



ORIGINAL RESEARCH PAPER

Pathology

“PATTERN OF BLOOD AND BLOOD COMPONENTS UTILIZATION IN A TERTIARY CARE CENTRE”

KEY WORDS:

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ABSTRACT

Introduction- Blood is a specialised physiological fluid that carries waste products away from the body's cells as well as essential nutrients and oxygen to the cells. The term "blood components" refers to the division of whole blood into several components, including Platelets, packed red blood cells (PRBC), platelet-rich plasma, fresh frozen plasma (FFP), and cryoprecipitate. **Methods-** This cross sectional study for 18 months was done with aim to study on pattern of utilization of blood and blood components in the Blood Bank of Department of Pathology in Index medical college, Indore. We also studied utilization of blood and its products in various departments. **Results-** 1361 transfusions totaled in the analysis, including 1.5% of whole blood, 68.8% of PCV, 13.1% platelets, 16.5% FFP and 0.2% of cryoprecipitate. A total of 14 transfusion reactions were documented. Blood products were majorly prescribed for female patients. Most of the blood units were requested by medicine department. O+ blood group was utilized by most of the patients followed by B +. Least units were utilized by Orthopedic sdepartment. Dermatology departments not requested any blood units. **Conclusion-** The blood bank must be able to meet the demand for this life-saving product while also evaluating and assessing the current trends in blood ordering. Therefore, it is crucial to periodically analyse and audit how blood components are used in order to determine the trends in hospital blood usage

INTRODUCTION-

Blood is a specialised biological fluid that comprises both solid and liquid components that are essential for carrying oxygen and nutrition, eliminating waste, and acting as the body's main defensive mechanism. The goal of blood transfusion services is to provide blood and blood components that are safe, consistent, and on time(1). As there is no alternative to this priceless medication, transfusions of donated blood continue to be the mainstay of treatment for a variety of clinical disorders(2).

In 1950s and 1960s, component therapy was established. In this therapy, only the necessary component is given, or "the minimum for the maximum." The clinical practise guidelines for the use of blood components aim to: increase consumer awareness of the advantages and risks of blood component therapy; improve consistency and appropriateness of transfusion practise; encourage the integration of quality management systems into transfusion practise and decrease the overall number of transfusion-related complications(4). In developing countries it is much essential to make an efficient use of blood as there are limited resources of blood and increase demand in community(5).

There are certain merits of component transfusion such as Avoiding overload, having a longer shelf life than whole blood, and being able to overcome the blood shortage for better patient care. A patient's exposure to the risk of blood-borne endogenous infections is frequently avoided by utilising blood to its fullest potential. This reduces or eliminates the need for allogenic blood and helps to minimise other risks(6). Commonly used components are- Red Cell Concentrate (RCC), Platelets Concentrate (PC), Granulocytes, Fresh plasma (FP), Fresh frozen plasma (FFP), Platelet Rich Plasma (PRP), Liquid Plasma, Cryoprecipitate and Cryoprecipitate reduced plasma(7).

Because blood and its components have a tendency to trigger immunomodulation in the receiver, blood transfusions must be done with caution(2). To reduce blood and its component wastage, it is crucial to only order a certain number of blood units. It is not necessary to collect one unit of blood to counteract the potential loss of one unit intraoperatively since one unit of blood loss does not significantly lower blood volume or result in tissue hypoxia. By infusing crystalloid solution, volume depletion of 10% (loss of 1 unit of blood) can be safely and efficiently addressed.

Numerous short-term and long-term complications have also been linked to blood transfusion. Haemolytic responses from transfusion errors are among the acute consequences. Transmission of significant chronic fatal infections through the blood is one of the long-term consequences of blood transfusion. Blood contamination by bacteria is another possibility. Even with all the precautions taken to avoid them, these problems still happen in around 1% of transfusions. Every indication for requesting blood products should be supported because unnecessary transfusions may contribute to a shortage of blood products. As a result, the needful patients are denied the benefit of blood products(10).

AIM-

A study of utilization of blood and blood components in a tertiary care centre-A retrospective cross sectional analysis.

OBJECTIVE-

To determine the frequency and pattern of utilization of blood and blood components in a tertiary care hospital

MATERIAL AND METHODS-

Study Design-A prospective observational study

Study Period-one and half years

Sampling Method and size-

All the requests for various blood and blood components with in the study duration were included. A total of 1316 units of blood were analysed.

Inclusion Criteria-

All the transfusion requested with in the hospital.

Exclusion Criteria-

Units issued outside hospital.

Data Collection-

The number of all whole blood units and blood components supplied in one and half year was recorded and their average was calculated.

Data related to transfusion, and clinical history along with blood bank records, request forms and patient registration details were obtained.

