



DETERMINATION OF THE RATE AND CAUSES OF WASTAGE OF BLOOD IN A DEVELOPING COUNTRY LIKE BANGLADESH, A THREE YEAR STUDY.

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Conflicts of Interest: Nil

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Abstract:

Background: A developing country like Bangladesh is always facing challenges in the world of blood transfusion. The growing health issues are more concerned to furnish the demands in applying blood as a remedy. 40% to 60% of whole blood and components are regularly used up by the patients and therefore also return back owing to rescheduling of operation or not utilized in time. But when this blood remains for a longer period of time in normal temperature that is unfortunately sometimes unreliable to be used up for the next time. Occasionally, the patients attendance collect unscreened blood from the remote area that could not be used up in time and has to be discarded promptly. Component wastage is more because of the ignorance of the traditional physicians for using only the fresh whole blood. These all issues need to be focused more to get back from the entire loss.

Aims: The aim of this study is to notify the way of wastage of blood components and the foremost reasons stay behind for that.

Materials and Methods: This is a retrospective, analytical study based on the statistical data available from hospitals blood banks. In this study total bloodletting from RD was 18,858 to 22,167 in the last three year. Total components prepared 18,179 to 21,329. Among them RCC 27.56% - 35.65%, FFP 26.99% - 35.41%, PC 27.59% - 35.34% and PRP 0% to 0.68% were prepared.

Results: The leading reasons included time expiry, wasted imports, blood medically or surgically ordered but not used. Data indicated that total wastage were 5.31% - 7.28% in these years. Amid this 9.47% to 26.81% were platelet concentrate; most of prepared from RD and wasted mainly due to time expiry. Packed cell wastage were 0.41% to 3.03% due to collection in pediatrics bags, expired dates, formation of micro clots, failure of transfusion for bacterial contamination and haemolysis. Whole blood wastage was 0.2% to 2.2% as formation of bulky clot owing to inappropriate mixing with anticoagulant solution during collection. Plasma wastage was 0.26% to 1.52%. Therefore, 1.20% was cracking in blood bags due to mishandling by unskilled passing and 0.32% were blocking of the flow during transfusion.

Conclusion: Modern blood transfusion requires proper storage, rational use as well as wise distribution. To reduce this wastage, the entire transfusion team should recognize the problems in a comprehensive and coordinated way. Blood component wastage is a major concern as we don't have adequate supply of blood and a reputable donor pool. The traditional physicians should also change their perception to use the conventional remedy which is only based on practicing whole blood. This is a common barrier that should be changed as quickly as possible. Consequently, if suitable actions are taken for the above distinguishing reasons then it will be possible to save more blood and the limited capital of this poor state.

Keywords: Blood component, Wastage, Traditional practice.

Introduction:

Transfusion of blood and the desired components is used for life saving purpose and so it still remains as indomitable for the precious human life. However, wastage of blood is sometime unavoidable that results from multiple contributing factor and many reasons worked behind it. Furthermore, less donor recruitment, inappropriate stock management, unsuitable transportation, unprofessional handling skills among the stuffs is another concern for this wastage. Though the continuous demand is

increasing day by day for the assistance of the patients in a developing country like Bangladesh, that's why now we need a look to address this wastage and even more try to reduce these conditions behind the issue.

According to the data of World Health Organization (WHO) showed that 87.5 % of developing countries usually collect less than half of the blood required to meet the transfusion requirements of their entire populations [1]. Studies within the developing countries has showed that limited use of blood are

supplied for hazards of pregnancy or during childbirth, severe anemia in childhood and also inroad traffic accident, any requirement for surgery etc. [2-4].

Moreover a lot of factors that lead to this wastage of blood products like expired units, wasted imports, broken bag or seal, returned after the time of expiry, blood medically or surgically ordered but not used in time, clotted blood inside the blood bag, tear bag during centrifugation, blood has been collected in pediatric bags which has not been used in time, short storage time of platelets or miscellaneous reasons which is most importantly due to lack of proper apprehension and awareness.

Ideally in a correct setting, outdating and wastage of whole blood or blood products would never occur. As because the need of inappropriate amount of blood stocks at most of the time and also often uncertain demands on the inventory, very limited and unavoidable outdating of components in blood bank is granted [8]. Different studies have also showed that through target interventions and compliance to strict guidelines, a remarkable reduction in the wastage of blood components could be attained and maintained [9-11]. Globally only about 106 countries have the accepted the national guidelines on the suitable clinical use of blood and blood products [12].

It should also be noted that now a days very limited number of countries have employ the essential structures and expedient to upgrade the blood transfusion centers [3]. The main elements of success are the utilization of financial and material resources, production and implementation of a pragmatic plan of action established on actual description, and analysis of the present conditions in every country, attainable of blood, proper and quality storage conditions, proper clinical use of blood in treatments, and compliance with law for prescription of blood and its products.

However, the proper hospital system regarding blood transfusion and the blood collection, processing and

screening of blood from these valuable donors should be centralized in which collected blood should be stored directly in blood bank refrigerator as or most of the blood that returned is after the scheduled time therefore, not possible to store again.

