

A Study on Utilization of Blood and blood products In Super Specialty Hospital

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ABSTRACT

Context:-Blood transfusion saves life of the patient, safe transfusion practices are essential for recovering magnitudes. Components transfusions are beneficial associated to whole blood. Blood is scarce product available, proper utilization is mandatory to reduce burden on persons, clinicians and blood bank services.

Aims and Objectives:-To study the utilization of blood and blood products by different departments in Super Specialty Hospital.

Study design:-Prospective observational study in blood bank and various departments, by Department of Hospital Administration from September 2010 to August 2011 in Narayana Medical College and Hospital (NMCH), Nellore.

Results:-The blood collections were 6123, blood issues 7009, whole blood 3209(52.4%), components 3800(62.0%). Amongst components FFP issues were 1058(17.2%), platelets 842(13.8%), packed cells 1900(31.0%).

Conclusion: -Blood issues were excess than collections, components utilization was higher to whole blood. Medical allied branches utilizes more components, surgical branches utilize whole blood. Whole blood wastage was more than components, owing to infections, expiry, less quantity withdrawals and damages of bags. Effective availability, utilization of blood, round the clock services especially during night, issue of blood without demand in emergencies will reduce the blood wastage. Quality control measures checking before in selection of bags will reduce bag leakages. Less post transfusion reactions, no transfusion transmissible infections.

Recommendations:-unrestricted availability, implementation of quality control measures, satisfactory withdrawals, timely utilization of blood, components supply before expiry will enhance the utilization of blood bank services

Key words:-Utilization, components, transfusion.

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I. Introduction

Blood is a therapeutic agent and also the medicine of life. It is essential for human life and has no substitutes¹. Transfusion, defined as the transfer of blood from one individual to another. Blood has been regarded as the most vital ingredient of the human being, since its loss was thought to be followed by loss of life².

A well-organized Blood Transfusion Service (BTS) is a vital component of health care delivery system³. Integrated strategy for Blood Safety include collection of blood only from voluntary, non-remunerated blood donors, screening for all transfusion transmitted infections and reduction of unnecessary transfusion⁴

The patients get maximum benefit and minimum risk like over loading, failure chances can be avoided¹. Blood is a raw material from which different blood components (red cell concentrates, platelet concentrates, fresh frozen plasma and cryoprecipitate) and plasma derivatives (albumin, coagulation factors and immunoglobulin)².

Once the blood is donated it can be used as a whole blood (using single bags) to the patient or separated into components (using double, triple, and quadruple bags) utilized for several needs to the patients³.

Through blood transfusion increased risk of Transfusion Transmitted Diseases to recipients.

To minimize transfusion of diseases three levels of safety strategies include².

Level 1- Predonation screening is to defer unsuitable donors with risk behaviour.

Level 2- Screening of donor units for the presence of infectious diseases.

Level 3-minimizing blood transfusion to the extent possible .

To achieve maximum safety at an acceptable cost requires a multi-layered risk reduction strategy involving safe blood donors, safe blood components, and safe transfusion practices. "Safe transfusion practices" are essential so as to correct blood is given only to the correct patient and given only when it is truly required⁵. Blood is a limited resource available, advantage in usage and inappropriate practices are balanced and proper utilization is crucial for needy people⁶

Hence this study was under taken to assess the utilization of blood and blood products by blood bank were taken place or any wastage present in the hospital. This helps in future for proper utilization of blood without any wastage is essential to save the life.

II. Aim And Objectives

To study the utilization of blood and blood products in the blood bank by different departments in Super Specialty Hospital.

III. Subjects And Methods

3.1 Study design:-Prospective observational study undertaken in the blood bank and various departments by the Department of Hospital Administration from September 2010 to August 2011 in Narayana Medical College, Nellore.

3.2 Study subjects:-100 doctors interviewed and 16 blood bank staff regarding utilization of blood and blood products

3.3 Methodology:-Information gathered through specially designed format, which is in an understandable way, to express their opinions regarding the utilization of blood and blood products to patients by blood bank and doctors in various departments.

3.4 Statistical Analysis:-Descriptive statistics including percentage and measure of tendency if work performed was done using Microsoft Excel 2007 software.

