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Demographic and Clinical Profiles of Blood Transfusion Recipients at a Teaching and Referral Hospital in Kenya

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Abstract

Background: Blood transfusion is an essential component of modern health care. It is required universally to manage various medical, surgical and obstetric conditions. Establishing the profiles of blood recipients would help in predicting the long term needs of blood transfusion as changing patterns of populations, diseases and health care will result in changing demands for blood and blood components. The objective of the study was to determine the pattern of blood use in terms of demographic and clinical profiles of the recipients. **Methods:** A hospital based medical chart review of 384 patients who were transfused from June 2013 to November 2013 was carried out. Systematic random sampling method was used; data were collected using a structured data collection form and was analyzed using frequency tables. **Results:** The median age of the recipients was 31.5 years (IQR 13, 45.8) and the range was 0 to 89 years. Females comprised 55.2% of the recipients, of which 57.7% were in the reproductive age group (15 - 49 years). The majority of the recipients (60%) were from surgical and medical wards. The main indication of the transfusion was anaemia (62.8%) and most of the transfused patients were being treated for neoplasms (23.2%), pregnancy and childbirth related conditions (11.7%), injuries (11.5%) and infections (11.4%). **Conclusion:** Majority of the transfused patients were relatively young and were females. Anemia was the main indication of the transfusion and most of the transfused recipients presented with neoplasms, pregnancy and childbirth related conditions, infections and injuries.

Classification of Disease (ICD)

1. Introduction

Blood transfusion is an essential component of modern health care. It is required universally to manage various medical, surgical and obstetric conditions [1]. Blood, though vital in health care, is a scarce resource, costly and its use can be associated with infectious and non-infectious risks. In order to improve the transfusion practice, review and continuous evaluation of blood usage is necessary [2]. This involves determining the pattern of blood use, the demographic characteristics of the transfusion recipients, the clinical conditions and the wards requiring blood transfusion in a population. Evaluation of blood requisition and utilization is crucial in assessing the present and future demands for blood and avoiding unnecessary requests and transfusions [3]. Various studies on blood use have demonstrated different profiles in terms of demographics, diagnoses and clinical indications. These differences might be due to varying geographical location and methodological heterogeinity of these studies [4].

The demographic and clinical profiles of the recipients of blood and blood components differ between developed and developing countries. According to WHO [1], blood transfusion in developed countries is commonly used to support advanced medical and surgical procedures, including trauma, cardiovascular surgery, neurosurgery, transplantation etc.; while in developing countries, a much greater proportion of blood is used to treat women with obstetric emergencies and children suffering from severe anemia, often resulting from malaria and malnutrition.

Data on blood use is helpful in resource limited settings in which there are always competing needs for scarce resources [5]. Information on blood utilization will assist in establishing clinical practice guidelines, strategizing on new donor recruitment, streamlining resources for the benefit of the patient and conducting cost effective analysis [3]. This study aimed at determining the demographic and clinical characteristics of blood transfusion recipients and the pattern of blood use in a national teaching and referral hospital.

2. Methodology

This was a retrospective hospital-based chart review carried out at Moi Teaching and Referral Hospital which is a 900-bed capacity hospital located in Eldoret town, Kenya and it serves western Kenya, parts of Southern Uganda and South Sudan.

The study targeted patients who were admitted to the general wards of the hospital and were transfused whole blood or packed red cells between the months of June to November 2013. A sample of 384 patient charts was sampled using systematic random sampling method.

Data was collected using a structured data collection form and information was extracted from the clinical notes, laboratory request forms and the nursing notes. The data collected included the recipient's age, gender, clinical department, presenting condition (diagnosis) and blood and blood component transfused. The International Classification of Diseases (ICD-10) version was used for classification of the presenting conditions requiring transfusion of blood and blood components. The primary and the secondary ICD-10 codes were matched with the clinical details and diagnosis obtained from the patient clinical notes and request forms to select the most appropriate condition requiring transfusion. The diagnoses were then grouped into broad categories according to the 21 (I-XXI) chapters of ICD-10.

The data was entered into SPSS software version 20, summarized and analyzed using frequency tables. Ethical clearance was obtained from Institutional Research and Ethical Committee (IREC) of Moi University and Moi Teaching and Referral Hospital. The patients' medical records were de-identified.

