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## Knowledge of Blood Transfusion Among Nurses at a Teaching and Referral Hospital in Western Kenya

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### Abstract

**Background:** Blood transfusion is a lifesaving treatment when used appropriately. It is a complex multistep process which involves health professionals of different cadres, including nurses. The health workers involved should have adequate knowledge and skills in order to ensure patient safety and good outcomes.

**Objective:** To assess blood transfusion knowledge among nurses at Moi Teaching and Referral Hospital (MTRH) and determine the factors associated with the knowledge level.

**Methods:** A cross-sectional study was carried out involving 95 participants. The participants were selected using proportionate sampling method. Data collected using a questionnaire was entered into SPSS version 20. Analysis was done using frequency tables, mean and analysis of variance (ANOVA). Statistical significance was set at  $p < 0.05$ .

**Results:** The mean age of the participants was 35.2 years (SD, 6.7) with a range of 26-52 years. Of the total participants, 74.7% (71/95) were females and the overall mean knowledge score was 60.2%, with a range of 29.6%-81.5%. Questions that were scored highly concerned infectious agents being screened in donated blood 92.6% (88/95) and management of an acute transfusion reaction 86.3% (82/95), whereas those that attracted the lowest scores were on storage temperature for platelets 13.7% (13/95) and labelling of patient blood samples 15.8% (15/95). There was only statistically significant relationship between knowledge score and academic qualifications.

**Conclusion:** The nurses' overall level of knowledge of blood transfusion in various domains assessed was suboptimal. There is need to enhance the knowledge of the nurses by way of in-service training and continuing professional development.

**Key words:** Blood transfusion, knowledge, nurses, training

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### I. Introduction

Blood transfusion is a lifesaving treatment modality when used appropriately and is indicated in the management of various medical and surgical conditions (World Health Organization, 2008). It is a complex multistep process which involves professionals of different cadres, physicians, nurses and laboratory technologists (Bolton-Maggs & Cohen, 2013). The process includes blood donation, preparation of blood components, decision to transfuse, patient identification, blood collection and labelling, collection and transportation of blood components from the laboratory, patient preparation (including obtaining of consent), administration of blood components, monitoring of patients and documentation (Derek, 2013).

Though blood transfusion essential in medical care, its use is associated with both infectious and noninfectious risks (Stainsby et al., 2006). These risks arise due to errors during transfusion process and most are caused by identification errors at the time of pre-transfusion blood sampling, sample handling in the laboratory, collecting the wrong component from the blood bank or transfusion to the patient at the bedside (Derek, 2013).

Nurses play crucial roles in all the stages of the process of blood transfusion. They are often involved in pre-transfusion sampling, provision of patient information, requesting blood from the laboratory, collecting blood, administration of the transfusion and monitoring the patient's response, during and after the transfusion event (Gray et al., 2007). The ultimate responsibility of the nurse is to ensure that the right blood component is given to the right patient at the right time (Derek, 2013) while following standard operating procedures (Marconi & Sirchia, 2000; Clark et al., 2001).

Lack or poor knowledge of clinical staff and consequently poor transfusion practice has been shown to be an important contributing factor to transfusion mistakes (Stainsby et al., 2005; Taylor et al., 2010). Therefore, in order to carry out this medical procedure safely and economically, the health workers involved ought to have adequate knowledge and skills in all the processes involved (Boyce & Brook, 2005). This study aimed at

assessing the knowledge and the factors affecting the knowledge of blood transfusion of among nurses at MTRH.

## II. Methods

The study was carried out at MTRH which is the second largest teaching and referral hospital in Kenya. The hospital serves a vast catchment area which spans western Kenya, Eastern Uganda and South Sudan with an estimated population of about 24 million.

It employed a cross-sectional descriptive study design and the participants were nurses providing direct patient care and based in wards/units where the survey was carried. Those who were excluded included nurse managers, new nurses with less than three months of experience and nurses on locum.

