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Original Research Paper

Targeted interventions to reduce blood and blood components wastage in Apollo Hospitals, Health city, Visakhapatnam

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ABSTRACT

Background: Blood is a valuable resource. Wastage of all blood and blood components is an important task for hospitals worldwide. Need to utilize "blood & it's components" in a rationale way and also to save the patient's life. The aim of this study is to analyze the reasons and possible interventions to reduce the wastage of blood & blood components **Methodology:** A comparative study of pre - intervention period and p ost intervention period during the year April 2017 to October 2018 done in the department of Blood bank/Centre, Apollo Hospitals, Health city Visakhapatnam**. Results**: Present study showed 20.52% wastage of blood and blood components during the pre - intervention period, which has come down to 6.0% with all possible interventions during post intervention period. **Conclusion:** Relatively inexpensive, simple and targeted interventions showed a dramatic impact on reducing blood wastage with regard to both cost and resource savings.

Key words: blood wastage, blood components, blood bank/Centre, TTI

INTRODUCTION

The first major study focusing on reducing blood wastage using Lean and Six Sigma techniques was performed by Heitmilleret al, who demonstrated that wastage of RBCs could be reduced by more than 60% over 4 years, resulting in a savings of more than $800,000. [1] In India in the year 2016-2017 over 6.57 lakhs units of blood and blood components were discarded, revealed by data provided NACO (National AIDS Control Organization). The worrying part is that 50% of blood and its products are being wasted[2]. Waste is not limited to blood products and is present throughout the health care system. Studies of systemic waste have examined the importance of workflows in the health care environment and have focused on minimizing operational sources of waste when issuing a variety of medications [3, 4] Wastage of all blood components, including PRBCs, platelets, and plasma and whole blood is an important issue for hospitals worldwide. Ideally, expiry and wastage of blood products would never occur. However, inevitably a low level of outdating of components in the blood bank is accepted due to the inherent need to have stock on hand at all times and the often-unpredictable demands on the inventory[5]. In view of this, we started studying possible interventions on how to reduce the overall wastage of blood and blood components in Blood Bank/Centre, Apollo hospitals, Health city, Visakhapatnam.

METHODOLOGY

AIM: To study the reasons and possible interventions to reduce the wastage of blood & blood components in Blood bank/Centre, Apollo Hospitals, Visakhapatnam.

Objectives:

To introduce possible interventions for minimizing blood wastage to compare the wastage rate after the implementation of strategies Review of data analysis showed 21% of wastage of blood and blood components from April 2017 to January 2018 (Pre- intervention period). The extent and causes of blood and its products wastage were identified. A list of all possible causes & interventions finalized in January 2018. From January to October 2018 (Post-intervention period) we have implemented all possible action points to address challenges in our hospital. A comparative analysis was done in October 2018 in comparison with the pre-intervention period. This study was carried out from April 2017 to October 2018. Every month we analyze the data and take corrective and preventive action to reduce the wastage of blood.

INTERVENTIONS

These are targeted multiple initiatives addressed to reduce blood and blood Components wastage in the hospital. Mandatory Review of wastage of blood in all blood transfusion committee meetings in our hospital.

Strict adherence to the guidelines of drug control authority of India. We followed the hospital policy and standard operational procedures. Regular blood donation camps were organized within the hospital. Maintained details of all voluntary donors. Established proper scheduling of blood donation. Established and streamlined communication mechanism between clinicians and blood bank staff regarding the utilization of blood. Circular distributed to all departments in the hospital regarding "30 minutes rule" and to issue blood components from blood bank "one by one" only. Strict adherence to donor selection criteria, a crucial role in minimizing collection of blood from unsafe donors – "Blood donor screening" There is also a need to encourage, inspire, and motivate regular voluntary donors to donate blood at regular intervals. This will reduce the risk of Transfusion Transmissible Infection (TTI) positivity. Limited preparation of platelets as and when required. Increased use of apheresis technique to prevent wastage of components such as platelets whose demand cannot be predicted, should be prepared on demand and urgently. To prevent the damage (hemolysis, clotting & leakage) of donated blood bags strict handling procedures and stringent storage policies were adopted. Periodic training to consultants, duty doctors and nursing staff for correct identification of patient and blood products, blood utilization, return back policy before 30 minutes. Hands on trainings and quality protocols adopted on technical expertise in phlebotomy, component preparation to prevent suboptimal volume collection of blood, ensured precaution during storage and thawing of Fresh Frozen Plasma (FFP) to prevent rupture/leakage such as the use of trays in the refrigerator, **c**ontinuous monitoring and periodic review meetings on day-to-day challenges and quality performance indicators with all blood bank staff.

RESULTS

The present study showed 20.52% wastage of blood and blood components during the pre-intervention period, which has come down to 6.0% with all possible interventions during the post intervention period.

