

How to Cite:

Riaz, H., Shah, M. A., Idrees, M., Ayaz, K., & Shah, H. (2022). Pattern of blood components utilization in Hayatabd medical complex: A Provincial tertiary care hospital of Pakistan. *International Journal of Health Sciences*, 6(S8), 5949–5957.
<https://doi.org/10.53730/ijhs.v6nS8.13671>

Pattern of blood components utilization in Hayatabd medical complex: A Provincial tertiary care hospital of Pakistan

Huma Riaz

MBBS, DCP, FCPS (Haem.), Assistant Prof. Haematology, Dept. of pathology, Hayatabad Medical Complex. Peshawar
Email: humariaz82@yahoo.com

Munawwar Ali Shah

MBBS, FCPS (Haem.), Assistant Prof. Haematology, Dept. of pathology Northwest School of Medicine, Peshawar

Muhammad Idrees

MBBS, M Phill (Haem.), Associate Prof Haematology, Dept. of Pathology Khyber Medical College, Peshawar
Corresponding author email: dr.idreeskhan2036@gmail.com

Kinza Ayaz

MBBS, M.Phil, Resident [FCPS II (Haem.)], Dept. of Pathology Hayatabad Medical Complex, Peshawar

Hamidullah Shah

MBBS, FCPS (Histo.), Associate Prof. Histopathology, dept. of Pathology Northwest School of Medicine, Peshawar

Abstract---Objectives: The objective of the present study was to review the blood components acquisition patterns and practices of transfusion in a tertiary care hospital. Material and Methods: An observational cross sectional retrospective study was conducted in the blood bank of Hayatabad Medical Complex (HMC) Peshawar, for a period of six months. The requisition forms for blood components and details of patients acquiring blood products for transfusion recorded in HMC blood bank Blood components issue register were the sources of data. The data was analyzed using software SPSS version 20. Results: In the study period of six months a total 16025 blood components were transfused with an average of 2670 units per month. whole blood was the maximum blood product transfused and followed by RCC, platelets and FFPs are least utilized blood products. Among total patients 50 % were males while 50% were females.

Pediatric units utilized maximum (21.2%) units followed by Gynae/Obs. (19.1%), Medical units demanded 16.7% , Accident and Emergency (A&E) unit 14.1%, surgical units 8.8% , intensive care unit (ICU) 6.8%, Orthopedic units consumed 3.3% , cardiology 3.1%, gastroenterology 2.6 % , oncology 2.4% and endocrinology consumed 1.5 %. Among the positive blood groups B+ was the most frequently utilized contributed 35.7% followed by O+ (25.3 %), A+ (23.9%) and AB+ was the least utilized blood group contributing 8.4% of the total blood components. Among the negative blood groups, A- (2.4 %) > O- (2 %) > B - (1.3 %) and B- (0.9 %) was the least utilized blood group in our study. Conclusions: The study statistics on the usage of blood component are highly valuable to plan awareness sessions in the units of maximum consumption for reducing the overutilization and thus can be available in units for essential needs. Also, it provides a data of blood groups most frequently utilized, which is of great help to maintain the blood components stock in the blood bank for a smooth response of blood components availability in an emergency situation.

Keywords---pattern, transfusion, blood components, red cell concentrates, platelets, fresh frozen plasma.

Introduction

Blood is a specialized biological fluid. Its main function is to supply nutrients and remove metabolic wastes from the cells. It is made up of two components plasma and cells. The cellular component further contains red blood cells, white blood cells and platelets, while plasma contains coagulation factors. Blood is essential for human survival. (1) Blood transfusion is a widely used, indispensable technique while handling various medical and surgical illnesses. (2) Just like medications use, blood transfusion also carry undesirable side effects. The side effects varies from transfusion transmitted infections to introduction of donor antigens in the recipient, and transfusion reactions. (3) Blood transfusions demand its judicial use keeping in view its scarcity and significance in health care facilities and minimizing the risks associated with transfusions. (4)