The sample size was calculated using the Taro Yamane formula (Yamane, 1967) with 95% confidence level.

$$n = \frac{N}{1+Ne^2}$$

Where:

n = desired sample size

N = study population size, in this case the total number of nurses working in the wards/units to be surveyed which was 310.

e = maximum acceptable margin of error (0.05)

1 = theoretical constant

$$n = \frac{310}{1 + (310 * 0.05^2)}$$

n = 178

The sample was selected by proportionate sampling method. A proportionate sample from each ward was calculated and the representative sample was then sampled by simple random sampling.

Data was collected from July to September 2017 using self-administered questionnaire. The questions were developed from the review of the literature and included demographic characteristics and 27 knowledge questions on the following topics: basic knowledge (blood groups, blood donation, blood component preparation, storage and appropriate use and blood tests (9 questions), clinical transfusion procedures ( consent, collection of blood samples, bedside procedures) (10 questions) and complications of blood transfusion/transfusion risks (8 questions). The questions were true /false questions with an option of don't know included to avoid guess work. One point was awarded to every correct answer and 0 to the wrong one or don't know response. The total knowledge scores were rated out of 27(100%). The higher the score, the higher the blood transfusion knowledge level.

The content validity of the tool was assured by subjecting it to scrutiny by two specialists in haematology and blood transfusion. They checked on the clarity of the items, and there were no changes recommended.

Data was entered into SPSS software version 20 and analyzed using frequency tables, mean (standard deviation), and Analysis of variance (ANOVA). ANOVA was used to determine the relationship between knowledge scores and some independent variables, e.g. age, sex, academic qualification. Results were deemed statistically significant if the p value was < 0.05.

Ethical approval was obtained from Institutional Research and Ethical Committee (IREC) of Moi University and MTRH. Informed consent was obtained from the study participants and no personal information was recorded.

## III. Results

Out of a total of 178 nurses issued with questionnaires, only 95 returned completely filled questionnaires, giving a response rate of 53.4%. The mean age of the participants was 35.2 years (SD, 6.7) and a range of 26-52 years. Of the total participants, 25.3% (24) were males and 74.7% (71) were females. The characteristics of the participants are summarized in table 1.

**Table 1:** Characteristics of study participants

Characteristic	Total	Percent
Age (years)		
< 30	15	15.8
30-34	32	33.7
35-39	20	21.1
40-44	11	11.6
>44	10	10.5
Sex		
Male	24	25.3
Female	71	74.7
Academic qualification		

Bachelor's degree	41	43.2
Diploma	54	56.8
Clinical department/ward/unit		
Medical	27	28.4
Paediatrics	22	23.2
Surgical	10	10.5
Obstetrics and Gynaecology	28	29.5
ICU	8	8.4
Work experience (years)		
< 2	4	4.2
2-5	21	22.1
>5	70	73.7
Time spend in unit/ward(years)		
< 2	12	12.6
2-5	29	30.5
>5	54	56.8
Participated in blood transfusion in-service training		
Yes		3
No	37	8.9
	58	61.1

The overall mean knowledge score was 60.2%, with a range of 29.6%-81.5%. The scores for questions on basic knowledge, clinical transfusion procedures and transfusions risks were 58.0%, 59.4% and 63.7% respectively. The possible maximum scores for basic knowledge, clinical aspects, transfusion risks and total knowledge were 9, 10, 8 and 27 respectively. None of the nurses correctly answered all the questions. The mean knowledge scores are summarized in table 2

**Table 2:** Mean knowledge scores in various domains of blood transfusion

Domain	Mean score	Standard deviation	Minimum	Maximum
Basic	5.22	1.45	3	9
Clinical transfusion procedures	5.94	1.23	3	9
Transfusion risks	5.06	1.41	2	8
Total	16.25	2.67	8	22

The specific questions which were scored highly by the nurses included those dealing with the infectious agents being screened for in donated blood 92.6% (88/95) and management of an acute transfusion reaction 86.3% (82/95). On the other hand, the questions that attracted the lowest scores were those on storage temperature for platelets 13.7% (13/95) and labelling of patient blood samples 15.8% (15/95)