Title 1: Comparative Summary of results obtained regarding wastage of blood and blood components before and after interventions

Name of Component	Wastage Details	No of Units of Packed Red Blood cells	Apr'17 - Jan'18		No of Units of Packed Red Blood cells	Feb'18 - Oct'18	
			No of Units wasted	%		No of Units wasted	%
Packed Red Blood Cells (PRBC)	Expired	1988	73	3.7%	1800	10	0.6%
	TTI		47	2.4%		33	1.8%
	Damaged		0	0.0%		0	0.0%
	After Issue		4	0.2%		4	0.2%
	Total	**1988**	**124**	**6.3%**	**1800**	**47**	**2.6%**
Platelet Concentration (PC)	Expired	1186	524	44.2%	874	120	13.7%
	TTI		39	3.3%		22	2.5%
	Damaged		0	0.0%		0	0.0%
	After Issue		1	0.1%		0	0.0%
	Total	**1186**	**564**	**47.6%**	**874**	**142**	**16.2%**
Fresh Frozen Plasma (FFP)	Expired	675	37	5.5%	1216	0	0.0%
	TTI		47	7.0%		33	2.7%
	Damaged		26	3.9%		10	0.8%
	After Issue		0	0.0%		4	0.3%
	Total	**675**	**110**	**16.4%**	**1216**	**47**	**3.8%**
Whole Blood (WB)	Expired	134	10	7.5%	124	2	1.6%
	TTI		7	5.2%		3	2.4%
	Less collection		2	1.49%		0	0%
	Damaged		0	0.0%		0	0.0%
	After Issue		0	0.0%		0	0.0%
	Total	**134**	**19**	**14.19%**	**124**	**5**	**4.0%**
Over All wastage		**3983**	**817**	**21.01%**	**4014**	**241**	**6.28%**

DISCUSSION

In Present study, 20.5% of wastage of blood and blood components during the pre-intervention period which has come down to 6.0% in post intervention period. Which is higher when compared with the study of Morish et al (2.3%)[6], but lower than Bobde et al (6.63%) [7]and Sharma et al (8.69%)[8]. The average wastage rate for PRBC during pre-intervention period is 6.23% which is reduced to 2.61% during post intervention period, which is in line with Bobde et al (2.0%)[7], Sharma et al (3.2%)[8]. In present study the most common reason for discard of PRBC is expiry, followed by TTI and return after issue (> 30 minutes). The reason for more expiry is less utilization than requesting a greater number of blood units. Blood bank/ Centre staff would order more stock to meet the demand, but not all requested units were being used. To address this challenge, we started sensitizing the consultants about the policy and proper utilization of blood and blood components. We trained blood bank/Centre staff to maintain equilibrium between request and blood stock. We even ensured proper scheduling of blood donation and coordinated as per the stock available in blood bank/Centre. Finally maintained blood group-wise records of voluntary blood donors so that they can be contacted as and when required. For return back of blood and blood components after issue we follow "30-minute rule" policy as per our blood bank/Centre standards of procedure. Circular distributed to all departments in the hospital regarding "30-minute rule" and to issue blood components from blood bank/Centre "one by one" depending on the priority of transfusion. Addressing this issue, we have trained duty doctors and nursing staff. A drastic decrease in Platelets was observed in our study period from 47% to 16%, which is even lesser when compared with Bobde et al 26.2%[7], Sharma et al 43.6%[8]. The common reason for discarding in their study is similar to our study. High discard rate of Platelets was because of short shelf life of 5 days. This poses challenges to blood bank/Centre and health services with regard to inventory management, to maintain balance between Platelets availability when and where needed, at the same time, minimizing Platelets wastage. There is therefore a necessary trade-off between shortage and wastage. Over 20% of Platelets may be wasted due to outdating. This varies both within and between countries, and also varies over the course of a year.[10] In Europe, the reported proportion of Platelets that are discarded due to expiry varies from 1% to 20%, and outdating has been reported up to 21% in Australia[11] extending Platelets shelf life may have the benefit of improving supply while also reducing wastage. To illustrate this, the level of wastage was reported to increase in the US following the U.S. Food and Drug Administration's decision to shorten the shelf life from 7 to 5 days in 1986.[10] Haijema et al and de Kort et al found that if the shelf life was extended, there would be a further decrease in wastage and shortage rates. [9&10]Assuming that extension of Platelet storage duration would improve Platelet availability and decrease Platelet wastage, prospective research is required to confirm that Platelets stored for longer durations are as safe and effective as fresher Platelets, particularly in vulnerable patient populations. Extending Platelets' shelf life may have the benefit of improving supply while also reducing wastage. To illustrate this, the level of wastage was reported to increase in the US following the U.S. Food and Drug Administration's decision to shorten the shelf life from 7 to 5 days in 1986.[12] A study of a single hospital's experience reported a significant decrease in wastage during a 6-month period when the shelf life of Platelets was increased again from 5 to 7 days.[13] Several papers in the field of Operations Research have attempted to predict the impact on wastage by extending the shelf life.[13] Haijema et al set a combined stochastic dynamic programming and simulation model to develop an ordering strategy to decrease wastage and shortages.[14] The authors found that if the shelf life was extended, there would be a further decrease in wastage.[14] When applying this model to a Dutch blood bank, de Kort et al found a substantial decrease in wastage and shortage rates.[9] In the pre intervention period it was observed an average wastage for FFP 16.28 % and in post intervention period 3.77%. More FFP wastage rates were observed in Bobde *et al.* is (7.6%)[7] and Sharma *et al*. (6.2%)[8]. In the present study the most common reason for discard of FFP was TTI positive units 2.63% (32/1216), followed by leakage 0.82% (10/1216), no utilization after issue 0.32% (4/1216) and date of expiry 0% (0/1216). Leakage was the most common cause of wastage which can be minimized by putting FFP units in a rack tray in the refrigerator. This minimizes the risk of breakage of product during storage, handling, and transportation. Sending FFP for fractionation further added to reduced discard rate. Other reasons for non-utilization after issue were death of patients and transfer of patients to higher center. Finally, the average wastage rate for whole blood has come down from 14.7% to 4.3%, compared to Bobde *et al* (6.6%)[7], Sharma *et al* (4.5%)[8]. Similar results observed in Thakare *et al* [15]. Among TTI the most common sero-positivity are HBsAg followed by HCV. During the pre-interventions period HbsAg is 3.1%, HCV 0.2%, HIV 0.1% and VDRL 0.1%. In post intervention period HbsAg is 2%, HCV 1.7%, HIV 0.9%, VDRL 0.02%. Despite the success, we still face challenges and difficulties during