IV. Results

Present study was under taken in the department of transfusion medicine at super specialty hospital in Narayana Medical College, Nellore,

Table -1: Collections and Issues of whole blood and Components - Sep 2010-Aug 2011

Product	Collections	issues	%
Whole blood	6123	3209	52.4%
Components		3800	62.0%
Total	6123	7009	114.4%

The total number of blood collections in Sep 2010- Aug 2011 was 6123, blood issues were 7009. Components preparation in NMCH Blood Bank started from Sep. 2010 onwards. Among 7009 issues, whole blood issues were 3209(52.4%), components issues were 3800(62.0%) represented in "Table-1".

Table – 2: Blood Collections and Components Utilization in 2010-2011

Product	Collections	Components issues	%
Whole blood	6123	-	-
FFP	-	1058	17.2%
Platelets	-	842	13.8%
Packed cells	-	1900	31.0%
Total	6123	3800	62.0%

Among 6123 collections, 3800 (62.0%) components were issued, among 3800 components, FFP issues were 1058(17.2%), platelets issues 842(13.8%), packed cells 1900(31.0%) illustrated in "Table-2".

Table – 3: Work Load Comparison from 2009-10 to 2010-2011

Year	Product	Collections	Issues
Sep2009-Aug2010	Whole blood	3046	2748
Sep2010-Aug2011	Whole blood	6123	7009

The above "Table-3" shows the work load comparison between Sep 2009-Aug2010 and Sep 2010-Aug2011. In the year 2009-10 the collections (3046) were adequate and sufficient for the requirements (2748). Whereas in 2010-11 the utilization of blood and its components (7009) were exceeded than collections 6123.

Table 4– Total blood and blood products issued to various departments

Issue of blood and blood products to various departments September 2010 to August 2011					
Departments	Whole blood	Packed cells	FFP	platelets	Total
Ctvs	418	18	32	0	468
Cardiology	35	30	8	0	73
Plastic Surgery	32	42	0	0	74
Paediatric Surgery	14	3	0	18	35
Paediatrics	22	74	17	111	224
Gastroenterology	126	133	108	5	372
Surgical Gastroenterology	115	56	193	0	364
Orthopaedics	639	53	3	0	695
Neurology	30	112	3	2	147
Neurosurgery	242	40	12	0	294
Nephrology	103	700	15	7	825
Urology	180	52	18	6	256
General Surgery	548	84	329	5	966
General Medicine	228	261	218	487	1194
Gynaecology	297	132	53	26	508
Pulmonology	22	26	25	0	73
Emergency	95	67	22	34	218
Endocrinology	1	4	0	0	5
Endocrine Surgery	26	0	2	0	28
Outside	36	13	0	141	190
Total	3209	1900	1058	842	7009

Total issues of blood and blood products to various departments September 2010 to August 2011 was illustrated in above “Table-4 ”.

Table – 5: Department wise doctors involved in survey and utilization of blood and its products

S.No	Departments	No. of doctors	No. of units of blood required on an average per day
1	Medicine	4	3-4
2	Surgery	12	3-5
3	Obstetrics and Gynaecology	23	4-5
4	Orthopaedics	11	3-4
5	Paediatrics	10	4-5
6	E.N.T	1	1
7	Ophthalmology	2	0
8	Anaesthesiology	1	6-8
9	Cardiology	3	1
10	Nephrology	3	2-5
11	Endocrinology	5	1
12	Medical GE	4	2-3
13	Urology	4	2-3
14	Pulmonology	4	2
15	CT Surgery	1	1-2
16	Neuro Surgery	3	3
17	Endocrine Surgery	1	1-2
18	Surgical GE	4	2-3
19	Plastic Surgery	1	1
20	Emergency Medical Dept.	3	3-5
	Total	100	36-63

The above “Table-5” shows average daily requirement of blood and its components utilization to each department per day was mentioned as per doctor’s opinion. Blood and its products were utilized for emergency, elective, medical, surgical, general and super specialty cases.

Maximum no of blood units utilization per day 6-8 in operation theatres, Obstetrics and Gynaecology, Paediatrics department uses 4-5units of blood per day. Emergency Medical Department, Medicine, Surgery, Orthopaedics, Neuro Surgery departmental consumption was 2-5 units.

Pulmonology CT Surgery, E.N.T Cardiology, Endocrinology Endocrine Surgery Plastic Surgery departments demands 1-2 units utilization of blood and its products. Ophthalmology does not need one unit per day.Total requirements of blood and components 36-63 per day in hospital by all the departments.

