been shown in various studies.⁽⁷⁾ After implementation of maximum surgical blood order schedule (MSBOS) in their surgical patients Vibhute et al showed an improved utilization rate from 23.14% to 74.74%.⁽⁷⁾

According to WHO 2012 statistics, 108 million blood donations collected globally with increase of 25% from 80 million donations collected in 2004.⁽⁸⁾ There is increase in 8.6 million voluntary blood donations from 2004 to 2012. Blood donation rate in higher income 102 countries is 36.8 per 1000 population, 11.7 donations in middle income and 3.9 donations in low income countries. 65% of blood transfusions are given to children under 5 years of age in low income countries and 76% of blood transfusions are given to patients group over 65 years of age in high income group countries.⁽⁸⁾ On contrary to the developed countries, the donation rate of blood in developing countries is very low, which homes for 6.9 billion word population with less than 10 per thousand donations.⁽⁹⁾ So with this low rate of donation it is difficult for these populations to bridge the gap of appropriate utilization of red blood cell with modern medicine technology.⁽¹⁰⁾ Blood and its products are more often used in developing countries for pregnancy complications and life threatening anaemia in mothers and children. So it is very important consider all factors that will influence the utilization patterns of blood and its components like age, gender, diagnosis etc. According to the National AIDS Control Organization (NACO) which is the statutory body for blood safety in India, annual requirement of country is estimated at 80 lakhs units for 2012-13, out of which 55 lakh units is target for NACO supported blood banks. During 2012 – 2013, 67.56 lakh blood units were collected across the country, till December 2012. Of this, NACO supported blood banks collected 38.68 lakh units.⁽¹¹⁾

This study is conducted in a tertiary care hospital among 4286 patients who received blood component transfusion during the period of study. Total number of transfusions carried in hospital during the period was 15000 units of blood and its products.

Borkent-Raven BA ⁽¹²⁾	2010	Data contains 290043 patients with 2,405,012 units of blood for duration of 10years
Gaur DS ⁽⁶⁾	2008	During the period of 1 year of study, 8558 units of blood were issued.
Ambroise MM ⁽¹³⁾	2015	Total of 20,683 units of blood issued, duration of 1 year
Our study		Total of 15,000 units of blood issued during the 1 and half year of study.
Borkent-Raven BA ⁽¹²⁾	2010	Recipients of >65 years of age was more in the study.
Gaur DS ⁽⁶⁾	2008	Recipients belong to age group of 21-60 years, male female ratio of 1.6:1.
Gomathi G ⁽²⁶⁾	2012	Recipient belonged to age group of 21-60years with mean age of 40±20years
Ambroise MM ⁽¹³⁾	2015	Recipients belong to age group of 21-60years.
Our study		Recipients belong to age group of 21-60years, with male female ratio of 1.15:1.

Age: the average age of the study subjects was 45 years. The range was wide from neonates to the age more than 90 years. Major recipient of blood transfusion was in age group between 21-70years compared to the older age groups and not similar to other western studies trend. One study from south India also shown similar results for utilization of blood and its product in the age group 21-50 years as compared to our study.⁽¹³⁾ This seems to depend upon population demographic trend of the region studied and the prevalence of conditions that require transfusion. For example, since Denmark had more population of old age people due to increased life expectancy, so more blood was utilized among old age people greater than 65 years of age. A small study from England collected data over 28 days in a prospective observational study also showed that 57.2% of the RBC units transfusion were given to patients over aged 65 years or older in the Northern parts of England.⁽¹⁴⁾ Life expectancy of older age group is increasing in developed and developing countries so that RBC consumption is displaying an increasing trend as we mention earlier. Hence, appropriate and judicious utilization of blood and its components should be considered in order to prevent shortage of blood.

The gender distribution showed a preponderance of males (53.5%, 2294 patients) than females (46.5%, 1992 patients) who received blood, with male to female ratio of 1.15:1. Total number of blood units for females was 6574 and for males was 8426. Similar patterns are seen in other studies. In the Brazilian study by TT Goncalvez et al, 62% of all components were utilized by males.⁽⁷²⁾ 59.8% red blood cell units were utilized by male which is much more than female red cell utilization (39%). Study conducted by Gaur DS et.al also recorded the preponderance of males in South Indian study with male female ratio of 1.6:1.⁽⁶⁾ It can be noted that the more number of issues of blood in females was in age group of 21-30 years and 41-50 years, one being the age to bear child and other peak for gynaecological issues in women.

Blood group distribution in the study group followed the general population blood group distribution with O+ blood group being commonest, followed by B+ and least common type being AB-.

