

A Study of Utilization of Blood and Blood Components at a Tertiary Care Centre- A 5 Year Study

Farida Begum¹, Swathi Samalla², Mohd. Imran Ali³, M. Lavanya⁴

¹Associate Professor, Department of Pathology, Government Medical and General Hospital, Nizamabad

²Assistant Professor, Department of Pathology, Government Medical and General Hospital, Nizamabad

³Associate Professor, Department of Pathology, Government Medical and General Hospital, Nizamabad

⁴Associate Professor, Department of Pathology, Government Medical and General Hospital, Nizamabad

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Corresponding author: Dr M. Lavanya

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Abstract

Background: Blood is the most precious and unique gift that one human being can give to another human being. The blood transfusion service is the very vital component of healthcare services. Till date we are not able to prepare whole blood artificially and no effective substitute is invented, so blood donor is very precious. The primary responsibility of blood transfusion services is to provide safe, sufficient and timely supply of blood and blood products. The component separation has maximized the utility of one whole blood unit. The emphasis has shifted from the use of whole blood to component therapy, as blood is a scarce and precious resource.

Aim: Aim of the study is to analyse utilization of blood and blood products in government general hospital Nizamabad- A Tertiary care centre.

Materials and Methods: This is a retrospective study conducted in government general hospital, Nizamabad. The data regarding request and utilization of blood and blood products by various speciality departments at blood bank Government general hospital, Nizamabad were analysed from January 2017 to December 2021, over a period of 5 years.

Results: A total of 20983 blood units were issued over a period of 5 years. Packed red blood cell was the most utilized product. Supply of blood was maximum to the gynaecology wards followed by medicine ward. The patients of anaemia under obstetric care and those who have had surgery required packed red blood cells mostly. Most common indication for blood products was anaemia.

Conclusion: The periodic review of blood component usage is essential to assess the blood utilization pattern in any hospital or community. This is useful for blood transfusion services to provide safe, sufficient and timely supply of blood and blood products in the community.

Keywords: Tertiary Care Centre, Blood Products, Gynaecology, Obstetric Care, Transfusion

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Introduction

Blood transfusion services are an important part of the healthcare system since blood transfusion is required in a number of frequently occurring clinical situations: Major surgical procedures, including treatment of trauma patients, obstetric care with major bleeding during childbirth, and treatment of several medical diseases, especially haematological diseases [1]. Blood transfusion has come a long way from the early 20th century when it was a complex and risky procedure. Currently, transfusion medicine is a specialty in its own right. The primary responsibility of blood transfusion services is to provide safe, sufficient, and timely supply of blood and blood products. At the same time, the blood transfusion services should ensure that the blood donation is safe and causes no harm to the donor [2]. The emphasis has shifted from the use of whole blood to component therapy as blood is a scarce and precious resource. Currently, good clinical practice guidelines mandate transfusion therapy for specific well established indications and use of blood components rather than whole blood. The component separation has maximized the utility of one whole blood unit [3]. It is important for the blood bank to be able to fulfil the demands for this life-saving product and at the same time to evaluate

and assess the existing trends of blood ordering. Hence, periodic review of blood component usage is essential to assess the blood utilization pattern in any hospital.

Materials and Methods

This is a retrospective study conducted in Government General Hospital, Nizamabad. The data is collected regarding utilization of blood and its products from January 2017 to December 2021, over a period of 5 years in Blood Bank of Government General Hospital. And also data analysed regarding supply of blood and blood components to various departments and indication for transfusion. Blood is separated into blood components using Remi cold centrifuge machine in our blood bank to prepare FFP, cryo precipitate, Prbc and RDP.

Results

Present study is a retrospective study from January 2017 to December 2021, over a period of 5 years conducted at the Blood Bank of Government General Hospital Nizamabad. Whole blood was separated into blood components like packed RBC (PRBCs), Fresh frozen plasma (FFP), Random donor platelets (RDP). The total blood and blood components issue over a period of 5 years are 20983.

Table 1: Monthly utilization of blood and blood products in 2017.