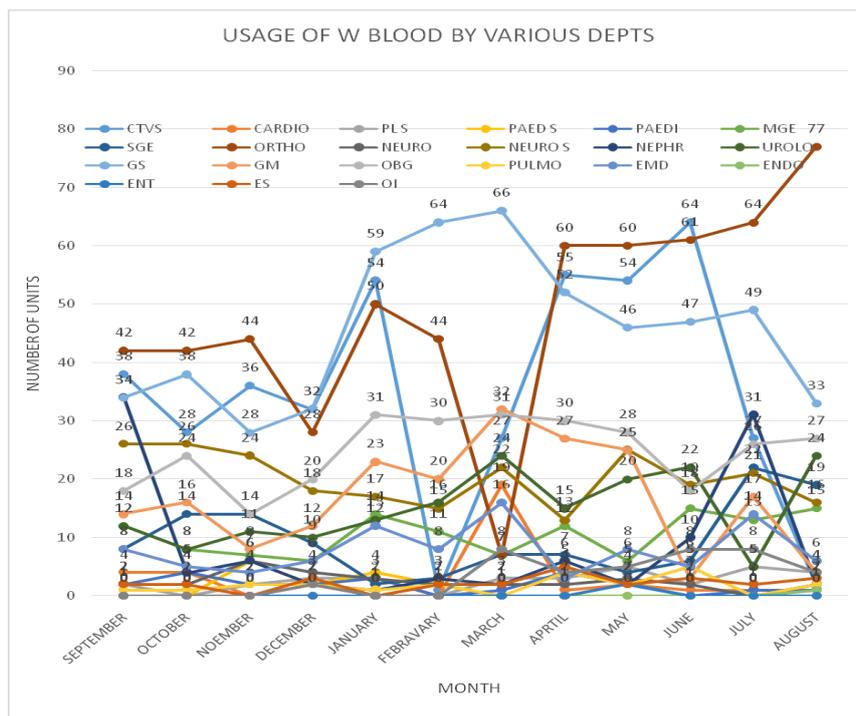


Fig - 1: Utilization of Whole Blood by Various Departments in 2010-2011

The “Fig – 1” graph shows the whole blood utilized by various departments both for emergency and elective. The number of utilizations by various departments was almost nearly average throughout the year. In General Surgery (GS), Orthopaedics, Cardio Thoracic Vascular Surgery (CTVS) shows major fluctuations in utilizations.

Maximum utilizations were in General Surgery, Orthopaedics, CTVS department. Low level utilizations were seen in Endocrinology Surgery, Pulmonology, Emergency, Neurology, Paediatrics, Plastic Surgery, and Cardiology. Very low utilizations were seen in Endocrinology-1, ENT-2, Paediatrics, and Surgery-10. Moderate utilizations were in remaining departments.