The World Health Organization recommends the sensible use of blood and blood products to decrease excessive transfusions and reduce the risks associated with it. To take full advantage of the efficiency and safety, clinicians should be well-informed about the likely hazard of blood component therapeutic use. (5) Continuous monitoring of blood transfusion practices in the form of clinical audit of blood banks is the need of time for assurance of effective patient management in the hospitals. (6) Through clinical audit, the evaluation and validation of suitability and efficacy of transfusion therapy can be done. It can also be an essential part of the quality assurance program which can deliver essential facts for improvements in practice of transfusion medicine. (7) Effective application of blood bank facilities by repeated auditing is fundamental; however, very little literature is available for blood utilization in Pakistan. The researchers aimed to review the blood ordering patterns and transfusion practices, and blood bank audit effectiveness at a single center in Pakistan.

Material and Methods

It was an observational cross sectional retrospective study conducted in the blood bank of Hayatabad medical Complex Peshawar, a tertiary care hospital of capital city of Khyber pakhtoonkhwah province of Pakistan. Duration of our study was six months in total from January 1st to June 30th, 2022. The study included all the consecutive patients who were admitted and received blood components transfusion in inpatient, emergency/trauma and intensive care units. All transfusions done and included in our study were allogenic. Those patients on regular blood components transfusions, registered in hospital haematology day care unit were excluded from the study.

The number of all blood components issues to all hospital units during the study period that was six months interval of our study was recorded. Of all, one month, the data of which was closest to the average monthly blood supply of the six months, was chosen as a representative month. All details of the blood components recipients in this representative month were recorded. The requisition forms for blood components and details recorded in HMC blood bank Blood components issue register were analyzed to obtain information about the total number of all components issued during six months interval and further details included gender, department of admission, unique hospital identification number, bed number of the patient, type of blood component issued, blood group of the blood component issued, number of blood components issued in the representative month selected. Data was analyzed using software SPSS version 20. Frequencies and percentages were calculated for categorical variables like gender, units of blood components, type of blood group of the issued blood components and the hospital units received number of blood components.

Results

During the study period of six months (Jan 1st to June 30th 2022), total number of the blood components utilized by various hospital units was 16025, including whole blood, Red Cell Concentrates (RCC), Platelets, Fresh Frozen Plasma(FFP) ; with a monthly average of 2670 units. For our study data was collected for a month (i.e.; May,2022)the blood supply of which (n=2671units) was closest to the calculated monthly average(n=2670 units).(table#1). A breakup of the supply for all blood components revealed that whole blood (n=744) was the maximum utilized blood component followed by RCC (n=727), Platelets (n=703) and then FFPs (n=497).(table#3} Among total 2671 patients receiving blood components , 1335(50 %) were males while 1336 (50%) were females.(table# 2)

Utilization of the blood components was found maximum by the pediatric units forming 566 (21.2%) units, including RCC 162 units, Platelets 182 units, FFPs 217 units and 05 units of whole blood transfusions. Gynecology units were the second in the list of utilizing the maximum blood components of 510 (19.1%) ,including 62 RCC , 64 PLATLETS , 44 FFPs and 340 units of whole blood. Medical units demanded 466(16.7%) followed by Accident and Emergency (A&E) unit utilizing 378 (14.1%) units while surgical units consumed 235 (8.8%)of the total blood components followed by intensive care unit (ICU) utilizing 181(6.8%),

Orthopedic units consumed 88 (3.3%) , cardiology 81(3.1%), gastroenterology 70 (2.6 %), oncology 65(2.4%) and endocrinology 40(1.5 %) (table# 3) &(chart#1)

Among the positive blood groups , B+ was the most frequently utilized blood group, contributed 954 (35.7%) of the total 2671 units followed by O+ blood group utilized 676 (25.3%) units, A+ 639(23.9%) and AB+ units utilized were 225(8.4%)of the total blood Components. Among the negative blood groups , A- was the frequent most utilized blood group , forming 65 (2.4%) followed by O- which is contributing 55(2%) of the units transfused. Blood groups AB- and B- were the least utilized blood groups contributing only 23(0.9%)and 34(1.3%)units transfusion respectively. (Table # 4) & (chart#2)