Data also included age, gender, type, number of each blood component issued and transfusion reaction if any were noted. ICD-10 was used for classification of diagnosis requiring transfusion of blood products.

Bias-

As the present study was conducted in a medical college hospital, the result observed are subject to bias arising from rate of reporting at the hospital (Berksonian Bias).

Data Management-

Data was collected and entered simultaneously in statistical package for social sciences (SPSS) version 23 and coded appropriately. Descriptive statistics were calculated to summarize the sample characteristics in terms of frequency and percentage. Analytical and inferential analysis was applied between dependent variable and other independent variables.

RESULTS AND OBSERVATIONS-

From study period a total of 1361 units of blood and blood products were transfused to the patients admitted at Index medical college and Research centre, Indore. Among those 1361 units, 20 (1.5%) were whole blood cell, 224 (16.5%) fresh frozen plasma, 936 (68.8%) packed cells, 178 (13.1%) platelets and 3 (0.2%) cryoprecipitate. Mean age of the study participants was 31 years and range was 03-63 years. Majority of the study participants were in the age group of 10-20 years (22.60%), followed by 21-30 years (17.10%). Females were transfused more units of blood compared to males (57.8%). Total transfusions were analysed for the indications of transfusion. Most common indications/diagnosis for blood transfusion was Anaemia (50.7%) followed by bleedings incidences (20.2%), operative reasons (17%), Malignancy (6.0%), shock (3.5%), Dialysis (1.80%) and thalassemia (0.70%). Majority of the blood transfusion were requested by department of medicine (36.3%) followed by Surgery (22.9%), Obstetric (20.3%), Paediatrics (15.4%) and orthopaedics (5.1%). Majority of the transfusion requested were for O+ blood group (30.2%) followed by B+ (29.8%), A+ (27.6%), AB+ (7.9%), O- (2.1%), B- (1.6%), A- (0.5%) and AB- (0.4%).

Department Wise Distribution Of Component Usage- Medicine

There were a total of 494 transfusions carried out during the study period in the department of medicine, of which 301 (60.9%) were packed cell transfusions, 96 (19.4%) were FFP, 87 (17.6%) were platelet transfusion, 07 (1.4%) were whole blood transfusion and 3 (0.6%) were cryoprecipitate. All cryoprecipitate counted in the study were utilized by the medicine department.

Surgery

There were a total of 210 transfusions carried out during the study period in the department of surgery, of which 181 (86.2%) were packed cell transfusion, 14 (6.7%) were platelet transfusion, 13 (6.2%) were FFP and 2 (1%) were whole blood transfusion. There was no use of cryoprecipitate.

Paediatrics

Of total transfusions, department of paediatrics used 276 total transfusions. 182 (65.09%) were packed cell transfusions and 59 (21.4%) were FFP. The whole blood was used in 03 (1.1%), while 32 (11.6%) were platelets.

Obstetrics and Gynaecology

There were a total of 69 transfusions carried out in the department of obstetrics and gynaecology during this period. Packed cell transfusions were performed in 56 (81.2%), 06 (8.7%) were platelet transfusions, 01 (1.4%) were whole blood transfusions, and 06 (8.7%) were FFP.

Orthopaedics

Orthopaedics used a total of 312 transfusions. 216 (69.2%) were packed cell transfusions, 50 (16%) were FFP, while 39 (12.5%) were platelet transfusions and 07 (2.2%) were whole blood transfusions.

DISCUSSION-

To ensure an appropriate supply, the availability of donated blood and the demand for blood components must be matched. Right now, there is not enough donated blood to meet the need. The current study was carried out over a period of 18 months. 1613 transfusions were recorded overall during the study period.

Blood Components- Among those 1361 units, 20 (1.5%) were whole blood cell, 224 (16.5%) fresh frozen plasma, 936 (68.8%) packed cells, 178 (13.1%) platelets and 3 (0.2%) cryoprecipitate. Blood components rather than whole blood to obtain more benefits and reduce adverse reactions in patients. Packed cells is the most frequent used products followed by FFP and platelets. A rarely used component was cryoprecipitate).

Age and Gender- In present study, majority of the study participants were females and were more than 10 years of age. Mean age of the study participants was 31±17 years and range was 03-63 years. **Sampat et al(14)** in their study reported majority of the blood transfusion in age group of 21-30 years and age range of 1-89 years. Females were transfused more units of blood compared to males (57.8%). In studies conducted by **Sampat et al(14)** and **Bansod et al(18)** majority of females had transfused blood which is similar to our study. In contrast to present study, **Hulwan et al(12)** and **Reema et al(17)** reported male preponderance with male to female ratio of 1.25:1 and 1.3:1 respectively.