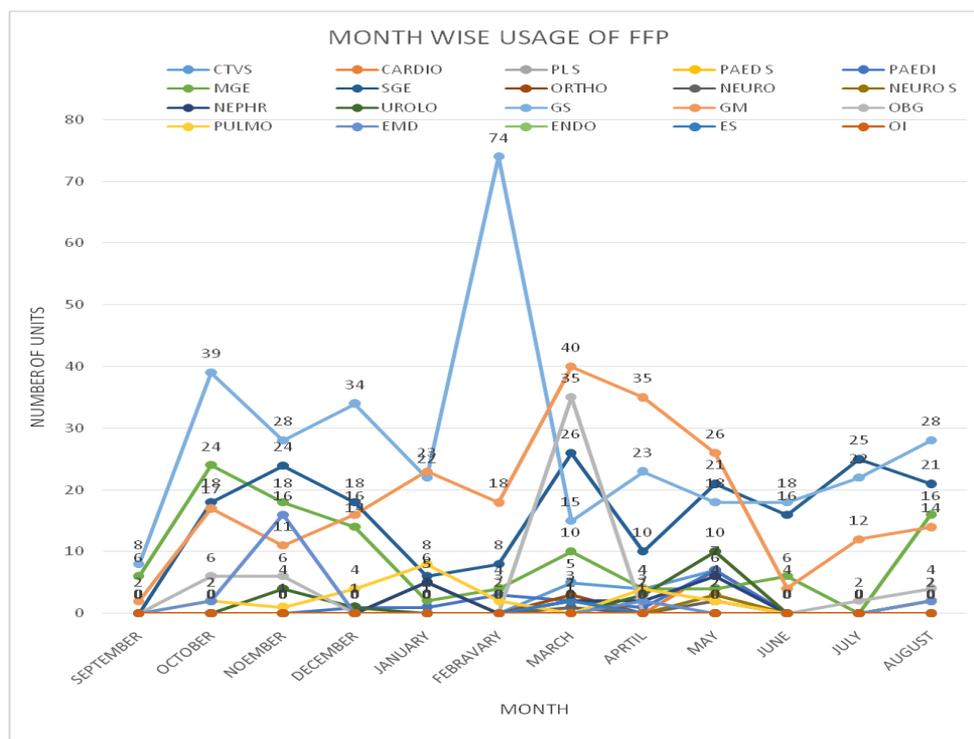


Fig - 2: Utilization of Fresh Frozen Plasma by Various Departments in 2010-2011

The “Fig – 2” reflects blood collections 6123 among them, FFP utilizations were 1058 (17.2%). Maximum FFPs were utilized by General Surgery 329. High in General Medicine, Surgical Gastro Enterology. Low utilizations were in Pulmonology, Emergency, Urology, Neuro Surgery, Paediatrics, CTVS less than 50. Very low utilizations were in Endocrine Surgery, Nephrology, Neurology, Orthopaedics, and Cardiology less 10, average in remaining Gynaecology, Medical Gastro Enterology and nil in Endocrinology, Plastic Surgery, Paediatrics Surgery