3. Results

3.1. Demographic Characteristics of the Transfusion Recipients

The median age of the patients (IQR) was 31.5 (13, 45.8) and the range was 0 to 89 years. The mean age (standard deviation) of the recipients was 31.3 (21.4). About 8.8% of the recipients were at least 65 years and 27.6% were below 15 years of age. Majority of the transfused patients were women (55.2%, 212/384), with recipients in the reproductive age group (15 - 49 years) accounting for the majority, 55.7% (118/212). The distribution of the transfusion recipients according to age and sex is as shown in Table 1 and Figure 1.
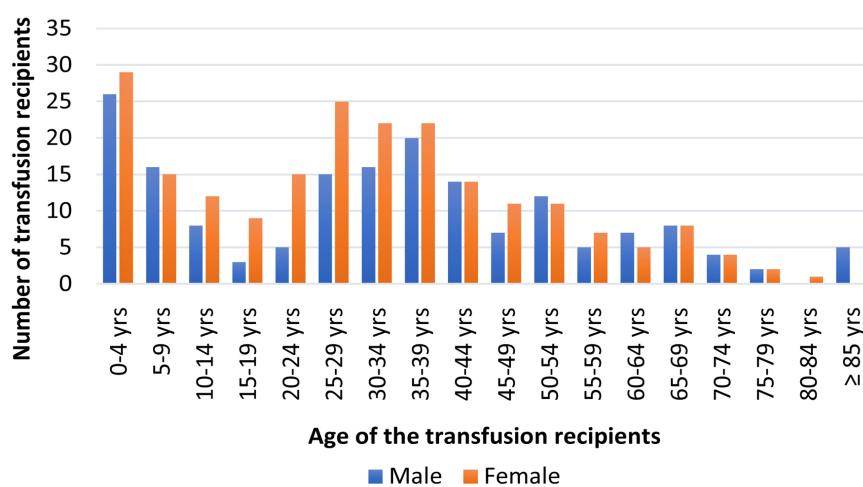
3.2. Clinical Profiles of the Transfusion Recipients

The clinical characteristics of the recipients are as shown in Table 2. Of all the transfused patients, 30.5% (117) were admitted to the surgical wards while 29.2% (112) were in the medical department. Neoplasms accounted for the majority of

Table 1. The demographic characteristics of the transfusion recipients.

Age group (years)	Recipients, n (%)	Sex of recipient	
		Males, n (%)	Females, n (%)
0 - 4	54 (14.1)	25 (46.3)	29 (53.7)
5 - 14	52 (13.5)	25 (48.1)	27 (51.9)
15 - 24	31 (8.1)	8 (25.8)	23 (74.2)
25 - 34	78 (20.3)	31 (39.7)	47 (60.3)
35 - 44	71 (18.5)	34 (47.9)	37 (52.1)
45 - 54	41 (10.7)	19 (46.3)	22 (53.7)
55 - 64	23 (6.0)	12 (52.2)	11 (47.8)
≥65	34 (8.8)	18 (52.9)	16 (47.1)

Table 2. Clinical profiles of the transfusion recipients.

Clinical profiles	Frequency (n)	Percent (%)
Clinical department		
Medical	112	29.2
Surgical	117	30.5
Reproductive health	75	19.5
Child health	80	20.8
Presenting condition		
Infectious and parasitic diseases (A00-B99)	44	11.4
Neoplasms (C00-O48)	89	23.2
Diseases of blood & blood forming organs (D00-D89)	31	8.1
Endocrine, nutritional and metabolic disease (E00-E90)	13	3.4
Diseases of the nervous system (G00 = G99)	2	0.5
Diseases of the circulatory system (I00-I99)	3	0.8
Diseases of the respiratory system (J00-J99)	4	1.0
Diseases of the digestive system (K00-K93)	28	7.3
Diseases of the skin and subcutaneous tissues (L00-L99)	3	0.8
Diseases of musculoskeletal system (M00-M99)	6	1.6
Diseases of the genitourinary system (N00-N99)	36	9.4
Pregnancy, childbirth & Puerperium (O00-O99)	45	11.7
Conditions in the perinatal period (P00-P99)	27	7.0
Congenital malformations (Q00-99)	9	2.3
Injuries (S00-T98)	44	11.4
Indication of the transfusion		
Unspecified anaemia	241	62.8
Elective surgery	56	14.6
Haemorrhage	53	13.8
Indication not documented	34	8.8
Blood groups		
A^+	111	28.9
A^-	7	1.8
B^+	51	13.3
B^-	2	0.5
AB^+	15	3.9
AB^-	2	0.5
O^+	190	49.5
O^-	6	1.6

Figure 1. Distribution of the transfusion recipients according by age and sex.

the presenting conditions for the recipients, 23.2% (89/384), of which 73/88 (83.0%) were malignant. This was followed by pregnancy and childbirth related cases (12.5%), injuries (11.5%) and infectious & parasitic conditions (11.2%). The top four broad diagnostic categories were further classified into four subcategories (Table 3).

