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The assessment of collection and utilization of blood and blood components in Zanzibar

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Abstract

Background: Assessment of blood and blood components requisition and utilization is essential for better planning and improvement of transfusion services to meet requests and demands. The main aim of this study is to assess the collection and utilization of blood and blood components in Zanzibar National Blood Transfusion Services (ZNBTS).

Method: It is a retrospective study in which data relating to the collection and usage of blood and its components from January 2021 to December 2021 at ZNBTS was collected and analyzed.

Results: A total of 16,388 units of blood were collected from January to December 2021. 21,265 units of blood components were generated from 8,585(55.0%) units of Whole Blood (WB), while the remaining 7,030 (45.0%) units were issued as WB. In Unguja, there was a significant increase in the use of Packed Red Blood Cells (PRBC) 10,177 (61.3%), followed by WB 3,759 (22.6%), Fresh Frozen Plasma (FFP) 1, 562 (9.4%) and Platelets (PLT) 10 (0.06%) respectively. In Pemba, the use of WB was high (n = 1,526; 69.8%), followed by PRBC 878 (3.6%) and FFP 68(0.4%). The monthly mean blood request was 2,975 units (WB 460 and Blood components 1,028). Blood collection was above ZNBTS annual target of 16,000 units but blood and blood components request was met only by 50%.

Conclusion: There is a gradual shift in clinical practice from the traditional use of WB to the use of PRBC and other blood components. For the appropriate use of blood and blood components, Transfusion Medicine training among Medical Students and junior clinicians is strongly recommended.

Keywords: Blood and blood components; ZNBTS; PRBC; WB and FFP

1. Introduction

Blood cellular components and plasma are essential for supplies of oxygen and nutrients to different parts of the body (Podder et al., 2022). Improper use of blood and blood products can cause unnecessary burdens not only to the patients but also to the blood bank (Podder et al., 2022). Otherwise, Understanding demand and variability in Hospital utilization of blood and Blood components could help in predicting the long term needs and emergency preparedness (Perelman et al., 2021). Blood component therapy has been found to reduce volume overload in patients and seems to provide better patient management when compared to the transfusion of whole blood (Chowdhury et al., 2015).

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The need for knowledge on the appropriate use of blood and blood components in transfusing Hospitals in Tanzania was reported to be of great importance to ensure appropriate usage of blood and blood components (Bhombo et al., 2022). It was reported that, the United Nations International Children's Emergency Fund (UNICEF) support to ZNBTS led to a significant improvement in blood collection and availability of blood and blood components in Zanzibar Hospitals (UNICEF, 2018 and UNICEF, 2020).

In 2020/2021, the total ZNBTS blood collection was above the target of 16,000 units per year. The target was set against 1% of the country's population as recommended by the World Health Organization (WHO) (Ministry of Health, Social Welfare, Elderly, Gender and Children, 2021). The ZNBTS blood collection targets have been gradually increasing from 10,000 units (2013/2015), 16,000 units (2016/2021), to 20,000 units (2022), respectively. Otherwise, most community members in Zanzibar were found to have positive perceptions towards blood donation, which could ensure ZNBTS meets its collection target (Khalfan et al., 2023). The aim of this study was to assess the utilization of collected blood and generated blood components by ZNBTS in Zanzibar.

2. Methods

2.1. Study area

The study was conducted at ZNBTS and hospitals that receive blood and blood components from ZNBTS. The study includes 13 hospitals and clinics with transfusing facilities that receive blood and blood components directly from ZNBTS. 9 facilities were from Unguja Island and 4 from Pemba. Among them, 7 were government hospitals, 3 based in Unguja (Mnazi Mmoja, Makunduchi, and Kivunge), and 4 based in Pemba (Chake-Chake, Wete, Abdalla Mzee and Micheweni).Private Hospitals wee 4 (Al-Rahma, Tasakhtaa, Tawakal, and Mina) and 2 were military based (KMKM and Bububu)all based in Unguja.

2.2. Study design

This study employed retrospective analysis of blood transfusion data relating to collection and usage of blood and blood component from January 2021 to December 2021. The ZNBTS was used as the main reference for blood collection, preparation and distribution and production of blood and blood components.

2.3. Data collection

Data for blood collection, blood component production, blood and blood component request and utilization for the period of 12 - months from January to December 2021 were collected from the ZNBTS register and Hospitals records for analysis. Two sets of data collection tools were used to capture the intended information. The ZNBTS tool captured monthly information, including the number of blood donors, the number of collected safe and unsafe blood,, the number and types of blood products generated, requested and distributed to different hospitals in Unguja and Pemba. Tool for information from Hospitals was designed to capture information on the number of units of whole blood and blood components requested and received/utilised by the respective hospital per each month..

2.4. Statistical analysis

The data collected were analyzed using Statistical Package for Social Study (SPSS) version 25 software (Armonk, NY. IBM Corp.). Frequency and percentages were used to summarize variables.

