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Rate and reasons for discarding blood and blood product units at the Northern Zone Blood Transfusion Centre in Tanzania

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Abstract

Blood transfusion is an essential component in modern healthcare. Blood being an irreplaceable resource needs to be appropriately utilized with preferably minimal or zero percent wastage. Only one third of required blood units are collected in a Northern Tanzania Hospital, demanding the need for zero rate of discard of blood and blood products. This study aimed to determine the rate and reasons for discarding blood and blood products at Northern Zone Blood Transfusion Centre in Tanzania. From the current study the discard rate of blood and blood component units was 2.48% and the main reason for discarding blood and blood components was Transfusion Transmitted infections, followed by plasma prepared after 24 hours of collection of blood. . Furthermore, the common discarded blood product was packed red blood cells in Northern Tanzania.

Keywords: Blood; Blood products; Blood transfusion; Blood discard rate

1. Introduction

Blood transfusion service is the process of transferring blood or blood-based products from an individual into the circulatory system of another [1]. Blood transfusion is carried out between two identical blood groups. This potentially lifesaving process can help to replace blood lost due to surgery or injury also help if a disorder prevents your body from production of blood or some of your blood's components correctly.

Blood transfusion is a key component in modern health care in saving the lives of many people in routine and emergency situations like in gynecological conditions, pregnancy and childbirth, severe childhood illness, trauma and cancers, or medical hematological conditions [2]. The goal of Blood Transfusion Service should be to provide effective blood and blood products, which are as safe as possible and sufficient to meet patients' need [3]. BTS plays a significant role in ensuring sufficiency, quality, and safety blood supply. A well-controlled BTS would contribute to better patient care.

In Tanzania one third of blood is being collected of which it does not meet the demands of blood transfusion [4].

With existing unmet target of blood collection, it is expected that blood collection centers and hospitals should have zero or minimal discard of blood and blood components. The WHO attributed most of the blood wastage due to poor

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managed stock, poor storage and transportation. This wastage is accountable for the loss of as a minimum as five million blood units every year [5].

Therefore, efforts to escalate amount of blood collected should go together with effort to decrease discards of blood and blood components. In northern zone blood transfusion centre proper donor counseling is done to reduce the rate of discarding blood units for those who are at high risk. Reduction of discard of blood and blood components can be done only if the rate and reasons for blood discard is known.

There is a limited study on the rate and reasons for discard of blood and blood products in Tanzania and non in Northern zone of Tanzania. Therefore, there is a need to know the rate and reasons for discarding blood and blood products.

The present study aimed to determine the rate and reasons of discarding blood and blood products at the blood bank in northern zone blood transfusion center in Tanzania.

2. Material and methods

This was a cross sectional study design, conducted at Northern Zone Blood Transfusion Centre in Tanzania on available data from July to December 2020. A census method was used for all documented blood units and blood products collected and discarded at Northern Zone Blood Transfusion Centre in Tanzania (NZ-BTC) and reasons for their discard. The data was processed and analyzed based on study objectives. Categorical variables were summarized using frequency and proportion or percentage. Rate was summarized using percentage by using Statistical Package for Social science (SPSS) version 23.

Data extraction sheet was used to extract data from a blood bank software information management system (Edelphyne) to capture information on reasons for discarding blood and blood products units at NZ-BTC. Information such as unit number, age, sex, month blood collected, month discarded, type of blood product, reasons for discarding blood unit were included in extraction sheet.

3. Results

A total 20,314 blood bags which were collected from donors during the study period, 3282 units were separated into components and rest 17,033 units were kept as whole blood units and a total 504 (2.48%) blood bags units out of 20,314 units were discarded. Where the main reason for discard was sero-positivity for various transfusion-transmitted infections (TTI) positive 71.4% (360) followed by plasma prepared after 24 hours of blood collection 17.4% (88).

3.1. Background characteristics of participant

Demographic characteristics of all participants are presented in Table 1 below. The majority of participant were males, who formed almost 16, 454(81%) of all participants while 3860 (19%) were females. More than three quarter of all participants 9,954 (49%) were aged between 18 and 35 years followed by 6,886(33.9%) who were aged 36 to 55 years, 3,475(17.1%) were greater than 55 years.

Table 1 General demographic characteristics of participants (N=20,314)

Variable	Frequency	Percent
Gender		
Male	16,454	81
Female	3860	19
Age		
18-35	9954	49
36-55	6886	33.9
>55	3474	17
Total		

Table 2 Characteristics of blood unit discarded (N=504)

Variable	Frequency	Percent
Blood unit group		
A	121	24
B	101	20
AB	22	4.4
O	260	51.6
Total	504	100
Type of blood product		
WB	125	24.8
PRC	228	45.2
FFP	149	29.6
PLT	2	0.4
Total	504	100

3.2. Rate of discarding blood units

It was observed that, among the blood units collected, the overall discard rate of blood and blood component units from July to December 2020 was 2.48%, where the discard rate among components collected 13.6%, 0.73%, 0.2% and 13.2% for PRC, WB, PLT and FFP respectively (Table 4 below).