The indication of the blood transfusion was classified into three broad categories: anaemia, haemorrhage and elective surgery. Majority of the recipients, 241 (62.8%) had unspecified anaemia as the indication for blood transfusion while 56 (14.6%) were transfused in preparation for elective surgery. Among the patients who were transfused because of hemorrhage, 34/53 (63%) had obstetric/gynaecologic bleeding. The common blood group among the transfusion recipients was O Rhesus positive (49.5%) and the least were blood groups B Rhesus negative (0.5%) and AB Rhesus negative (0.5%).

3.3. Distribution of Transfusion Recipients by Blood and Blood Component Transfused and Age and Sex

Whole blood was transfused to 231 (60.2%) of the recipients while PRBC was used by 153 (39.8%) patients. Patients in the 20 - 49 years age range utilized 48.4% (186/384) of all the blood and blood component, out of which 69.9% (130/186) was whole blood. Whole blood was mostly transfused to women (126/212, 59.4%) and paediatric patients below the age of 9 years received 13.2% (28/212) of whole blood and 36.6% (56/153) of PRBC (Figure 2).

Table 3. The 16 most frequent ICD-10 diagnoses.

| Broad diagnostic category	Four subcategories	Number of recipients	Percent (%)
Neoplasms	Malignant disorders of lymphoid and haematopoietic tissues	18	4.6
	Benign neoplasms	16	4.2
	Malignant neoplasms of female genital organs	12	3.1
	Malignant neoplasms of digestive system	10	2.6
Pregnancy, childbirth and the puerperium	Abortion, unspecified	11	2.7
	Postpartum haemorrhage	8	2.1
	Antepartum haemorrhage, unspecified	8	2.1
	Anaemia complicating pregnancy, unspecified	7	1.8
Certain infectious and parasitic diseases	Human immunodeficiency (HIV) disease, unspecified	25	6.5
	Malaria, unspecified	10	2.6
	Visceral leishmaniasis	4	1.0
	Tuberculosis	3	0.8
Genitourinary	Chronic kidney disease, unspecified	23	6.0
	Obstructive uropathy and reflux uropathy, unspecified	2	0.5
	Menorhagia	2	0.5
	Benign prostatic hyperplasia	2	0.5
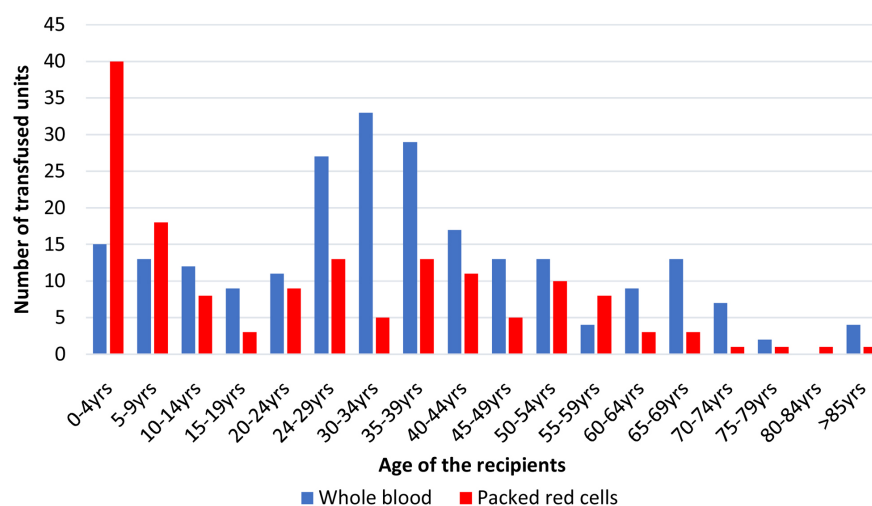
Figure 2. The distribution of transfusion recipients by blood and blood component used and age.

3.4. Distribution of Recipients by Blood and Blood Component Transfused and the Clinical Department

A higher proportion of blood and component utilized by recipients in the reproductive health department was whole blood (76.0%, 56/75) and this was followed by recipients in surgical department (69.2%, 81/117). Only 30% (24/80) of the recipients in child health department utilized whole blood. Packed red blood cells were transfused to 70% (56/80) of recipients in the child health department (Table 4).