Month 2017	Whole blood	Prbcs	FFP	RDP	Total
January	110	235	07	49	401
February	20	367	19	66	472
March	0	407	10	32	449
April	10	378	15	13	416
May	16	321	37	12	386
June	40	285	29	09	363
July	35	337	18	26	416
August	90	335	18	30	473
September	67	267	29	99	462
October	174	167	31	80	452
November	18	378	60	143	599
December	15	299	53	53	420
Total	595	3776	326	612	5309

In the year of 2017 total 5309 transfusions were done. Out of these 595 whole blood transfusions, 3776 packed RBC transfusions, 612 Random donor platelets, 326 Fresh frozen plasma transfusions were carried out.

Table 2: Monthly utilization of blood and blood products in 2018.

Month 2018	Whole blood	Prbcs	FFP	RDP	Total
January	22	338	38	48	446
February	50	309	15	3	377
March	78	307	45	18	448
April	0	363	18	24	405
May	65	354	32	33	484
June	34	330	28	17	409
July	68	361	25	12	466
August	97	295	30	54	476
September	103	295	17	53	468
October	87	295	16	34	432
November	197	175	30	05	407
December	54	235	12	14	315
Total	855	3657	306	315	5133

In the year of 2018 total 5133 transfusions were done. Out of this 3657 packed RBCs, 855 whole blood transfusions, 315 Random blood donars,306 Fresh frozen plasma transfusions carried out

Table 3: Monthly utilization of blood and blood products in 2019.

Month 2019	Whole blood	Prbcs	Ffp	Rdp	Total
January	64	254	26	0	344
February	120	210	21	0	351
March	105	147	13	0	265
April	59	220	16	0	795
May	173	76	02	0	251
June	109	97	9	0	215
July	20	182	15	03	220
August	1	191	15	23	230
September	13	193	19	100	325
October	7	377	36	161	581
November	6	274	26	100	406
December	1	273	55	32	361
Total	678	2994	253	419	4344

In the year of 2019 total 4344 transfusions were done. Out of this 2994 packed RBCs,678 whole blood transfusions 419 Random blood donars,263 Fresh frozen plasma transfusions carried out.

Table 4: Monthly utilization of blood and blood products in 2020.

Month 2020	Whole blood	Prbcs	FFP	RDP	Total
January	1	288	25	23	337
February	1	305	17	03	326
March	2	244	39	03	288
April	-	166	14	02	182

May	-	261	17	14	292
June	-	251	29	0	280
July	11	176	19	0	206
August	-	121	49	0	170
September	-	272	32	01	305
October	98	116	36	0	250
November	31	154	42	0	227
December	17	168	61	0	246
Total	161	2522	380	46	3109

In the year of 2020 total 3109 transfusions were done. Out of this 2522 packed RBCs, 161 whole blood transfusions, 46 Random blood donors, 380 Fresh frozen plasma transfusions carried out.

Table 5: Monthly utilization of blood and blood products in 2021.

Month 2021	Whole blood	Prbcs	Ffp	Rdp	Total
January	10	212	52	0	274
February	10	307	23	0	340
March	20	297	45	0	362
April	-	120	32	0	152
May	-	125	53	0	148
June	20	169	28	0	217
July	5	197	29	0	231
August	0	222	56	0	278
September	0	192	68	25	291
October	0	284	34	54	372
November	1	259	36	60	356
December	0	45	10	12	67
Total	66	2429	466	151	3088

In the year of 2021 total 3088 transfusions were done. Out of this 2429 packed rbc, 66 whole blood transfusions, 151 Random blood donors, 466 Fresh frozen plasma transfusions carried out.

A special note needs to be mentioned for the year 2020 and 2021. During the pandemic our Government General Hospital, Nizamabad served as a nodal centre for North Telangana. Although in

many centres the elective surgeries were minimised and also due to reduced RTA, the utility of blood and blood products was expected to decrease. But since ours was a nodal centre for covid and many obstetrics and gynaecology cases were managed. We saw a very marginal fall of 1000-1500 transfusions. We saw the same trend over the entire 2020 and 2021.