Location wise utilization: in our study, we found the majority of the blood components were issued to the department of medicine (4547 units) and followed by intensive care units of various departments (3358 units). Surprisingly the oncology department patients received more number of blood components (2226 units). The request for the blood from OBG was with 1381 units of blood, from surgical department 340 units and from orthopaedics 936 units of blood. The medicine department requested for various blood components; packed red cell (1839), FFP (1471) and PT (1235) in almost equal distribution with 1 whole blood request for the patient. On contrary, the surgical departments requested for packed red cells more than the FFP and PT. The oncology department requested for 838 units of platelet. Compared to ICU setup, the majority of the blood component requested was FFP (1526) followed by PRC (924) and PT (892), and 14 units of whole blood. The overall whole blood request was very minimal and is comparable to the current trend.⁽¹¹⁾ Compared to routine and emergency, the utilisation of the blood products was found to be equal. The ICU’s were considered the emergency requirement of the blood and the medical conditions like trauma, fractures, DIC, PPH, Bleeding.

Gaur DS ⁽⁶⁾	2008	More requests for blood components was from Medical ward and surgical wards.
Gomathi G ⁽²⁶⁾	2012	Request for blood components were from the medicine department followed by surgery and OBG.
Ambroise MM ⁽¹³⁾	2015	More requests for blood components were from Medical, surgical and ICU.
Our study		Highest requests for the blood components were from the medical department, ICU’s, Oncology, orthopaedics and surgical departments.

Diagnosis: the various diagnoses were assessed for the utilisation of the blood products in our study. On review, it was found that the data filled in by the clinician on the requisition form was not of good information. In many patients, the indication for the transfusion such as anemia was implied as the diagnosis. Further, many tertiary care hospitals don’t have a standardized system to classify the diagnosis real-time while the patients is admitted, as the coding happen post-hoc at discharge or later. In study by Cobain et al, they mention that different red cell utilization in different countries for different diagnosis.⁽¹⁶⁾ In England the all surgical conditions utilized 39.7% of blood; medical conditions utilize 53.2% of blood and Haematology 16.3% of blood. In USA, the largest proportion is for cardiovascular disorders (24%) followed by digestive system disorders (17%) and then neoplastic disorders (16%). In Australia maximum red cells were utilized by Haematology including malignancy (20.7%), orthopaedic surgery (13.8%) and cardiovascular surgery (10.8%). In Denmark for diagnosis Neoplasms utilize 25.7% of blood, digestive system utilize 15.5% and diseases of red blood and Blood and blood forming organs diagnosis utilize 11.1% red blood cell.⁽¹⁶⁾ In our study most common diagnosis for patients requiring blood components was haematological causes or Bleeding (n=1164; 27.2%) followed by elective surgery (n=1121; 26.2%). Other common diagnosis in patients was carcinoma (n=742; 17.3%) and obstetric causes (n=418; 9.8%) which include the labour and LSCS. Others included renal disease (n=391), hepatic disease (n=295), infections (n=118).

Gaur DS ⁽⁶⁾	2008	Common diagnosis for the patients requiring the blood components was trauma (20%) followed by malignancy (17.3%) and elective surgery (14.7%).
Ambroise MM ⁽¹³⁾	2015	Poisoning and elective surgery were the most common diagnosis for the blood component transfusion.
Our study		Common diagnosis for the patients requiring a blood component was haematological diseases and bleeding followed by elective surgery and carcinoma.

Indication: in presents study, presence of the anemia (6292 units of blood) was the major indication for the blood transfusion in the patients. Followed by for surgical procedures (4827 units of blood) and thrombocytopenia (2177 units of blood) in our institute. 633 units of blood were used for patients presenting with bleeding and 613 for plasmapheresis. 224 units of blood were issued for patients undergoing dialysis. 16 units were issued for the patients presented with sepsis and admitted under the critical care units.

Gaur DS ⁽⁶⁾	2008	Anemia was the most common indication followed by elective surgery.
Our study		In present study, anemia was the most common indication followed by surgical procedure and thrombocytopenia.

Red blood cells: Balance between demand and supply of red blood cell is increasing precarious in many countries.⁽¹⁷⁾ Due to change in life style and stringent eligibility criteria, the donor availability is getting affected. As mentioned earlier aging population increase the demand for blood.⁽¹⁷⁾ By understanding the patterns of RBC use and current usage will help predict future pattern in demand and help in managing to reduce use in particular areas. Total of 6445 (41.9%) units of red blood cells were issued during period of study to 3562 (83.1%) patients, this reflects the demand of for blood in a tertiary care centre in our country. Major requesting departments were the divisions of medicine and surgery for red cell requests, along with that ICU’s oncology department and the OBG also included, with preponderance of medicine department. The indication for the use of PRC was majority with anemia, followed with the various surgical indications in our study. Patients with bleeding received a combination of both PRC and FFP.