the study period: To convince the consultants of various departments During the counselling of donor selection

Post–intervention period:

We have devised a sustainable targets chart to monitor these results for another one-year period. So, to ensure sustainability, we continue to monitor data, investigate deviation, and monthly review of blood and blood components wastage indicator from here onwards as an institutional policy.

Table 2: Table showing blood and blood components wastage from 2017 to 2019

Components	Apr'17 - Jan'18	Feb'18 - Oct'18	Nov'18 - Oct'19
Packed Cell	6.23%	2.61%	2%
Platelet concentration	47.36%	16.23%	<10%
FFP	16.28%	3.85%	2.5%
Whole Blood	14.17%	2.41%	1.5%

This study has a greater impact not only in improving quality protocols of blood bank/Centre, Apollo Hospitals, Visakhapatnam but have a direct and indirect impact in so many ways which are enlisted below.

Cost Benefit analysis: Cost effectiveness was assessed for wastage of blood and blood components for pre intervention period, total cost is Rs 12,77,200 and in post intervention period total cost is Rs 2,55,200. Total cost savings achieved during the study period by implementing all the enlisted interventions, the amount saved is Rs 10,22,000 which is a significant cost benefit by almost 80%.

Respecting Donor Values: These interventions helped us to value and preserve donor's precious lifesaving blood donation cause. Also ensured blood donors restoration of faith in the Apollo Hospitals.

Clinical benefit: The whole process of blood wastage prevention helped us in increasing the availability of blood & blood components to all clinicians and for needy patients. Also improved the availability of blood in the blood bank/Centre, Apollo hospitals, health city, Visakhapatnam by 21% by everting wastage during the period January to October 2018.

Greater Patients satisfaction: Patient and relative's satisfaction is the utmost gratifying thing that we noticed and continued to value. The image of Apollo hospitals is elated in terms of increased blood availability (24*7) for all needy and emergency patients.

Research Opportunity: Identified opportunities for prospective research is required to confirm that Platelets stored for longer durations are safe and effective as fresher Platelets, particularly in vulnerable patient populations.

Achieving Clinical Excellence: This intervention helped us to gain expertise, knowledge and opportunity to serve better. We adhered to all quality protocols required for excellence in health care. This is could only be attained and established through: increased staff technical expertise, establishing quality protocols, streamlined recording and reporting, internal validation, established and streamlined inter departmental coordination and communication, patient satisfaction, respecting donors' values and overall escalation of Apollo hospitals in Visakhapatnam Andhra Pradesh.

CONCLUSION

As we compare our study with other studies, it was noticed that lesser number of blood and blood components were discarded in our blood bank/Centre due to implementation of interventions as and when required. Relatively inexpensive interventions can have a prompt and dramatic impact on reducing blood wastage with regard to both cost and resource savings. It also demonstrated the responsibility and value that a collaborative effort between the departments and blood product prescribers can have on wastage reduction. Good donor selection, training and evaluation of the staff, continuous monitoring and supervision will improve the output and help in preventing the wastage of donated blood and its products. Blood is a valuable resource. There is no substitute for human blood. We all should respect donor precious gift "blood" by utilizing in a rationale way and saving the patient life. Let us continue to move forward to achieve "save blood, save lives".

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