3.5. Distribution of Transfusion Recipients by Blood Component Transfused and Presenting Condition

The proportion of whole blood accounted for 82% (37/45) of all the blood and blood component transfused to recipients who had pregnancy and child birth related conditions, followed by those with digestive system disorders 75% (21/28). Of all the blood and blood component transfused to patients with conditions in the perinatal period, packed red blood cells accounted for 88.9% (24/27) (Table 5).

3.6. Distribution of Transfusion Recipients by Blood and Blood Product Transfused and the Indication

Whole blood was mainly used in patients with anaemia, accounting for 35.2% (135/384) of all the transfused units. A large proportion of whole blood was given to patients with haemorrhage (73.6%, 39/53) as shown in Figure 3.

4. Discussion

In our findings, blood was used mainly by relatively young population of which the median age for the recipients was 31.5 years with patients in the 20 - 49 years age range utilizing the highest proportion of the transfused units. This finding

Table 4. The distribution of transfusion recipients by blood and blood component use and the clinical department.

Clinical department	Recipients, n (%)	Blood and Blood component	
		Whole blood, n (%)	Packed red cells, n (%)
Medical	112 (29.2)	69 (61.6)	43 (38.4)
Surgical	117 (30.5)	81 (69.2)	36 (30.8)
Reproductive health	75 (19.5)	57 (76.0)	18 (24.0)
Child health	80 (20.8)	24 (30.0)	56 (70.0)
Total	384 (100)	231 (60.2)	153 (39.8)

Table 5. Distribution of recipients by blood and blood component use and the presenting condition.

Presenting condition	Recipients, n (%)	Blood and Blood component	
		Whole blood, n (%)	Packed red cells, n (%)
Infectious and parasitic	44 (11.4)	25 (56.8)	19 (43.2)
Neoplasms	89 (23.2)	55 (61.8)	34 (38.2)
Diseases of blood	31 (8.1)	16 (51.6)	15 (48.4)
Endocrine, nutritional and metabolic disorders	13 (3.4)	8 (61.5)	5 (38.5)
Digestive system diseases	28 (7.3)	21 (75.0)	7 (25.0)
Genitourinary disorders	36 (9.4)	25 (69.4)	11 (30.6)
Pregnancyrelated conditions	45 (11.7)	37 (82.2)	8 (17.8)
Perinatal conditions	27 (7.0)	3 (11.1)	24 (88.9)
Injuries	44 (11.4)	29 (65.9)	15 (34.1)
Others	27 (7.0)	12 (44.4)	15 (55.6)
Total	384 (100)	231 (60.2)	153 (39.8)
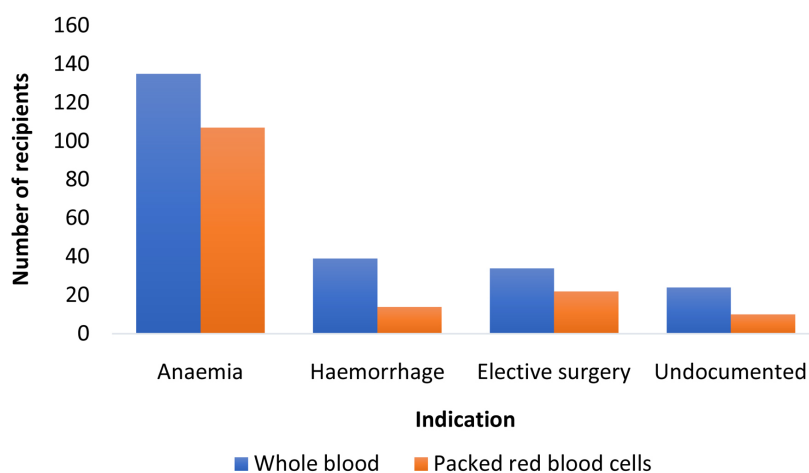
Figure 3. Distribution of transfusion recipients by blood and blood product used and the indication.

concurs with that of other studies from developing countries [5] [6] [7] [8] [9]. However, it varies from studies from developed countries [3] [10] [11]. This could be attributed to differences in age distribution of transfused patients in

these countries, whereby in developing countries, most transfusions are utilized by younger patients while in the developed countries the elderly (65 years and above) patients are ones mostly transfused [12].

In terms of gender, females (55.2%) utilized more blood transfusions than males, with those in the reproductive age group (15 - 49 years) accounting for the majority (118/212, 55.7%). This observation is consistent with study findings from other sub-Saharan Africa countries where women receive more blood for pregnancy-related complications resulting from intra-partum and post-partum haemorrhage [5] [8] [13]. In our study, of all the patients admitted to the reproductive health department, 45.3% (34/75) were transfused due to obstetric/gynaecologic haemorrhage, out of which 61.8% (21/34) resulted from abortions, ante-partum and post-partum haemorrhage.

