



Original Research Article

Utilization of blood and blood products in a tertiary care hospital- A descriptive cohort study

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ABSTRACT

Introduction: Blood is a specialized bodily fluid that delivers necessary substances to the body's cells, such as oxygen and nutrients and transports waste products away from these cells. It is composed of cells (red blood cells, white blood cells and platelets) and plasma. Till date no substitute of blood is formed therefore transfusion of donated blood is the mainstay of treatment in medical or surgical conditions. Blood must be transfused while keeping precautions because, blood and its components can cause side effects in recipient such as transfusion reactions or transmission of transfusion transmissible disease like HbsAg, HCV, HIV, Syphilis and malaria. It is very important for clinicians to be aware of these potential risks and hence blood should be transfused in conditions where it is needed only. This study aims to evaluate the pattern of blood component usage, its demand and utilization in a tertiary care hospital.

Materials and Methods: This is a retrospective cohort study in which data concerning request and utilization of blood and its products from January 2019 to December 2019 in blood bank of tertiary care hospital were collected and analyzed.

Results: The blood units issued were 5190. Packed red blood cell was the most utilized product. Supply of blood was maximum to the surgical wards followed by medicine ward. The patients of anemia followed by surgery required packed red blood cells mostly. Most common indication for blood products was anemia.

Conclusions: Periodic review of blood component usage is important to assess the utilization pattern of blood in any hospital.

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1. Introduction

Blood is a specialized bodily fluid that delivers necessary substances to the body's cells, such as oxygen and nutrients and transports waste products away from these cells. It is composed of cells (red blood cells, white blood cells and platelets) and plasma. Plasma contains coagulation factors.¹⁻⁸ Blood must be collected into sterile, single use, FDA licensed containers.¹ The blood should be drawn from an area which is free of any skin lesions, and the phlebotomy site should be decontaminated properly. The site is scrubbed with a soap solution, followed by the application of tincture of iodine or iodophor complex solution. The selection of the venipuncture site and its decontamination is an important

step in preventing bacterial contamination which is a fatal blood transfusion reaction. Till date no substitute of blood is formed therefore transfusion of donated blood is the mainstay of treatment in medical or surgical conditions. In 1818 James Blundell first performed blood transfusion successfully.² Blood component therapy has gained interest in recent years as it is better than whole blood transfusion because it reduces volume overload in patients, has greater shelf life and better patient management.³ In between 1950-1960 blood component therapy was introduced, to maximize the benefits of all components present in the whole blood.⁸⁻¹⁶ In developing countries it is essential to make an efficient use of blood as there are limited resources of blood and increase demand in community.¹¹ Data on the use of blood products are limited and studies have revealed that in both developing and developed countries there is high

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proportion of inappropriate use of blood transfusion.³ Blood must be transfused while keeping precautions because, blood and its components can cause side effects in recipient such as transfusion reactions or transmission of transfusion transmissible disease like HbsAg, HCV, HIV, Syphilis and malaria. It is very important for clinicians to be aware of these potential risks and hence blood should be transfused in conditions where it is needed only. This study aims to evaluate the pattern of blood component usage, its demand and utilization in a tertiary care hospital.

2. Materials and Methods

This is a retrospective cohort study in which data concerning request and utilization of blood and its products from January 2019 to December 2019 in blood bank of tertiary care hospital were collected and analyzed. Data of monthly requirement and its utilization was collected from record books of blood bank. It included cross matched and issue units of blood and its products. We also studied utilization of blood and its products in various department of hospital including surgery, gynecology, orthopedics, ENT and other nonsurgical departments like medicine, nephrology, neurology etc. Data also included gender of transfusion recipient. The data so obtained was fed into Microsoft excel sheet for further analysis.

3. Results

The total number of whole blood and its products issued from our blood bank in 1 year (1st January 2019 to 31st December 2019) was 5190 units; with a monthly average of 432 units. The supply showed some seasonal variation, with lesser units supplied near year beginning and peak observed around end of the year (Table 2).

Most common blood group for which blood was issued was A positive (n=816 units) and least were of AB negative (n=40 units) (Table 3).

A breakup of the supply for whole blood and various components (n = 5190) showed that packed red blood cells (n = 2740) was the maximum utilized product followed by fresh frozen plasma (FFP) and platelet concentrates than whole blood (Table 1). Supply of blood was found to be more in the surgical wards forming 21.49% of total supply followed by general medicine (20.44%).

Male: female ratio of the patients was 1.3:1. The most common diagnosis for patients requiring blood products was anemia (43.80%); followed by surgery (25.55%) and trauma (17.88%) (Table 6). The total demands for whole blood were 390 out of 5190 cases.