Table 1
Total Units Of Blood Components Utilized Per Month

S.NO	MONTH	WHOLE BLOOD	RCC	FFP	PLATELETS	TOTAL
1.	JAN,22	826	747	361	907	2841
2.	FEB,22	700	626	354	843	2523
3.	MAR,22	822	734	401	794	2751
4.	APR,22	791	721	337	836	2685
5.	MAY,22	744	727	497	703	2671
6.	JUN,22	684	608	409	853	2554
TOTAL AVERAGE						16025 2670

Table 2
Gender Wise Utilization Of Blood Components (%)

	Gender	Frequency	Percent
Valid	MALE	1335	50.0
	FEMALE	1336	50.0
	Total	2671	100.0

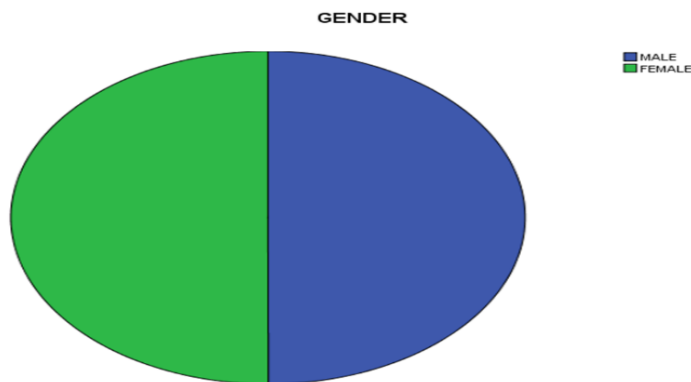


Table 3
Hospital Wards Wise Utilization Of Blood Components

HOSPITAL WARDS	COMPONENT				Total	Percent %
	RCC	PLATELETS	FFP	W.BLOOD		
SURGERY	108	0	32	95	235	8.8
ORTHOPEDIC	26	0	0	62	88	3.3
GYNAECOLOGY	62	64	44	340	510	19.1
TRAUMA/ ER	10	132	36	200	378	14.1
CARDIOLOGY	81	0	0	0	81	3.1
OTHERS	8	0	0	3	11	0.4
MEDICAL	134	190	122	0	446	16.7
PEDIATRICS	162	182	217	5	566	21.2
ONCOLOGY	26	39	0	0	65	2.4
ENDOCRINOLOGY	24	0	0	16	40	1.5
GASTENTEROLOGY	47	0	0	23	70	2.6
INTENSIVE CARE UNIT (ICU)	39	96	46	0	181	6.8
Total	727	703	497	744	2671	100

Chart #1
Ward Wise Utilization Of Blood Components (%)