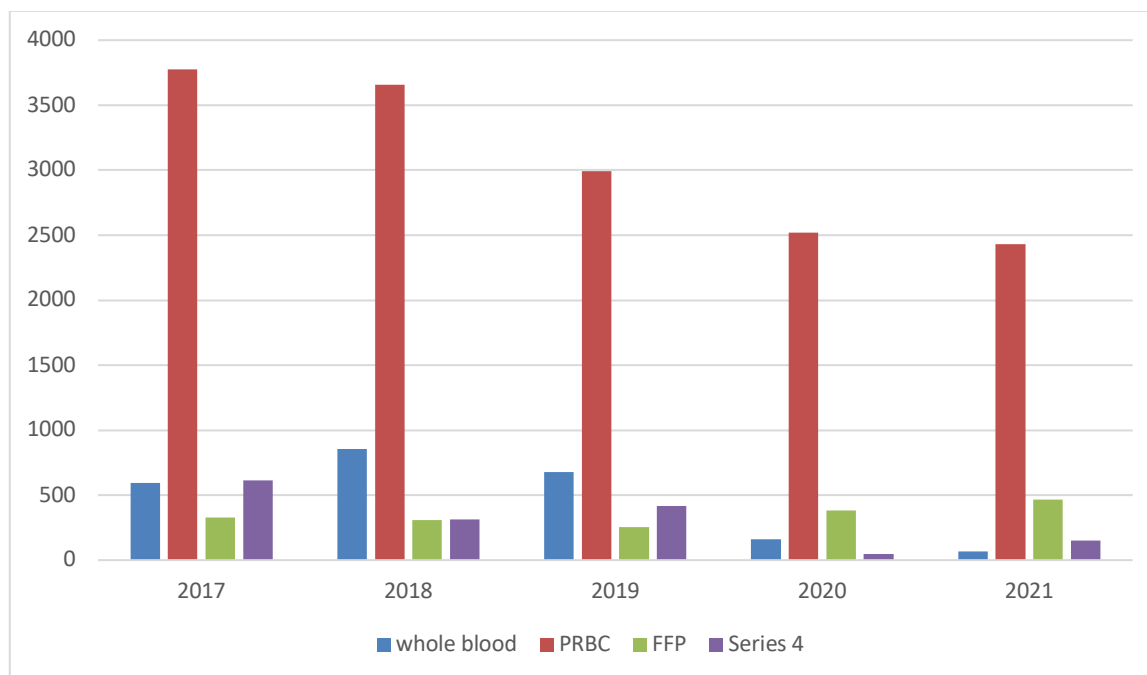


Figure 1: Utilization of blood component frequency during 5 years duration

Table 6: Utilization of blood component frequency during 5 years duration.

	2017	2018	2019	2020	2021	Total
Whole blood	595	855	678	161	66	2355(11%)
PRBC	3776	3657	2994	2522	2429	15378(73%)
FFP	326	306	253	380	466	1731(8.5)
RDP	612	315	419	46	151	1543(7.5%)
TOTAL	5309	5133	4344	3109	3088	20983

Most commonly utilized blood component during 5 years period of present study was PRBC. Total 15378 (73%) PRBC Transfusions were done followed by whole blood 2355(11%), FFP 1731 (8.5%) and RDP 1543(7.5%). The utilization of PRBC accounted for 73% of total transfusions.

Later, we analysed the most common blood group required among over patients, this would help over blood bank services to maintain and supply required blood groups to the patients.