Blood Group- Majority of the transfusion requested were for O+ blood group (30.2%) followed by B+ (29.8%) and A+ (27.6%). Similar results were reported by **Hulwan et al(12)**, **Agrawal et al(19)** and **Venkatachalapathy et al(20)** with O+ was requested majority of time. In contrast to our findings, **Handa et al(15)** reported B Positive was the most common blood group supplied followed by O positive. **Reema et al(17)** in their study reported A+ was most demanded blood type and AB- were least.

Department And Indication For Transfusion- In present study majority of the blood transfusion were requested by department of medicine (36.3%) followed by Surgery (22.9%). Similar results were reported by **Hulwan et al(12)** and **Agrawal et al(19)**, that maximum transfusion was seen in the department of medicine. In contrast to our findings, **Sampat et al(14)** and **Venkatachalapathy et al(20)** reported majority of the transfusion were requested by Obstetrics and gynaecology department. **Vaghele et al(16)** in their study reported that majority of the blood units were issued to a gynaecology department, followed by medicine and paediatrics departments. Most common indications/diagnosis for blood transfusion was Anaemia (50.7%) followed by bleedings incidences (20.2%). Similar results were reported by **Hulwan et al(12)** and **Reema et al(17)** where most common indication was anaemia followed by bleeding disorders. Cryoprecipitate were used for bleeding incidences and used by medicine department only. In contrast to our findings, **Sampat et al(14)**, reported most common indication of blood transfusion was hepatic disorders. **Handa et al(15)** in their study reported most common indications as blood disorders.

The blood bank must be able to meet the demand for this life-saving product while also evaluating and assessing the current trends in blood ordering. For cost evaluations, designing local and regional blood donation programmes, and quality control of transfusion practise, it is crucial to periodically analyse and audit how blood components are

used in order to determine the trends in hospital blood usage. The study provides information on the utilisation of blood components and the need for blood in this teaching hospital. It is important to research the various component requirements in order to optimise component separation and prevent shortages and waste. To accomplish judicious usage of components, regular clinical meetings on transfusion medicine are required for the indication of various components. More of these studies are required to standardise component usage and enhance patient care.

Funding- No funding sources

Limitations- The study reflects to the findings of a specific geographical area.

Conflicts of interest- No potential conflict of interest relevant to this article was reported

Ethical Approval- Approved

Acknowledgement- The authors recognise the invaluable assistance provided by the scholars whose publications are mentioned and included in the manuscript's references.

Blood Component Result

Table 1: Age group wise distribution of total transfusions

Age Group	Count	Column N %
< 10 years	166	12.20%
10 - 20 years	308	22.60%
21 - 30 years	233	17.10%
31 - 40 years	205	15.10%
41 - 50 years	202	14.80%
51 - 60 years	199	14.70%
> 60 years	48	3.50%
Total	1361	100.00%

Fig 1: Age group wise distribution of total transfusions

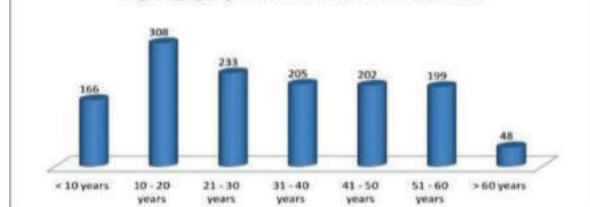


Table 2: Gender-wise distribution of total transfusions

Gender	Count	Column N %
Male	574	42.2%
Female	787	57.8%
Total	1361	100.0%

Fig 2: Gender-wise distribution of utilization of total transfusions

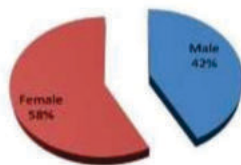


Table 3: Blood group wise distribution of total transfusions

Blood Group	Count	Column N %
A+	376	27.6%
B+	405	29.8%
AB+	107	7.9%
O+	411	30.2%
A-	7	.5%
B-	22	1.6%
AB-	5	.4%
O-	28	2.1%
Total	1361	100.0%

Fig 3 Blood group wise distribution of utilization of total transfusions

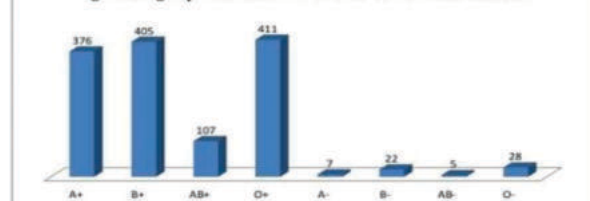


Table 4: Utilization of blood and blood components in study period

Type of Blood Product Issued	Frequency	Percentage
Whole blood	20	1.5%
Packed Cell Volume	936	68.8%
Fresh Frozen Plasma	224	16.5%
Platelet	178	13.1%
Cryoprecipitate	3	.2%
Total	1361	100.0%