There was only statistically significant relationship between mean knowledge scores and the academic qualification of the nurses ( $p= 0.036$ ). Those nurses with bachelor's degree had higher mean scores in all knowledge domains and overall knowledge score as compared to nurses with diploma qualifications, though this was only statistically significant in the basic knowledge domain ( $p = 0.022$ ) and in overall score ( $p=0.0036$ ). (Table 3)

**Table 3:** Relationship between knowledge scores and academic qualification

Variable/Domain	Mean (SD)	95% CI	Min	Max	F	p value
Basic knowledge						
Bachelor's degree	5.61 (1.41)	5.16-6.06	3	9	5.407	0.022
Diploma	4.93 (1.43)	4.54-5.32	2	8		
Total	5.22(1.45)	4.93-5.52	2	9		
Clinical aspects						
Bachelor's degree	6.10 (1.39)	5.66-6.54	3	9	1.112	0.284
Diploma	5.81 (1.21)	5.88-6.63	3	8		
Total	4.94(1.30)	5.67-6.20	3	9		
Transfusion risks						
Bachelor's degree	5.20(1.42)	4.75-5.64	2	8	0.365	0.547
Diploma	5.02(1.41)	4.63-5.40	2	7		
Total	5.09(1.41)	4.81-5.38	2	8		
Total knowledge score						
Bachelor's degree	16.90(2.66)	16.06-17.74	11	22	4.416	0.036
Diploma	15.76(2.60)	15.05-16.57	8	22		
Total	16.25(2.67)	15.71-16.80	8	22		

Sixty one percent of the respondents reported that they had not participated in any training on blood transfusion after their basic training and most of the participants indicated that they needed further training in various aspects of blood transfusion. The areas of blood transfusion that the participants perceived that needed

further training are blood transfusion risks (64.2%), blood components (61.1%), blood donation and pretransfusion tests (55.8%) and bedside procedures (29.5%).

#### **IV. Discussion**

The mean age of the respondents in our study was 35.1 years and this finding is similar to that of studies by Nunes da Silva et al., (2017) and Hijji et al., (2013). Majority of the participants were females (74.7%) and this concurs with other studies (Freixo et al., 2017; Hijji et al., 2013) . Studies have shown that though the nursing profession is dominated by women worldwide, the number of men joining the profession is on the rise (Zamanzadeh et al., 2013).

The overall level of blood transfusion knowledge in our study was 60.1% and it compares with that of Elhy, (2017); Talati et al., (2016) and Hijji et al., (2013) Published data on the knowledge and practice of blood transfusion among nurses have posted varied results though; most have reported an insufficient knowledge and practice on several key aspects of blood transfusion (Freixo et al., 2017; Elhy, 2017; Rajki et al., 2015; Kabinda et al., 2014; Hijji et al., 2013; Reza et al., 2009; de Graaf et al., 2009 and Saillour-Glénisson et al., 2002), As blood transfusion is an elaborate clinical practice and health workers involved in its performance are required to have adequate skills and knowledge. Adequate knowledge on blood transfusion is essential for good practice which contributes to safe and effective transfusion through avoidance of errors and monitoring of patients (Murphy et al., 2011; Reza et al., 2009 and Dzik et al., 2003),.

When it comes to individual questions, low scores were noted in questions dealing with storage and shelf life of blood components, where the cores were 13.7% and 32.6% respectively. Similar results were reported by (Freixo et al., 2017). This finding may impact on the quality of blood components being transfused and for stock management. Proper storage of blood components is to ensure viability of the components, prolong the shelf life, retard biochemical changes and prevent bacterial growth (Hess, 2010).

In regards to informed consent, 57.9% of the participants agreed that it is important to obtain an informed consent before a transfusion. Different studies have registered varied results on this topic. In a study by Kavaklioglu et al., (2017), 97% of the participants agreed that it is important to obtain an informed consent before a blood transfusion. Whereas, Kafando et al., 2017) reported that informing the patient in order to obtain their consent was done by 5% (10/192) of the respondents. Informed consent must be obtained from the recipient of blood transfusion before commencing the procedure. Sufficient verbal or written information on the benefits, risks and alternative of the transfusion should be availed to the patient and this should be documented (Whitmore, 2014).