Table 7: Blood group analysis of PRBCs over a 5 years period -2017 to 2022

Type of blood group	Utilization of blood (PRBCs)					Total
	2017 (3776)	2018 (3657)	2019 (2994)	2020 (2522)	2021 (2429)	
A+ve	680(18%)	805(22%)	479(16%)	630(25%)	532(22%)	3126(19%)
B+ve	1019(27%)	878(24%)	869(29%)	429(17%)	997(41%)	4192(25%)
AB+ve	792(21%)	696(19%)	718(24%)	505(20%)	368(15%)	3079(21%)
O+ve	1133(30%)	1170(32%)	838(28%)	858(34%)	522(21%)	4521(30%)
A-ve	57(1.5%)	36(1%)	15(0.5%)	25(1%)	0	133(1.5%)
B-ve	38(1%)	18(0.5%)	15(0.5%)	25(1%)	0	96(1.1%)
AB-ve	0	18(0.5%)	0	0	0	18(0.4%)
O-ve	57(1.5%)	36(1%)	60(2%)	50(2%)	10(1%)	213(2%)

Most common utilized blood component was PRBC 15378, and most common issued blood group was O positive 4521(30%), and least common issued was AB negative 0.4%.

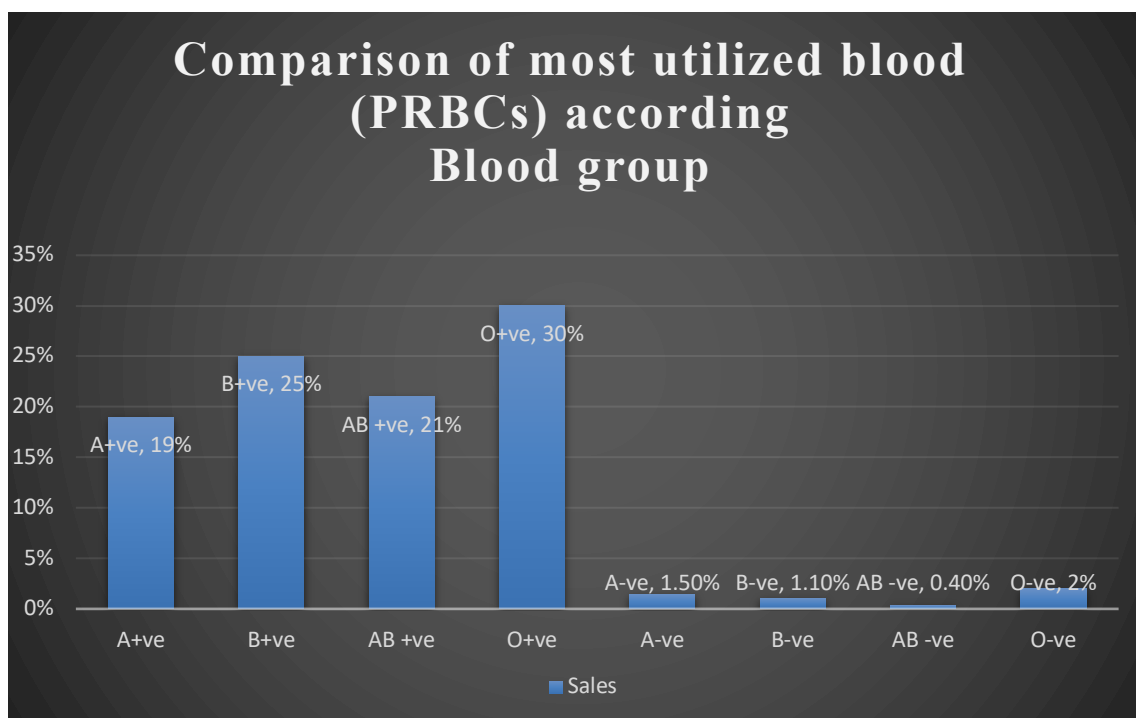


Figure 2: Comparison of most utilized blood (PRBCs) according Blood group

Table 8: Department wise utilization of blood products.