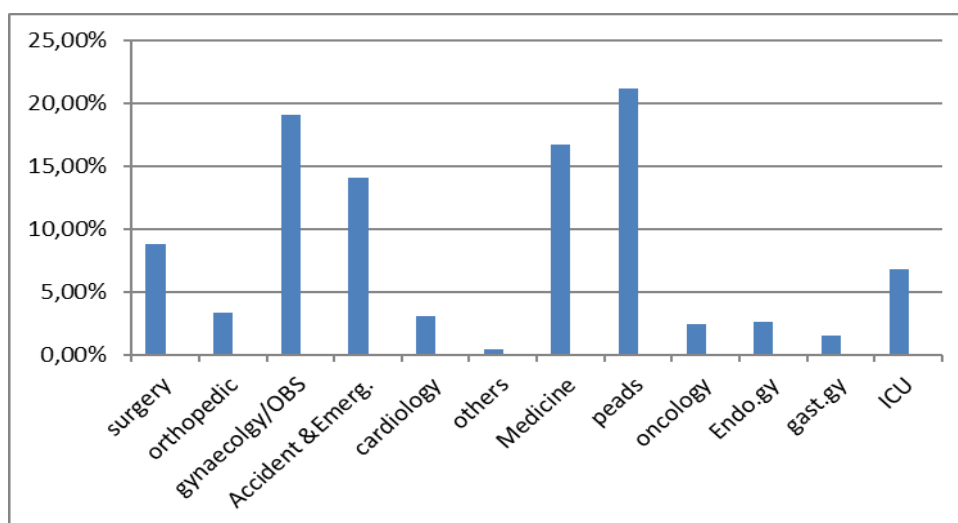
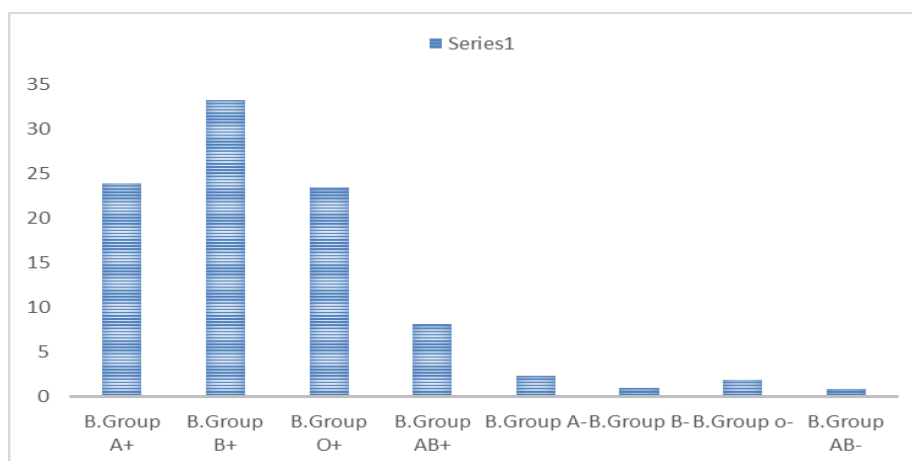


Table 4
Blood Group Wise Utilization Of Blood Componentets

BLOOD GROUPS	FREQUENCY	PERCENT
A+	639	23.9
B+	954	35.7
O+	676	25.3
AB+	225	8.4
A-	65	2.4
B-	34	1.3
O-	55	2
AB-	23	0.9
Total	2671	100.0

Chart#2
Blood Group Wise Utilization of Blood Components (%)



Discussion

An un-judicial use of blood and its components is on a rise. It can either be due to easy availability of blood bank services or inadequacy of knowledge of transfusion guidelines or both. Clinical audits are essential part of quality control and management of blood bank products. Whole blood and its components are used as therapeutic drugs for treatment of different ailments. Therefore, the quality assurance regarding its collection, storage and use is inevitable. Clinical audits are an important aspect of blood banking to ensure safe and effective blood components availability in life threatening situations and elective situation as well. The significance of an internal audit has been highlighted by many authors. They have also reported a decline in unnecessary transfusions and use of proper blood components with these audits followed by many awareness and educational sessions for clinicians (3).

Hayatabad Medical Complex (HMC) is a tertiary care hospital with a multitasking blood bank. Most of the units from our blood bank were issued to Paediatric wards of our hospital 21.2 %. Being a tertiary care hospital of the capital city of our province, it caters all kinds of complicated cases from the whole KP. Mostly FFPs units were utilized by Pediatric ward. Ambroise et.al. also showed maximum use of FFPs (8), however, Ahmad et. Al. showed maximum use of RCC as compared to other components (9). The issuance of blood and blood components based on gender are almost equal with 50% either male or females.

Second highest number of blood components were issued to Gynae and Obstetrics ward which was 19.1 % of total blood components utilized. This highlights the poor socioeconomic status and ignorance of majority of our population where lack of antenatal supplementation and improper nutrition leads to low hemoglobin prenatally and is the major cause of blood components transfusions in the concerned units of the hospital. Gynae/Obs. ward had maximum number of whole blood transfusions which is in contrast to that reported by Vaghela KV et al who reported maximum Red Cell Concentrates and only 1.5% whole blood transfusions by Gynae/ obstetric unit of the hospital. (10) This finding highlighting a major need of awareness among these units to avoid whole blood transfusions and switch over to RCC for the correction of anemia.