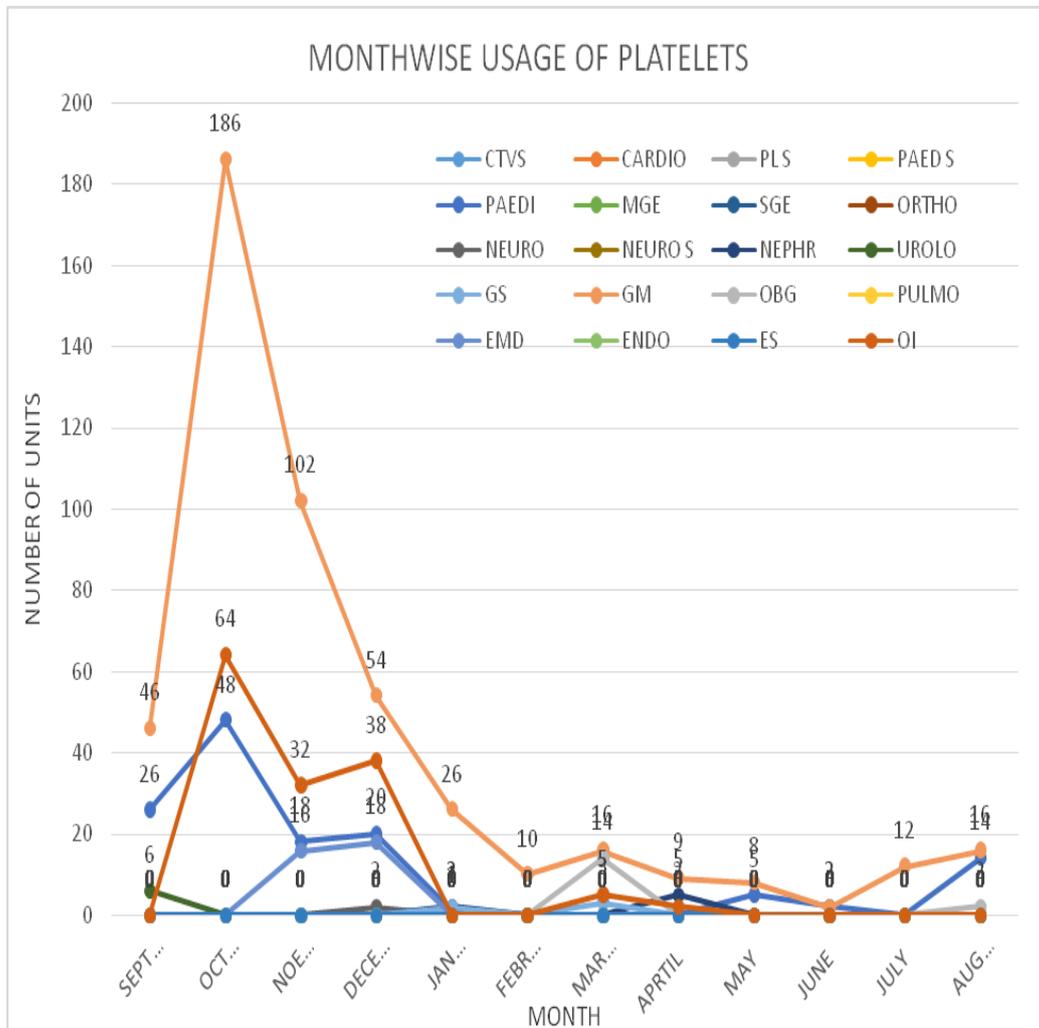


Fig - 3: Utilization of Platelets by various departments in 2010-2011

The “Fig-3” reflects among the 6123 collections, platelets utilizations were 842 (13.8%). Maximum utilizations were in General medicine -487(57%), high utilizations in paediatrics-134. outside issues were-141, low in Emergency, Gynaecology less than 50, very low in nephrology, neurology less than 10, and nil in remaining departments.