Various wards	Utilization of blood (PRBCs)					Total
	2017 (3776)	2018 (3657)	2019 (2994)	2020 (2522)	2021 (2429)	
Gynaecology	1410	1767	694	804	1094	5769(37.5%)
Nephrology	83	34	42	81	73	313(2%)
General surgery	585	640	480	219	145	2069(13.5%)
Orthopaedics	156	220	341	128	92	937(6%)
General medicine	962	709	1050	856	867	4444(28%)
Paediatrics	50	35	21	37	7	150(1%)
Arogyasree	107	28	17	77	24	253(2%)
On payment out side	370	146	320	158	75	1069(7%)
Thalassemia	61	70	63	120	60	374(3%)

In present study most commonly PRBCs were issued to gynaecology ward 5769(37.5%) followed by General medicine wards 4444(28%), General surgery 2069(13.5%), for out of hospital to secondary and primary care centres 1069(7%), orthopaedics 937(6%), thalassemia 374 (3%), nephrology ward 313 (2%) and arogyasree 253(2%) and least common was paediatrics (1%).

Discussion

Blood transfusion is an integral part of health services. Even today clinician demands for whole blood which should be discouraged. as effective use of blood with minimal wastage should be the goal so that those who are in need can get blood [4,5]. In the present study we issued 20983 units after proper cross matching and screening,

most commonly issued blood component was PRBC. Out of total 20983, PRBC were most issued in present study. PRBC accounted for 15378(73%) of transfusions. The results correlated with Anshoo *et al* [6] and Venkatachalapathy and Subhashish [7] we also found similar results in our study, which showed increased utilization of packed red cells among blood components. We noted 2355(11%) units of whole blood utilized among total 20983 blood units which are in contrary to Joshi *et al* [8] who found increased number of whole blood utilization compared to other components. This may be because of increase awareness of component utilization recently. And 1731 (8.5%) FFP, 1543(7.5%) RDP units utilized out of 20983 units in present study, which is not correlated with Ambrois *et al* [9] who showed increased issue of FFP and Platelets in relation to PRBC. This discrepancy can be attributed to the demographic differences and utilization of whole blood is decreased from 2017 year which was 11%(595 units) to 2%(66 units) in year of 2021 In present study we noticed these results are correlated with Ambroise *et al* study [9]. The whole blood utilization was limited to few indications such as heavy blood loss and emergency. Also noted was in the given period – the use of whole blood reduced, gradually indicating the impact of transfusion medicine in teaching and increased awareness. However, this was not in concordance with the study done by Gaur *et al.*, in which 49%(whole blood),22%PRBC transfused. The most commonly used blood group was O positive (30%). Similar finding noted by Agarwal P *et al* with O + use being 34.43%, and Venkatachalapathy *et al* [7] (40.54%) ‘O’ Positive being predominant group for blood transfusion. This corresponds to percentage of blood group distribution in India [10]. Among all blood groups, AB negative was the least (0.2%) commonly used similar to Venkatachalapathy (0.68%).The most

common overall indication for transfusion was anemia. Similar finding was observed by other studies [11]. In present study most commonly PRBCs were issued to obstetrics and gynaecology ward 5769(37.5%) these results correlated with Venkatachalapathy *et al* and Subhashish *et al* [7] who noted highest utilization of blood units by gynaecologic department. Obstetrics and gynaecology department was followed by the General medicine wards 4444(28%), General surgery 2069(13.5%), on donation to secondary and primary centres outside 1069(7%), orthopedics 937(6%), thalassemia 374 (3%), nephrology ward 313 (2%) and arogyasree 253(2%) and least common was paediatrics (1%). But Ahmaed and Subhashish *et al* [7] noted increased utilization of PRBC (74.9%) among paediatric patients which did not correlate with our study. The pattern of utilization of blood and blood components is relevant for quality management of transfusion practice, cost analyses, and planning local and regional blood donation programs. The study provides data regarding requirement of blood and blood component use in this teaching hospital. It is necessary to study the different component requirement so as to improve component separation to avoid wastage and shortage. Regular clinical meetings on transfusion medicine for indication of different components are necessary to achieve judicious use of components. More such studies are needed to standardize the component utilization to improve patient care

Conclusion

The periodic review of blood component usage is essential to assess the blood utilization pattern in any hospital or community. This is useful for blood transfusion services to provide safe, sufficient and timely supply of blood and blood products in the community.

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