In this study, we have also shown that which components go through for more wastage and what remain the reasons behind it. Furthermore, what are the dearth of our unskilled hands that bears to impose this type of issues and also the inadequate knowledge of our regional physicians to stuck for only whole bloods in different cases where random donor platelet or single donor platelet can be used to save this kind of wastage.

Materials and Methods:

This is a retrospective, analytical study based on the statistical data available from hospitals blood banks. In this study total bloodletting from the directed and voluntary was 18,858 to 22,167 in the last three year. Total components were prepared 18,179 to 21,329. Among them RCC were 27.56% - 35.65%, FFP 26.99% - 35.41%, Random donor platelet concentrate 27.59% - 35.34% and PRP 0% to 0.68%.

Results:

The leading reasons included time expiry, wasted imports, blood medically or surgically ordered but not used. Data indicated that total wastage were 5.31% - 7.28% in these years. Amid this 9.47% to 26.81% were platelet concentrate; most of prepared from RD and wasted mainly due to time expiry. Packed cell wastage were 0.41% to 3.03% due to collection in pediatrics bags, expired dates, formation of micro clots, failure of transfusion for bacterial contamination and haemolysis. Whole blood wastage was 0.2% to 2.2% as formation of bulky clot owing to inappropriate mixing with anticoagulant solution during collection. Plasma wastage was 0.26% to 1.52%. Therefore, 1.20% was cracking in blood bags due to mishandling by unskilled passing and 0.32% were blocking of the flow during transfusion.

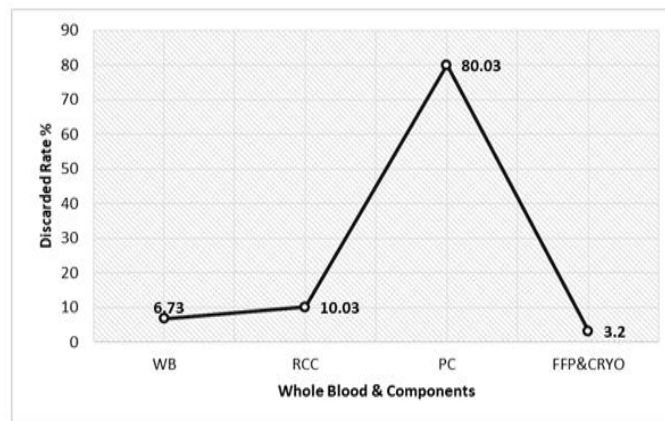
Table 1:

Year	Donor screening and cross matching	Total blood letting	Total component preparation	Total blood grouping	Total patient attend in day care	Coomb's test	ICT crossmatching	Antibody detection	Rhesus genotype and Phenotype
July 2014-June 2015	45688	22167	21329	24929	8362	2211	1182	206	120
July 2013-June 2014	23944	21619	20718	22529	8293	1739	967	236	140
July 2012-June 2013	21722	19501	18179	20007	8238	1501	887	212	190
July 2011-June 2012	20954	18858	18415	17902	7213	1046	553	202	206

Table 2: Distribution of the components according to the discarded blood in different year

Years	Total discard	Blood discard							
		WB		RCC		PC		FFP	
		n	%	n	%	n	%	n	%
July 2014 to June 2015	1079	78	7.2	107	9.9	859	79.6	35	3.2
July 2013 to June 2014	850	56	6.6	94	11.1	667	78.5	33	3.9
July 2012 to June 2013	839	54	6.4	76	9.1	688	82.0	21	2.5

This table of this study showing total wastage in these hospitals were 839 to 1079. Among them 6.4% to 7.2% was Whole blood, 9.1% to 11.1% was packed red cells, 78.5% to 82.0% was Platelet concentrate, while 2.5% to 3.9% was Fresh Frozen Plasma and cryoprecipitate.



Graph 1:

In this table there is a notification that platelet wastage is more than other components like packed cell, plasma or cryo.

Discussion:

Wastage of all blood components, including RBCs, platelets (PLT), and plasma, is an important issue for all the developing country’s hospitals worldwide. Therefore wastage remains as burning issue for the limitation of voluntary donors as our expecting demands.

One study showed that the comprehensive cost of waste to the American health care system was possibly as high as \$910 billion.¹ Studies of systemic waste have examined the importance of workflows in the health care environment² and have focused on minimizing operational sources of waste when provides a variety of medications.³⁻⁹ . Many studies have showed that, comparatively simple interventions resulted in noticeable reductions in waste.

The “30-minute rule” and also the validate guidelines for blood transfusion in the UK recommend, if RBC units are not in temperature range for more than 30

minutes , that should not be stored back for reissue [5]. The justification for the rule is that once RBC units are out of controlled temperature storage, the component warms up very quickly and the risk of bacterial proliferation raises with time.^{6,7}

As because of high demand for blood transfusion in Guyana, a National Blood Transfusion service is responsible for fortify and providing sufficient amount supply of blood components. So, it is very much helpfull to analyze the available data on blood utilization in GPHC and it provides the world a vey helpful guideline for maximum use of blood and its products.