Males (56.64%) consumed more blood components than female (43.35%). Male:female ratio is 1.3:1.

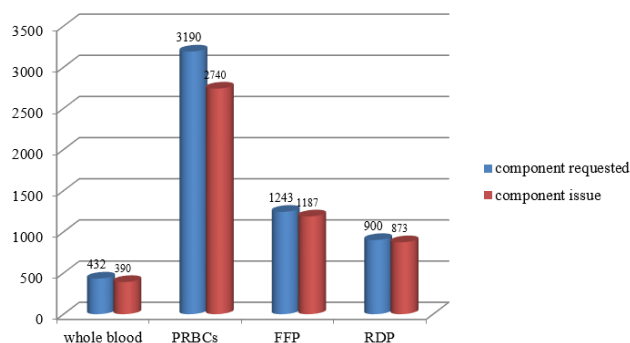


Fig. 1: Blood component distribution

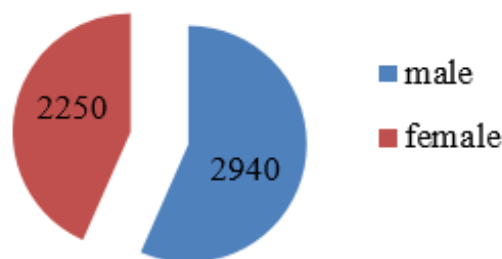


Fig. 2: Comparison of utilized blood component between male and females

4. Discussion

Blood transfusion is an integral part of health services. Even today clinician demand for whole blood which should be discouraged as effective use of blood with minimal wastage should be the goal so that those who are need can get blood.^{15,16}

In the present study we received 5765 requests and 5190 units were issued after proper cross matching and screening. In our study males received more blood transfusion units than female, this is similar to the studies done by Mathew et al,² Bansod et al.¹⁷ We noted 390 units of whole blood utilized among total 5190 blood units which is contrary to Joshi et al. who found increased number of whole blood utilization compared to other components. Anshoo et al.¹⁸ and Venkatachalapathy and Subhashish³ also found similar results as our study which showed increased utilization of packed red cells among blood components. But Ambroise et al.⁴ showed increased issue of FFP and Platelets in relation to PRBC. Ahmaed and Save¹⁹ noted increased utilization of PRBC (74.9%) among paediatric patients while Venkatachalapathy and Subhashish noted highest utilization of blood units by gynaecologic department. In the present study, majority of the blood units were issued to general surgery department which constituted 589 units among total 5190 units. This was followed by medicine

Table 1: Blood component wise distribution

S.No	Blood component	Whole blood	PRBC	FFP	RDP	Total
1	Component required	432	3190	1243	900	5765
2	Component issue	390	2740	1187	873	5190

Table 2: Utilization of blood and blood products in one year

Month	Whole blood	PRBCs	FFP	RDP	Total
January	33	162	92	28	315
February	24	182	62	10	278
March	34	123	65	15	237
April	22	231	92	58	403
May	23	290	115	67	495
June	30	255	106	62	453
July	42	250	101	66	459
August	35	260	142	94	531
September	36	232	91	89	448
October	42	359	112	178	691
November	37	191	87	135	450
December	32	205	122	71	430

Table 3: Comparison of most utilized blood (PRBCs) according to blood group

S.No	Type of blood group	Utilization of blood (PRBCs)
1	A+ve	816
2	B+ve	780
3	O+ve	508
4	AB+ve	447
5	A-ve	55
6	B-ve	42
7	O-ve	52
8	AB-ve	40
Total		2740

Table 4: Comparison of various wards for blood utilization

S.No	Various wards	PRBCs (n=2740)	Most utilized blood product (PRBCs) %	FFP (n=1187)	RDP (n=873)
1	General surgery	589	21.49	226	145
2	Trauma centre	490	17.88	129	56
3	Orthopedics	301	10.98	167	134
4	Neurosurgery	100	3.66	34	22
5	Gynecology	155	5.67	55	65
6	Otolaryngology	120	4.38	19	34
8	Cardiothoracic surgery	150	5.47	154	78
9	General medicine	560	20.44	201	265
10	Nephrology	43	1.55	46	23
11	Pediatrics	32	1.18	65	12
12	Others	200	7.30	101	39

Table 5: Comparison between various diseases for most utilization of blood (PRBCs=2740)

S.No	Various disease	Blood utilized(units)	%
1	Anaemia	1200	43.80
2	RTA	490	17.88
3	Pregnancy	20	0.73
4	Post operative	300	10.95
5	Emergency	30	1.09
6	surgery	700	25.55