Fresh Frozen Plasma: It is very crucial to rationalize, reduce wastage and optimize FFP transfusion due to concern regarding transfusion transmitted infections and blood components non availability specially in developing nations. Residual viral transmission by blood products is hardly known in India due to lack of such data. Blood or its components transfusion should be based on scientific basis. Especially plasma transfusion can overload. Rational use of FFP should be implemented. Up to 5% of transfusion reactions in USA is due to FFP transfusion mostly TRALI.⁽¹⁸⁾ Total of 4808 (32.05%) units of Fresh Frozen Plasma (FFP) was issued for 726 (16.9%) patients. The highest request for the FFP (1526 units, 31.7%) was from the ICU’s followed by the medicine department (1471 units, 30.5%), with least from the surgery (29 units) and paediatric departments (34 units). Major indication for request for FFP was anemia and elective surgery in our study and minor for plasmapheresis.

Platelets: total of 3716 (24.7%) units of platelets were issued to 591 (13.8%) patients in present study. The majority of patients with thrombocytopenia (1650 units, 44.5%) were the patients received PT, followed by the patients with anemia (1205 units, 32.5%) whose diagnosis was not clearly mentioned in request form. The patients posted for surgery also received the PT (649 units, 17.5%). Few patients who are posted for dialysis also received the platelet along with other components of the blood. Only a few centres perform component preparation by apheresis technology to fulfil the requirement of thrombocytopenic patients.⁽¹⁹⁾ In last two decades platelet utilization has increased all over the world, more than the use of any other blood components. In our study medical group (50%) had consumed maximum platelets followed by Paediatrics (26%). In both category Haematology and paediatrics oncology were the main speciality for large consumer of platelets. Haematology patients are the largest group of patients as recipient for platelet transfusions. Reports have mentioned that haematology patients have received up to 67% of all issued platelets.⁽²⁰⁾ In present study, 44.5% of patients received platelets were diagnosed with thrombocytopenia. The availability of the technology made the specific component availability and transfusion at ease for the right patients. The departments ordered most for the platelets were medicine, ICU’s and oncology departments.

Cryoprecipitate: Cryoprecipitate is a concentrate of high molecular weight plasma proteins that is stored in cold. It contains factor VIII: C, VonWillebrand factor fibrinogen, factor XIII and fibronectin. Indications for appropriate usage of cryoprecipitate are limited.⁽²¹⁾ Very small number of requests for cryoprecipitate as compared to other components is seen in our study due to limited use. Cryoprecipitate is also used for fibrinogen supplementation in patients with acquired or congenital Hypofibrinogenemia and dysfibrinogenemia. Fibrinogen levels of greater than 100mg/dL are considered to be adequate for haemostasis. Total of 2 (<1%) cryoprecipitate were issued to the surgical procedure to 1 patient in our present study. Bleeding is usually associated with fibrinogen levels lower than 100mg/dL. Cryoprecipitate unit contain a minimum of 150 mg of fibrinogen. A bag of transfused cryoprecipitate will raise the fibrinogen level by 30mg/with 3 to 6 days of half-life in a stable situation where there is no abnormal consumption. Clinically, acquired hypofibrinogenemia is associated with

conditions like consumptive coagulopathy such as DIC. Risk of transfusion transmitted infection associated with cryoprecipitate is similar to red blood cells because cryoprecipitate is usually transfused along with pool of multiple products, so the risk is proportionately higher. Anaphylaxis, severe pulmonary reactions and haemolytic anaemia due to RBCs antibodies present in cryoprecipitate has been reported.⁽²²⁾

Whole blood: Total of 29 (<1%) units of whole blood was issued to 26 patients in present study observations. The low number of the utility of the whole blood trend in India is seen after 2012, with the availability of the techniques to separate the blood and blood components and strict policies by the hospitals and NACO. These results are comparable with other studies conducted in India.⁽¹³⁾ Survey conducted in 2011 and 2013 revealed decline in both blood collection and utilization in US and southern Asia.^(23,24) recent studies also described an association between liberal transfusion policies and increased incidence of the health care associated infections in patients, including surgical site infections and sepsis.⁽²⁵⁾

VI. CONCLUSION:

Auditing the use of blood, its components and indications for their use by the various departments of the hospital has helped to finding the trend of number of blood and its components used, type of blood and its components used, indication for blood and its components used as well as the requirement from various departments. This knowledge helps the blood banks to procure, preferentially categorise and release blood and blood components to as per requirement effectively. The inappropriate use of the blood component transfusion use has been reduced due to effective auditing in the institution. With the availability of the component substitution, the whole blood transfusion has reduced, <1% in our institution. This kind of audit also helps in efficient handling of blood and its components to minimise the wasteful usage. Also appropriate component therapy should be actively endorsed as it ensures optimum utilization of a scarce resource in a populous third world country like India.

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