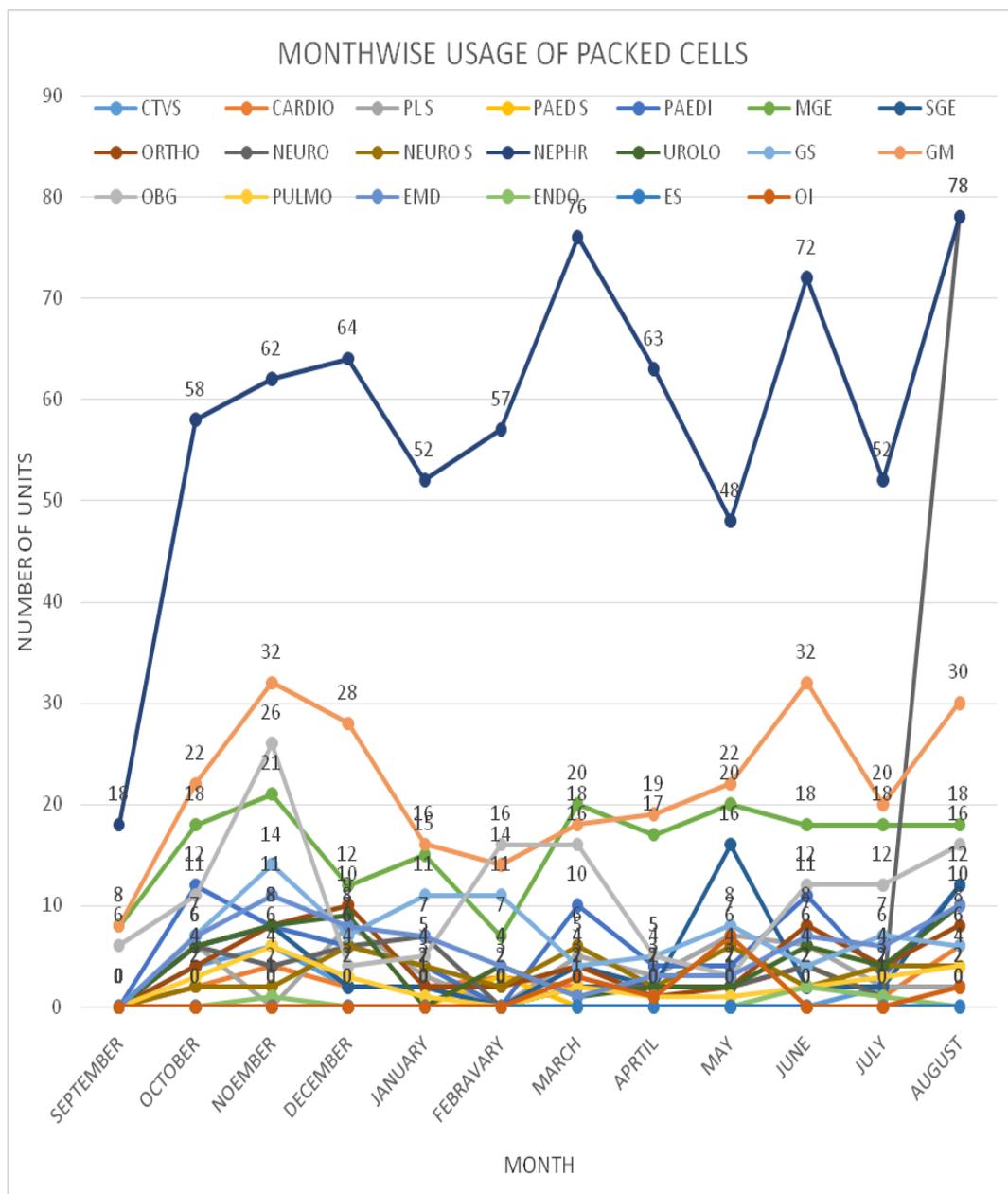


Fig – 4: Utilization of Packed Cells by various departments in 2010-2011

The “Fig - 7” represents among the 6123 collections, packed cells utilizations were 1900 (31.0%) this was 50% of components utilizations. Maximum number of packed cells was utilized by nephrology-700 throughout the year. Average usage was seen in General Medicine, Medical Gastro Enterology, Gynaecology, Neurology-100-200, very low in Endocrinology, Paediatric Surgery less than 100, low in remaining and nil in Endocrinology.

Table- 6: Total No. of discarded bloods in 2010-2011

Product	HIV	HBsAg	HCV	VDRL	MP	QNS	Expiry	Damage	MISC	Total
Whole blood	32	177	20	-	-	34	300	84	1	597 (9.7%)
FFP	8	44	3	-	-	4	3	74	-	135 (2.2%)
Platelets	3	22	4	-	-	31	31	9	-	64 (1.0%)
Packed cells	9	40	3	-	-	4	40	12	-	129 (2.1%)
Total	52	283	30	-	-	73	410	169	1	925
Percentage	5.6%	30.2%	3.2%	-	-	7.8%	44.3%	18.2%	0.1%	

The above "Table-6" shows total discarded bloods from Sep2010-Aug 2011 were 925 (15.1%). Among 6123 collections, the discarded whole blood was 597 (9.7%), FFP were 135 (2.2%), platelets - 64 (1.0%), packed cells -129 (2.1%).

Among total 925 discarded, HIV positive cases were 52(5.6%), HBsAg positive cases were high among discarded 283 (30.2%), HCV positive - 30(3.2%), Quantity Not Sufficient(QNS) cases 73(7.8%). Discarded blood bags due to expiry were high 410(44.3%), damaged bags were 169(18.2%), and miscellaneous-Microbial contamination bags 1(0.1%).

The discarded whole blood was 597 (9.7%) among 6123 collections,, maximum discarded blood was due to expiry of date, HBs Ag positive, damaged bags and remaining QNS, HIV,HCV so on.

The discarded FFP among 6123 collections were135 (2.2%),mostlyowed to HBs Ag positivity, next being damages of bags, followed by HIV, QNS, HCV and expiry date.

The discarded Platelets amongst 6123 collections were 64 (1.0%), cause mainly HBs Ag positivity, expiry, QNS, damage, HIV and HCV in order.

The discarded Packed cells in 6123 collections were (2.1%), majority due to expiry of date, HBs Ag positivity, damage, QNS, HCV and HIV.

Among 100 doctors 71 members (71%) not experienced adverse reactions,29members (29%) were experienced mild blood transfusion adverse reactions to the patients. patients.

Post transfusion transmitted diseases were not observed by all i.e.100 members (100%) to the patients

V. Discussion

Present study represents it was observed that more number of blood units were utilized by the patients than collections. The components were more utilized than whole blood. Our study correlates with Ambroise et al⁷ opinion as the utilization of components are increased than whole blood usage⁷,however differs to Giriyan SS et al⁶study the utilisation of whole blood was more to components,

Present study reveals disparity in distribution of blood components FFP's, packed cells, platelets usage. More number of packed red cell utilization when compared to platelets, FFP's was observed. We observed that more number of packed cells were utilised in the nephrology department because anaemia is common in chronic renal disease need packed red cells rather than whole blood or other components The recent developments in the blood transfusions practices are equal units of packed red cells, FFP, platelet transfusions rather than whole blood to avoid over loading complications⁸

The work load was enhanced doubly on blood bank from 2009-10 to 2010-11. As collections and utilization of blood was increased. Preparation of components in blood bank was started in 2010-11. Over all issues were increased than collections as components wereprepared, improved components utilization compare to whole blood

Surgical departments utilizemore numberof whole blood units than medical departments. Surgical specialities always had a risk of bleeding, hence utilization will be more compared to medical specialities, and present study coincides with a study by Latha et al⁹.