Table 6: Various disease of utilization of FFP and RDP

Disease	FFP (n=1187)	RDP (n=873)	WB (n=390)
Anaemia	34	12	102
Trauma	313	373	78
Labour/child birth	121	56	32
Surgery	442	182	45
Postoperative	232	124	43
Emergency	45	126	90

It is shown that FFP and RDP are used mostly in surgeries.

and trauma which showed nearly equal distribution of blood units (560 and 490 respectively). The majority of the blood requested was a positive for both females and males. For PRBC as well as other blood components most common indication was Anemia. In studies conducted by Babita et al., Subham et al., Mathew et al.² and Bansod et al.¹⁸ majority of females had transfused blood which is contrary to our study. In studies conducted by Subham et al., Dushyanth et al.,²⁰ Girian S S et al.²¹ and Joshi et al.²² showed that whole blood was most common used blood component which was contrary to our study. Alcantara et al.¹⁶ found medicine department utilizing maximum number of blood units. Study conducted by Subham et al showed that the most common indication for whole blood and PRBC was Anemia which is similar to our study.

Whole blood and its components are considered as drugs by the Food and Drug Administration (FDA) as its use produce therapeutic benefits to the patient. Thus FDA emphasizes on the quality of blood and its products and apply various standards to the collection, testing, storage and supply of safe blood. Indications for blood usage have been changed with time. In the post-World War II era, blood transfusion indication was a Hb level less than 10 g/dl. Presently, better guidelines have been suggested according to the specific need of patient. It is now a standard practice of blood bank to manufacture different blood components from donated whole blood units and supply only specific components thereafter to patients which they need.^{23–26} However, use of whole blood is recommended in certain situations, One such situation is polytrauma, as in road accident casualties and hypovolemia (class III and IV). Whole blood is needed in an actively bleeding case with loss of more than 25% of total blood volume or an active bleeding patient who has already received 4 units of PRBC, as it not only replenishes the blood volume and oxygen-carrying capacity, but also prevents dilution of coagulation factors too.

It is very important to consider that in cases of anemia the values of Hb and hematocrit is important to note before blood transfusion and correlate the clinical condition of the patient.²⁷ Misuse of PRBC can also be avoided in patients whose Hb or hematocrit can be improved by other means like diet, hematinics, etc. Clinicians often transfuse 1 or 2 units of blood to more to severely anemic patients,

which actually brings no benefit to these patient as it does not increase the Hb or oxygen carrying capacity significantly but introduces several foreign antigens in the blood circulation of the recipient. Similarly in cases of shock, sometimes blood is transfused in class I and II, where it is not recommended according to WHO guidelines. Cases where there is established hypovolemia of class II and above and showing only transient or no improvement need to be transfused blood.^{28,29} In the case of FFP, it is recommended to transfuse 5–6 units to correct the hemostatic defect which is due to clotting factor deficiency.²⁴

In surgical cases blood and blood components are often ordered more than needed due to anticipated loss than actual one. This practice, to hold a ration of cross matched blood for operative cases in advance to combat any unforeseen complications during or after operation is not good as often this blood is not used and causes wastage of blood. for such situation in which there is an anticipation of use of blood a better option would be to keep a reserve of blood in the Blood bank itself and not in the ward, which can be supplied to the patient on demand and if not utilized, can be used for other patients who is in need. Thus inappropriate use of blood should be avoided.

Over the last two decade use of platelet is increased due to its ready availability, which helps in managing acute hematological and malignancy conditions.¹⁷

Autologous transfusions importance should be emphasized to ensure availability of patient's own blood which is most effective and immunologically safe for him.

5. Conclusion

This study gives information on blood component usage in our tertiary care hospital. It demonstrates the trend of utilization of blood and blood components, cost analyses Packed red blood cell (PRBCs) was the maximum utilized product followed by FFP, platelet concentrates and then least is whole blood. Supply of blood was found to be highest in the surgical wards. The most common diagnosis of patients requiring blood was anemia followed by surgery. Overall, anemia was the most common indication. Packed red blood cell is used in plenty at our center as it caters to a large number of anemia cases.

Periodic assessment of blood usage followed by educational sessions for clinicians is recommended to prevent its overuse or misuse, which may lead to shortage of blood to someone in a life-threatening situation as blood demand is high than its supply. Our study has limitations because our data is derived from a single center and represents only a small proportion of the North India population. Well-designed national studies are essential to formulate guidelines to improve transfusion practices and understand the variation in transfusion practices in India.

6. Source of Funding

None.

7. Conflict of Interest

None.

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