Targeted intervention may help in achieving reduction of the wastage of blood components and it has been proven in different studies of supply chain and blood usage benchmarks.^{11,12}

Lean and Six Sigma techniques was the first major study which focused on decreasing blood wastage and it was performed by Heitmiller et al,¹³ who revealed that wastage of RBCs could be decreased for more than 60% over the 4 years that result in reduction of more than \$800,000.

Hence, it should be less than 1% of the units issued in institutional wastage.¹⁴ Calculation of wastage as a percentage of units issued (WAPI) exposition for gap between hospital transfusion volumes and allows for benchmarking.¹⁵ By using this formula different hospitals of United Kingdom have analyzed their RBC wastage and the WAPI rates were between 0.26% and 6.7% annually,^{10,15} though in national level of England and North Wales, Northern Ireland, and Scotland the RBC WAPI rates for hospitals were, ranges from 2.1% to 4.8% in 2011–2012.¹⁶ In true words, this translates into a stumbling 19,687 wasted RBC units in 2012. Likewise, one study of a large institution in United States had revealed a WAPI RBC wastage rate of 4.4%.¹³

US Food and Drug Administration and also the AABB necessitated that RBCs must be kept between 2°C and 6°C. If there is probable chance of an RBC unit which has been issued but not transfused should be returned to the blood bank for the purpose to use in a different patient and that blood bag should be maintained temperature limit. Even though,^{17–19} many blood banks have acquired a “30-minute” rule for the compliance of the blood and not accepted the unused blood if it did not preserve in temperature range for more than 30 minutes. By this way, wastage of blood bag will increase if the transfusion has not started within 30 minutes of its issue.

Platelet components must be maintained at room temperature and should be discarded if refrigerated. Noncompliance with these temperature guidelines once the products have been issued can result in high levels of wastage. Multiple interventions focused on reducing blood waste have been attempted by various institutions, including education of providers, enhanced transport containers, robust temperature monitoring systems, and alteration of RBC storage protocols.^{12–14} Continued follow-up, including monthly meetings with clinical staff, distribution of blood wastage audits, and retraining of blood bank staff, was also identified as being effective in reducing waste.^{10,13,14} In addition, by focusing on the donors’ commitment of time, money, and resources in making their donation, as well as the moral duty to prevent the waste of a donated component, one group was able to make marked improvements in their wastage rates in the operating rooms (ORs) and on the wards.¹⁰

As an inventiveness of the patient blood management (PBM) committee at a tertiary health

care system, the extent and causes of blood product wastage were identified, and then targeted interventions to address the causes of wastage were implemented.

In a prospective study of Bone Marrow Transplant Program, Division of Hematology and Oncology, Georgetown University Medical Center, Washington, DC 20007, USA. Shows the evaluation of platelet transfusion, its utilization, available resource to use and also the costs in a tertiary care hospital for about 6-month period. Therefore, they have shared their experiences about the significant costs and duration of length of stay for platelet transfusion on special emphasis on platelet refractoriness and BMT allude patients. Hence, their point of view was very different from us as our maximum patients are poor and unable to use random platelet. Moreover, platelet wastage is more common in our setting as the short storage period of time 5 days and due to general tendency to use whole blood instead of components.

Moreover another point of key issue that also remains behind for this wastage is the skilled technical staff, their adopting capability to handle the components so precisely as their strength and weakness in working is also remains as a authentic reason to safe dealing of these components. As a part of developing nation we have also shown that our plasma wastage is due to cracking of blood bags is about 0.26% to 1.52% and formation of bulky clots as well as visible clots is about 0.2% to 2.2% due to inappropriate mixing with the anticoagulants.

The next foremost reason that remains for Packed cell wastage were 0.41% to 3.03% due to collection in pediatrics bags, no longer used in valid time therefore go for expiry, failure to transfuse due to bacterial contamination and haemolysis; all these things committed to inappropriate mobilization and teaching of the hospital staffs. In addition to that, particular skilled leadership and active involvement of the transfusion specialists can solve these critical day to day issues. Moreover, our expanded hands is needed to compliant these factors.

Conclusion:

Now in our constant and acceptable setting while the voluntary donors are limited though the patients are increasing in our regular setting so we should notice this important issue to proper and effective use of blood whenever it knocks. Another thing is to monitor our regular facing of wastage. Many physicians even don’t want to agree to use

components rather its more beneficial for our surviving poor society. Eventually the unskilled hands should be taught either locally or centrally to get the minimum advantage from them to reduce this issue. Educational interventions were also introduced to increase clinician awareness of blood waste and transfusion guidelines. A special attention for the donors and encourage them in different settings may also turnover and regain the bloodstock. Therefore, clinical nursing guidelines on blood product storage requirements should be developed more. Lastly, auditing of blood wastage might be performed on daily or weekly basis to concern more about the expiring blood components. The wastage reports should be forwarded to all the working physicians, technical stuffs and also the nursing units for further investigation when excessive wastage occurs.

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