The indications for RCC and platelets and FFPs use are different. For RCC its Hb less than 8gm/dl, or decreased oxygen carrying capacity due to bleeding and also cases of chronic anemias. Similarly, platelet counts $<20 \times 10^3/\mu\text{l}^3$; or a case posted for operative procedure in <12 hours with platelet counts $<50 \times 10^3/\mu\text{l}^3$, are indications for transfusion of platelet concentrates. Indications for Fresh Frozen Plasma (FFP) are activated Partial Thromboplastin time (aPTT) more than 60 seconds; Prothrombin Time (PT) more than 16 seconds or clotting factors deficiency disorders with bleeding episodes.(11,12) . In this study Whole blood (27.9%) and RCC (27.2%) were the maximum utilized components followed by platelets concentrates (26.3%) and then FFPs (18.6%).

In the present study, General medicine wards were found third most frequently blood components utilizing units of the hospital, contributing to 16.7% of the whole blood components consumption compared to surgical wards using only 8.8% monthly. Results of our study are complementary to the study done by Gaur DS, Negi G, et.al, which concluded that the supply of blood components to medical units was high as compared to surgical unit. (3) Another study conducted by Tinegate, Chattree, et.al., also concluded that the supply to medical units was higher as compared to surgical units (13). Blood components utilization was found high in Accident & Emergency (A&E), 14.1% 4th among the list of most frequent consumer unit of blood components. The finding is justifiable by the fact that being a tertiary care hospital of the capital provincial city, there is a high turnover of patients to accident and trauma and thus the need of blood components transfusions.

The study found that the surgical unit was on 5th number in the blood components transfusion order contributing to 8.8% of the total transfusions completed. Most of them were RCCs. However, in surgical units the blood components ordered are usually on elective basis according to the need of the

patient. This leads to unnecessary burden on the blood bank staff for cross-matching and other investigation and can lead to scarcity of blood components for emergency patients. (14)

Blood group distribution is different regionally, ethnically, and from one population to another. Most of the blood components issued during our study interval belonged to blood group B+, which is followed by O+ and third highest being A+ blood group. Consistent to our study, a systemic review research study conducted by Rehman.GU et al revealed that the sequence of the distributions of blood groups in the Pakistani population is B > O > A and then AB is the least frequent blood group in the overall population of Pakistan and more than 90 percent of the population is Rh-positive. (15) Findings in various international studies revealed blood group O>B>A>AB in order of frequency from various countries. (16-19)

Conclusion

This pilot study illustrates statistics on the usage of blood component usage in our tertiary care hospital. It also gives an insight to the blood components used by different units of the hospital, which is very essential for quality management of transfusion medicine. Supply of blood was found to be highest in the Pediatrics ward followed by Gynae and Obs department. Awareness sessions must be sorted out for clinicians to make them aware of the blood utilization protocols for patients benefit whether elective or emergency cases. Also it provided a data of most frequent blood groups which was B+ > O+ > A+ and least frequently utilized blood group which was AB+. This information will be of great help to maintain the blood components stock in the blood bank for a smooth response of blood components availability in any emergency situation.