Replacement of whole blood in active or acute blood loss is appears to be suitable but in case of huge blood loss massive transfusion protocols follow up is ideal. Our study not coincides with a study by Apuca Susan Mathew et al medical departments utilization was more than surgical specialities¹⁰

Present study denotes maximum utilizations of platelets were in medical department due presence of thrombocytopenia with dengue fever where plateletsmanagement is necessary. Present study coincides with the study of Apuca Susan Mathew et al¹⁰ where Utilization of platelets was experienced by medicine department as dengue fever was high¹⁰. In Paediatrics department utilization of platelets were more, even paediatrics surgery also utilizes more platelets. .

We observed that more number of packed cells were utilised in the nephrology department because anaemia is common in chronic renal disease need packed red cells rather than whole blood or other components.

In General Medicine department gross anaemia cases were treated with packed red cells than whole blood as it causes overload leads to congestive cardiac failure. The occurrence of dengue fever also enhances the utilization of packed red cells in Medicine department. In Paediatrics also packed red cells utilization was more to prevent overloading complications. Present study concurs with a study by Giriyan SS et al stated that more packed red cells utilization in paediatrics department⁶.

Present study denotes maximum utilizations of FFP's were in medical department due to amassed number of dengue fever wherethrombocytopenia, abnormal coagulation profile demands FFP, platelet treatment. Present study concurs with the study of Apuca Susan Mathew et al¹⁰ where Utilization of FFP's were experienced by medicine department as dengue fever is the causative factor¹⁰

Blood and blood components positive with infective diseases like HIV, HBsAg, HCVetc. has to be discarded as it transmits diseases to the recipients. Bag damages will be encountered with proper checking the bags before collection and maintaining quality control in selection of bags,.

Most of the bags were discarded due to expiry of date, majority discarded were whole blood, smaller extent packed cells, FFP's, lesser extent platelets. Discarded blood due to expiry can be avoided by utilizing the units in appropriate time before expiry. In emergencies utilization of blood without waiting for replacement can reduce the discarded due to expiry. Proper utilization before expiry will reduce the discarded rates. Increased availability of blood and blood products round the clock especially during night times, available stock should be displayed at EMD.

Quantity not sufficient will be encountered by withdrawing the sufficient amount of blood from the donors. 40 ml of blood units to be prepared for paediatric patients instead of 400 ml will reduce the wastage of blood and its products¹¹.

Majority cases do not have any post transfusion reactions, trivial cases had minor complications which were managed medically without complications by continuous observation during transfusion. Post transfusion reactions may be with immunological or non immunological². Even with careful cross matching 1% of post transfusion reactions can occur², in our study the post transfusion reactions were little bit high, individual variations always considered².

Transfusion transmitted diseases were not identified in all cases, this denotes the meticulous screening procedures were conducted in the blood bank as per WHO's standard operating procedures¹².

VI. Conclusion

Utilization of blood and blood products enhance compared to previous years. Blood issues were additional than collections. Utilization of blood components were more than whole blood. General Medicine, paediatrics, nephrology departments utilise more components packed red cells, platelets to lesser extent FFP's, whereas surgical specialities like General Surgery, Orthopaedics, gynaecology, CTVS utilise more whole blood than components.

Wastage of blood observes more with whole blood than components, due to different infectious diseases (HIV, HBsAg, HCV), expiry of blood, bag damages, quantity not sufficient to a lesser extent.

Effective utilization in time, availability of blood round the clock especially during night time, issue of blood without demand of replacement in emergencies will reduce the blood wastage. Quality control measures in selection of bags, meticulous checking before collection will reduce bag leakages. Sufficient amount withdrawal as per need reduces wastage. Less post transfusion reactions, no transfusion transmissible infections.

Recommendations: -Round the clock blood issues without replacement in emergency, adequate volume withdrawal, checking bags before collection, quality control measures in selection of bags, timely utilization of blood and its products before expiry will enhance the utilization of blood bank services

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