Table 3 Rate of discarding blood and blood components (N= 20,314)

Year	Component status	WB	Blood components		
			PRC	FFP	PLT
July - December 2020	Collected	17,034	1680	1126	474
	Discarded	125	228	149	1
	Discard rate	0.73%	13.6%	13.2%	0.2%

Table 4 Rate of discarding blood unit by month (N=504)

Variable	Frequency	Percent
Month unit discarded		
July	78	15.5
August	62	12.3
September	39	7.7
October	143	28.4
November	46	9.1
December	136	27
TOTAL	504	100

3.3. Reasons for blood discard

A total number of WB and components were discarded due to various reasons are shown in table 5, Among discarded units of WB and its components, TTI positivity were 71.4% (360/504), date of expiry 0.2% (1/504), underweight 9.5% (48/504), leakage 0.2% (1/504), and other reasons such as plasma prepared after 24hrs of collection of blood was 17.4% (88/504) and units returned after being issued for transfusion and not used was 1.2% (6/504).

Table 5 Reasons for discarding blood and blood components (N=504)

Blood And Its Component	Reasons						Total
	Tti Postive	Leakage	Expired	Underweight	Plasma >24hrs	Returned After Being Issued for Transfusion and Not Used	
Whole Blood	78	1	0	46	0	0	125(24.8%)
Packed Red Blood Cell	223	0	1	1	0	3	228(45.2%)
Fresh Frozen Plasma	58	0	0	1	88	2	149(29.6%)
Platelets	1	0	1	0	0	2	2(0.4%)
Total	360(71.4%)	1(0.2%)	1(0.2%)	48(9.5%)	88(17.4%)	6(1.2%)	504(100%)

4. Discussion

Our study aimed to determine the rate and reasons of discarding blood and blood products at NZ-BTC in Tanzania. The rate for discarding blood and blood products was 2.48% and the rate was higher in October (28.4%).

The discard rate of blood in our study was similar to studies done in USA (1.6% by blood center and 2.5% among hospitals) and in Nigeria (1.8%) [6-7]. However, it was low compared to studies done in Ethiopia (16.3%), in Uganda (7.2%) and in 150 countries where the rate of blood discard ranged from 5.7% to 10.9% in different countries [8-10]. This may be due to the fact that, there is high utilization of blood and blood products in Northern zone Tanzania compared to those previous studies as the most common reason in these studies was date of expire. Strict adherence of garbage in, garbage out principle may be followed in NZ-BTC compared to other places.

Moreover, in Northern zone Tanzania, over past 15 years several efforts have been taken to strengthen blood bank operations and policies including training of staffs and proper implementation of blood transfusion policies. This study has been conducted following above measures, which could explain the findings of low discard rate in this study.

The rate of discarding blood unit and blood components in Northern Zone- Tanzania is very low (2.48%), six times less compared to average rate of Tanzania which is 15% according to the Ministry of Health [11]. This may be due to proper counseling of donor following stringent deferral norms. Furthermore, adherence to blood bank operational policies may be higher among NZ-BTC compared to other places in Tanzania.

In our study, the main reasons for discarding blood units were TTI positive 360 (71.4%). This is similar from studies done in 38 African regions (5.6%), in Uganda (93.3%), in Ethiopia and in Tanzania (14.8%) [12, 9, 8, 11].

However, the findings of this study are different from studies done in Nigeria, in Guyana-South America from 2012 to 2014 and by WHO whereby the most common reason for blood discard was the expire date [7,13,10]. This may be due to the fact that, there is scarcity and high utilization of blood and blood products in Northern zone Tanzania compared to those previous studies. Furthermore, shortage of staffs in NZ-BTC can also explain why plasma prepared after 24 hours of collection of blood was the second most common reason for blood discard at NZ-BTC different from other studies done in India and Uganda where component expiry due to non-utilization was 30.7% and 2.4% respectively being the second most common cause [14,9]. Also, another study in western India, the second most common cause of discarding blood and blood product was due to insufficient quantity 801 (35.19%) [15].

Also from our finding PRC was the most discarded product 228(45.2%) due to TTI positive. This is similar to study done in south America 82.8%, 69.2% and 68.3% for 2012, 2013 and 2014 respectively [13]. However, the finding was different from studies done in India where the most common component discarded was platelets (21.7%) due to expire date [16,14]. This may be due to the fact that most age group that donate blood at NZ-BTC are young adult aged 18-35 (49%) which are sexual active group susceptible to STI's.

As compared with other studies, it was observed that most of blood units were discarded at NZ-BTC because of seropositivity for different transfusion transmissible infections (TTI's) but for leakage, low volume, expiry and other reasons were least found, may be due to proper staff training and donor counseling such as proper conducted donor interview and notification of permanently deferred donors.

5. Conclusion

The discard rate of blood and blood component units 2.48% is still remarkable in Northern Tanzania Blood Bank but six times less than country blood discard rate 15%. The main reason for discarding blood and blood components was Transfusion Transmitted infections, followed by plasma prepared after 24 hours of collection of blood, underweight then leakage and expiry. Furthermore, the common discarded blood product was packed red cells in Northern Tanzania.

Compliance with ethical standards

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Author's contribution

ISM, MMT and SMI conceived and designed the study, carried out literature review, data analysis and manuscript writing. OJM supervised and provided guidance in designing the study, guided in conducting the study, statistical analysis and interpretation of data also reviewed the manuscript. All authors contributed to the study and approved the final manuscript.

Disclosure of conflict of interest

All authors listed in this article declare they have of conflict of interest for this publication.

Statement of ethical approval

The ethical approval for carrying out this study was obtained from the Kilimanjaro Christian Medical University College Research and Ethical Committee (CRERC 07).

Statement of informed consent

The study involved already collected data from the Blood bank of Northern Tanzania, therefore, informed consent was not required and hence not obtained.

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