3. Results

A total of 16,388 units of blood were collected from January to December 2021. This include 15,615 (95.3%) units of safe blood and 773(4.7%) of unsafe. The 8,585 (55.0%) units of safe WB were processed to generate 21,265 units of blood components while the remaining 7,030 (45.0%) units were issued as WB. The generated blood components were PRBC, FFP and PLT, shown in table 1.

The number of requests (blood and blood components) in Unguja and Pemba reached 35,386; however, only 17,501 (49.5%) units were issued. The mean request was 2,975 per month while the mean supply was 1,488 for WB 460 and Blood components 1,028. Overall blood collection was above the ZNBTS annual collection target of 16,000 units, yet demand was met only by 50%, as shown in Table 2.

An increased use of PRBC 10,177 (65%) was observed in Unguja Hospitals, followed by WB 3,759 (24%), FFP 1 562 (10%) and PLT 148 (1%), respectively. In Pemba, the use of WB (n = 1,526; 69.8%) followed by PRBCS (n = 592; 27%), FFP (n = 68; 3.1%) and PLT (n = 0.0; 0.0%), shown in Figure 1

Table 1 Monthly blood collection at ZNTBS -

Month 2021	Visited donor	Monthly collection	Screened blood	Safe blood	Unsafe blood	WB	Other product	Blood & blood product
Jan	1,444	1,341	1,341	1,314	27	496	1,655	2,151
Feb	1,452	1,367	1,367	1,285	82	436	1,846	2,282
Mar	1,435	1,299	1,299	1,171	128	483	1,857	2,340
Apr	1,825	1,726	1,726	1,675	51	441	1,719	2,160
May	1167	1,105	1,105	1,002	103	467	1,550	2,017
Jun	1,870	1,768	1,768	1,711	57	729	2,189	2,918
Jul	1,277	1,188	1,188	1,143	45	815	1,232	2,047
Aug	1,471	1,378	1,378	1,308	70	582	1,983	2,565
Sep	1,417	1,351	1,351	1,282	69	537	1,953	2,490
Oct	1,337	1,268	1,268	1,216	52	880	1,641	2,521
Nov	1,768	1,672	1,672	1,638	34	604	1,903	2,507
Dec	1,002	925	925	870	55	560	1,737	2,297
TOTAL	**17,465**	**16,388**	**16,388**	**15,615**	**773**	**7,030**	**21,265**	**28,295**

Table 2 Distribution of the blood and blood components

WB	Blood products	Blood & product	All requests	Supply	WB requested	WB supplied	Components requested	Component supplied
7,030	21,265	28,295	35,702	17,856	9,270	5,515	26,432	12,341

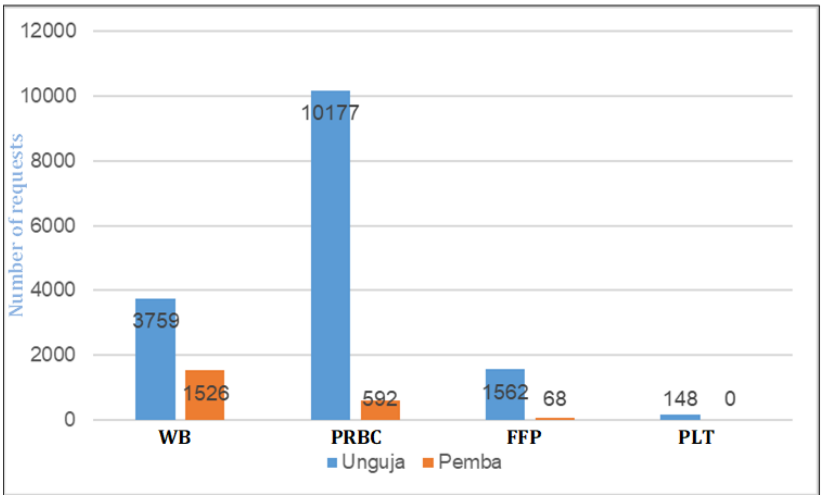

Figure 1 Utilisation of blood and blood components in Unguja and Pemba

In Unguja, the Private Hospitals received more than half of their request compared to the Public Hospitals. Mnazi Mmoja Referal Hospital received only 45% of its request and Kivunge Hospital 48%, while Al-Rahma received 60% and

Bububu Military Hospital received 61%. However, supply for Pemba in Wete, Chake-chake and Abdalla Mzee Public Hospitals was 94%, 88% and 84.6%, respectively. Overall supply for Unguja was 46.3 % and for Pemba was 87.9 %.

4. Discussion

This study assessed the collection and utilization of collected safe blood and generated blood components by ZNBTS in Zanzibar. From January to December 2021 a total of 16,388 units of blood were collected. The collection was above the target of 16,000 units of blood for the year 2021. In 2018, reports from UNICEF indicated that ZNBTS was able to collect 15,057 units of the estimated target of 16,000 units (UNICEF, 2020) met more than 85 per cent of the total demand (UNICEF 2018, and UNICEF 2020).