Fig 4: Utilization of blood and blood components in 18 months

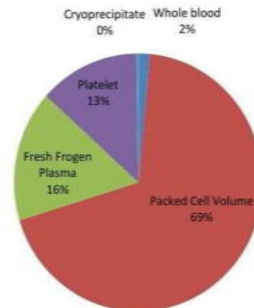


Table 5: Frequency of indications of blood transfusion

Indication	Count	Column N %
Bleeding	275	20.20%
Anaemia	690	50.70%
Thalassaemia	10	0.70%
Malignancy	83	6.10%
Shock	48	3.50%
Dialysis	23	1.80%
Operative	232	17.00%
Total	1361	100.00%

Fig 5: Frequency of indications of blood transfusion

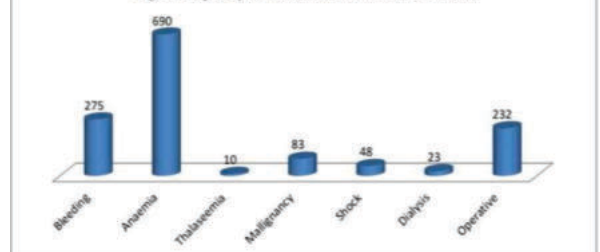


Table 12: Trend of different blood and blood components throughout the year (monthly)

Month	Type of Blood Product Issued				
	Whole blood	Packed Cell Volume	Fresh frozen Plasma	Platelet	Cryoprecipitate
Jan	0	65	21	11	0
Feb	3	76	23	18	1
March	1	84	12	13	2
April	2	87	19	20	0
May	3	75	22	16	0
June	2	77	25	10	0
July	1	76	16	13	0
Aug	2	74	21	19	0
Sep	1	75	21	18	0
Oct	0	79	17	10	0
Nov	2	77	16	16	0
Dec	3	91	11	14	0

Fig 12: Trend of different blood components throughout the year (monthly)

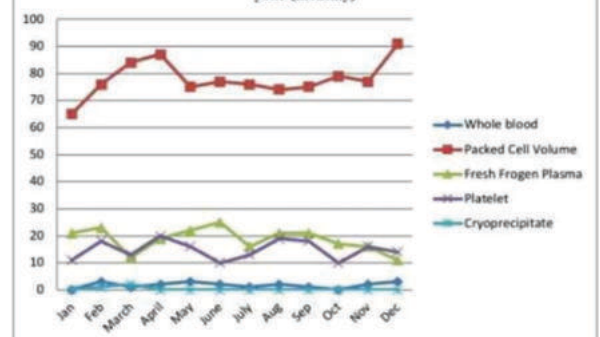


Table 13: Association between indication and blood product issued

Indication	Type of Blood Product Issued									
	Whole blood		Packed Cell Volume		Fresh Frozen Plasma		Platelet		Cryoprecipitate	
Bleeding	0	0.0%	1	.1%	180	80.4%	91	51.1%	3	100.0%
Anaemia	8	40.0%	671	71.7%	0	0.0%	11	6.2%	0	0.0%
Thalassemia	0	0.0%	10	1.1%	0	0.0%	0	0.0%	0	0.0%
Malignancy	0	0.0%	43	4.6%	13	5.8%	27	15.2%	0	0.0%
Shock	4	20.0%	32	3.4%	9	4.0%	3	1.7%	0	0.0%
Dialysis	0	0.0%	23	2.5%	0	0.0%	0	0.0%	0	0.0%
Operative	8	40.0%	156	16.7%	22	9.8%	46	25.8%	0	0.0%
Total	20	100%	936	100%	224	100%	178	100%	3	100%

Table 14: Association between indication and blood product issued

Clinical Diagnosis	Type of Blood Product Issued									
	Whole blood		Packed Cell Volume		Fresh frozen Plasma		Platelet		Cryoprecipitate	
Bleeding	0	0.0%	1	0.4%	180	65.5%	91	33.1%	3	1.1%
Anaemia	8	1.2%	671	97.2%	0	0.0%	11	1.6%	0	0.0%
Thalassemia	0	0.0%	10	100.0%	0	0.0%	0	0.0%	0	0.0%
Malignancy	0	0.0%	43	51.8%	13	15.7%	27	32.5%	0	0.0%
Shock	4	8.3%	32	66.7%	9	18.8%	3	6.3%	0	0.0%
Dialysis	0	0.0%	23	100.0%	0	0.0%	0	0.0%	0	0.0%
Operative	8	3.4%	156	67.2%	22	9.5%	46	19.8%	0	0.0%
Total	20		936		224		178		3	

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