References

1. Agbana BE, Daikwo MA, Metiboba LO. Pattern of Blood Groups among Students of Major Ethnic Groups in Kogi State University, Anyigba-Nigeri. *Int J Curr Res Aca Rev*. 2015; 3:1-4.
2. Ahmed M, Save SU. Blood component therapy in pediatric intensive care unit in tertiary care center: an audit. *International journal of Contemporary Med Res*. 2016;3(5):1506-1510.
3. Ambroise MM, Ravichandran K, Ramdas A, Sekhar G. A study of blood utilization in a tertiary care hospital in South India. *J Nat Sci Biol Med*. 2015;6(1):106-110 Doi: 10.4103/0976-9668.149101
4. Bashwari LA, Al-Mulhim AA, Ahmed MS, Ahmed MA. Frequency of ABO blood groups in Eastern region of Saudi Arabia. *Saudi Med J*. 2001; 22:1008-12.
5. Carson JL, Guyatt G, Heddle NM, Grossman BJ, Cohn CS, Fung MK, et al. Clinical Practice Guidelines From the AABB: Red Blood Cell Transfusion Thresholds and Storage. *JAMA*. 2016;316(19):2025-35.
6. Chandrasekar M, Balakrishnan V, Ponnaiyan A, Ramachandran T. Audit of clinical use of blood products in a tertiary care hospital. *Journal of Hematology and Allied Sciences*.1.
7. Gaur DS, Negi G, Chauhan N, Kusum A, Khan S, Pathak VP. Utilization of blood and components in a tertiary care hospital. *Indian journal of*

- hematology & blood transfusion : an official journal of Indian Society of Hematology and Blood Transfusion. 2009;25(3):91-5.
8. Hillyer CD, Silberstein LE, Ness PM, Anderson KC (Eds.) (2003) Blood Banking and Transfusion Medicine. 2nd Edition, Churchill Livingstone, New York
 9. Hillyer CD, Silberstein LE, Ness PM, Anderson KC (Eds.) (2003) Blood Banking and Transfusion Medicine. 2nd Edition, Churchill Livingstone, New York
 10. Joshi RA, Ajmera JR, Kulkarni SA, Bindu SR, Kulkarni SS (2014) Observational study in Utilization of blood and blood products at tertiary care centre. International Journal of Health Sciences and Research 4:38-47.
 11. Karim S, Hoque MM, Begum HA, Rahman SM, Shah TA, Hossain SZ. The distribution of ABO and Rhesus blood groups among blood donor attending transfusion medicine department of Dhaka Medical College Hospital in 2014. J Dhaka Med Coll. 2015; 24:53-6.
 12. M. Ahmed, A. Memon, K. Iqbal, Distribution pattern of ABO and Rhesus blood groups among different ethnic population of Karachi. JPMA. October 2019; 69(10) : 1474-78
 13. Periyavan S, Sangeetha SK, Marimuthu P, Manjunath BK, Seema DM. Distribution of ABO and Rhesus-D blood group in and around Bangalore. Asian J Transfus Sci. 2010; 4:41.
 14. Rehman GU, Hong Shi *et al.* ABO AND RH (D) BLOOD GROUPS DISTRIBUTION IN PAKISTAN: A SYSTEMATIC REVIEW, *Int. J. Pure Appl. Zool.*, 9(1):1-9, 2021
 15. Sharma A, Parveen H, Ranga S, Arora R. Assessment of Appropriate Use of Blood Products in a Tertiary Care Center in India- An Audit Study. J Evid Based Med Healthc. 2020;7:1239-1244.
 16. Tinegate H, Chattree S, Iqbal A, Plews D, Whitehead J, Wallis JP. Ten-year pattern of red blood cell use in the North of England. Transfusion. 2013;53(3):483-9.
 17. Vaghela KV, Jokhi CD. Analysis of Blood Transfusion Request and Utilization Pattern at the Blood Centre of the Tribal District, Dahod, India. Cureus. 2022 May;14(5):e25237. DOI: 10.7759/cureus.25237. PMID: 35746990; PMCID: PMC9214831.
 18. World Health Organization (2001) The clinical use of blood in medicine, obstetrics, paediatrics, surgery & anesthesiology, trauma & burns. WHO Blood Transfusion Safety, Geneva
 19. Zafar, A., Sarosh, N., Saeed, T., Bashir, S. A Clinical Audit of blood component transfusion practices in the Paediatric intensive care unit of a Tertiary Care Hospital, Rawalpindi. Journal of Rawalpindi Medical College. 31 Mar. 2022; 26(1): 103-106.