In this study, requests for blood and blood components were reported to reach 35,386 units; however, only (n =17,501; 49.5%) of requests were fulfilled. The findings indicate that ZNBTS was not able to meet requests by 50.5%. This observation raised a question of whether the ZNBTS target was set on the basis of actual documented blood and blood components demand. For proper planning and appropriate setting of collection targets, the collection center needs to do donor profiling and advance prediction of the donation (Epifani et al., 2023).

Two recent studies from Tanzania National Blood Transfusion Service (TNBTS) and Northern Zone Blood Transfusion Centre in Tanzania (NZ-BTC) revealed overall blood collection belowthan one-third of actual demand (Mathias et al., 2021; Valerian et al., 2018). ZNBTS has set up its annual collection target based on the WHO formula of 1% of the country's total population (Ministry of Health, Social Welfare, Elderly, Gender and Children, 2021). WHO Report on Global Status of Blood Safety and Availability 2021 reveals that for the year 2018, there were blood collections of less than 10 whole blood donations per 1000 population in 34 countries under the WHO African Region (WHO, 2022).

On the other hand, our findings revealed that the Private Hospitals received more than 60% of their request compared to Public Hospitals, which received less than 50% of their request. These findings could be well explained due to the fact that the number of requests from Non-Government Hospitals was within the capacity of ZNBTS as not many as those from Public Hospitals that came at high frequency with the huge requests.

Another observation among the Public Hospitals is that the supply for Pemba was met by more than 88%. Possibly this is due to the fact that the rate of collection by ZNBTS Satellites in Pemba is always higher compared to the collection and demand in Unguja. In Zanzibar, ZNBTS blood donation mostly relies on military camps, politicians, district leaders and sports groups rather than community and religious groups. The engagement of the local government in assisting ZNBTS in community mobilization has proven to expand blood donation (UNICEF, 2020; Valerian et al., 2018). It has been revealed that community mass education in the general population in blood donation campaigns seems to increase blood donation (UNICEF, 2020). Otherwise, proper staff training and donor counselling are very crucial (Mathias et al., 2021).

On distribution and utilization of blood and blood components in Zanzibar Hospitals, we reveal that PRBC were the most utilized (n = 10,649; 61.3%), followed by WB (n = 5,317;30.6%), FFP (n = 1,245; 7.2%) and PC (n = 148; 0.85%) respectively. The observed pattern differs with neighboring countries findings from studies conducted in Tanzania (Drammeha et al., 2018), Uganda (Checkley et al., 2019), and other sub-Saharan Africa (Uyoga & Maitland, 2019) but concurs with studies conducted in Ethiopia (Gurmu et al., 2021) with increased use of PRBC among blood components which is correlating with our findings in Unguja.

Despite the above general observation, we found a different pattern of blood components between Unguja and Pemba. The use of blood components in Unguja Hospitals was dominated by the use of PRBC (n = 10,177 (65%), followed by WB (n = 3,759; 24%), FFP (n = 1, 562; 10%) and PLT (n = 148; 1%). Contrary to Pemba Hospitals, whereby was dominated by the use of WB (n = 1,526; 69.8%) followed by PRBC (n = 592; 27%), FFP ((n = 68; 3.1%) and PLT (n = 0.0; 0.0%). This finding clearly highlights the gradual shift of clinical practice from the traditional use of WB to the use of blood components in Unguja Hospitals. It has been reported that the use of WB yet remains more common in most sub-Saharan African countries compared to PRBC and other blood components (Uyoga & Maitland, 2019).

A series of recent studies reported an inconsistency in training and knowledge of Transfusion Medicine among healthcare professionals (Garraud et al., 2018; Kipkulei et al., 2023; Laher & Patel, 2019; Vuk et al., 2023) and poor Hemovigelance in medical schools that resulting in a lack of competencies and knowledge on the entire transfusion chain from donor to recipient (Vuk et al., 2023).

Throughout the world, the issue of rational use of blood, blood components, adequate blood supply, equitable access and blood safety remain as among major challenges in blood transfusion (Uyoga & Maitland, 2019). To the best of our knowledge, no similar study has been conducted in Zanzibar. More studies have to be conducted to identify the gaps in improving transfusion services in Zanzibar.

5. Conclusion

Our study provides basic information on the collection and supply of blood and blood components by ZNBTS among transfusing hospitals in Zanzibar. A significant shift in clinical practice from the traditional use of WB to the use of blood components has been observed in Unguja Hospitals. On the other hand, the ZNBTS collection target should reflect the national actual demand. Subsequently, training on transfusion medicine should be emphasized to medical, nurses and midwifery students, interns, and clinicians to ensure the appropriate use of blood and blood components.

Compliance with ethical standards

Acknowlegement

The study was approved by the Zanzibar Health Research Ethics Committee (ZAHREC) of the Zanzibar Health Research Institute (ZAHRI) of the Ministry of Health Zanzibar, Tanzania

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

This is a records/chart review study, informed consent was not obtained as no individual participation.

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