Whole blood was transfused to the majority of the transfusion recipients (60.2%) and this result compares to the finding by Okoroiwu *et al.* [13] where 71.57% of the transfusion recipients received whole blood. This finding reflects common practice of requesting for whole blood in resource limited settings because of lack of facilities to prepare blood components.

The number of units of blood and blood components used was slightly higher in the surgical disciplines (51%) than in medical disciplines (49%). This finding is similar to those of other studies [3] [7] [14]. Whole blood accounted for a higher proportion of the total blood and blood components transfused in the surgical 61.6% (69/112) and reproductive health 76.0% (57/75) departments and this is similar to the study by Gaur *et al.* [7]. This finding could be due to the fact that one of the few indications of whole blood is severe haemorrhage [15] [16] which can result from traumatic injuries seen in surgical practice and from obstetric and gynecologic complications. In this study haemorrhage accounted for 14.3% (55/384) of all the indications of transfusion, of which surgical and obstetric/gynaecologic haemorrhage comprised 78.1% (43/55) of the cases.

The top five common presenting conditions of patients requiring blood transfusion in our study were neoplasms (23.2%), pregnancy related (11.7%), injuries (11.4%), infections (11.4%) and genitourinary (9.4%). Our findings are relatively similar to those reported in Zimbabwe [5] and Nigeria [13] [17]. The Zimbabwe study found that the top five common diagnoses were pregnancy related (22.4%), disorders of blood and blood forming organs (17.5%), neoplasms (10.1%), infectious (9.0%) and digestive diseases (8.2%). The study by Okoroiwu *et al.* [13] reported diagnoses in the pregnancy & childbirth, perinatal, genitourinary, blood and blood forming, neoplasms and injury categories as accounting for 38.9%, 14.4%, 7.9%, 7.8%, 6.7% and 4.4% respectively, of the blood and blood components issued. Studies from non-African countries have reported neoplasms, injury, digestive and circulatory systems diseases as the main diagnoses associated with transfusion [10] [18]. This strongly demonstrates that blood utilization pattern vary significantly within regions and this difference could be attributed to the variation in the clinical practices, diseases burden, lev-

el of organization and advancement of healthcare in the different settings [1].

The finding that neoplasms was the commonest presenting condition among transfused patients in our set up could be attributed to the large number of patients with neoplasms coming to the teaching and referral hospital, as it is the only referral health facility serving Western Kenya, Eastern Uganda and South Sudan [19].

Anaemia was the most common indication of blood transfusion and this finding is similar to that of other studies [7] [9] [20]. Majority of the patients who were transfused because of anaemia could have had anaemia of chronic disease as 66.4% (160/241) of these patients had neoplasms, infectious and chronic renal disease which is associated with anaemia of inflammation [21]. Anaemia of chronic disease is also the most common type of anaemia among hospitalized patients [22].

In terms of the specific blood component used, whole blood was the mainly transfused to recipients with anaemia and those undergoing elective surgery and. is similar to the findings by Gaur *et al.* [7]. Anaemia is associated with impaired cardiac function [23] and giving these patients whole blood may cause cardiac failure due to fluid overload [24]. The recommended blood product for transfusing patients with anaemia is packed red blood cells [25] [26] as it contains minimal amounts of plasma.

The distribution of the ABO and Rhesus blood groups among the transfusion recipients in our study compares with that reported in the Kenyan population [27]. Blood shortage of specific blood groups is a common occurrence in Kenyan hospitals, hence making it important to understand the distribution of blood group types among transfusion recipients. This knowledge is vital in ensuring that patients requiring blood transfusion receive blood matching their ABO and Rhesus blood types.

One of the limitations of this study is that it was a single site study and therefore generalization of the findings may have to be taken with caution. The study also assumed that all the blood requested and issued was transfused to the patients requiring the therapy.

5. Conclusion

Most of the transfused patients were relatively young and were females, most of whom were in the reproductive age group. Anemia was the main indication of the transfusion and majority of the transfused recipients presented with neoplasms, pregnancy and childbirth related conditions, infections and injuries. Whole blood was the major blood component utilized and this indicates inappropriate use and unnecessary wastage of a scarce resource. Although our study presents data from a single site, the findings provide an insight into the demographic and clinical characteristics of blood transfusion recipients. The study findings also form the basis for planning more comprehensive blood utilization studies in our set up.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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