About 16% of the nurses in our study indicated that blood could be warmed blood by wrapping in a clothing or standing in room temperature before transfusion. The practice of warming blood by wrapping in clothing, or in putting in bed or an armpit of a patient have been reported in other studies (Hijji et al., 2010; de Graaf et al., 2009). These warming methods are not recommended as they could cause bacterial growth (Ramirez-Arcos et al., 2016). In cases where warmed blood is required, the warming should be done in a designated blood warmer (Derek, 2013).

Only 42.1% of the nurses interviewed indicated correctly that only normal saline could be mixed safely with blood. This result concurs with that of Hijji et al., (2013), where many study participants reported that incompatible agents could be safely co-administered with blood. According to World Health Organization, no other medicines or infusions, apart from normal saline (sodium chloride 0.9%) should be added to any blood component (World Health Organization, 2001).

In our study, 80% of the nurses answered correctly the question about the recommended time interval for observations during transfusion. Hijji et al., (2013) reported that 90% (224/248) of the respondents were uncertain as to the frequency of recording vital signs of a transfused patient. The best transfusion practices recommend that the patient's vital signs should be observed before starting the transfusion, as soon as the transfusion is started, 15 minutes after onset of transfusion, at least every 30 minutes during transfusion, on completion of transfusion and four hours after completing the transfusion (World Health Organization, 2001). Close monitoring of patients being transfused is essential because it enables early detection of transfusion related reactions that can sometimes be harmful to the patient (Kavaklioglu et al., 2017)

Sixty six percent of the participants correctly indicated that clerical errors are the commonest cause of fatal transfusion reaction. Hijji et al., (2013), reported that 50% of nurse participants answered correctly that the commonest cause of most fatal transfusion reaction is the identification error of patient. Proper identification of the patient and blood component by a trained and competent health worker is crucial to ensure that the right patient and the right blood component is being transfused (Gray et al., 2007). Failure to carry out proper identification has been shown to be the most frequent error leading to incorrect transfusion. (Bolton-Maggs & Cohen, 2013). Hijji et al., (2010) in their study observed that 29% of the nurses confirmed ABO compatibility of blood bag and ID bracelet, while 4% checked the patient ID bracelet, blood bag, blood request form, and the information recorded in the patient observation form.

The proportion of respondents who answered correctly the questions on causes of blood transfusion reactions was 54.8%. This finding is similar to the one by Hijji et al., (2013), where 57% of nurses surveyed knew about the complications that can be caused by blood transfusion. In addition, majority (80%) of the nurses correctly answered a question asking how to manage an acute transfusion reaction (mild allergic reaction) and a similar result was posted by Hijji et al., (2013) where 85% of the study participants answered correctly when asked about the first action the nurse should take with mild allergic transfusion reaction. Blood transfusion reactions are classified as acute or delayed reaction and they are an important cause of morbidity and mortality. Therefore, it is very important that nurses can recognize a blood transfusion reaction and know the measures to be taken in managing them.

Our study did not establish any statistical significance between mean knowledge scores and the age, sex, work experience and length of service in the ward and this finding is in concordance with studies by Yesilbalkan et al., (2019 and Reza et al., (2009). However, a statistically significant relationship between mean knowledge scores and the academic qualification of the nurses was demonstrated and this compares with studies by Elhy, (2017) and Hijji et al., (2013) where a relationship between mean knowledge scores of study participants the educational qualifications was established. Our study showed that nurses with bachelor's qualifications had higher mean knowledge scores compared with those with diploma credentials ( $p=0.036$ ). This variance could be attributed to difference in the curricular of the two training programmes.

Sixty one percent of the respondents indicated that they had not received or participated in any training in blood transfusion. Studies by Hijji et al., (2013) and Diakité et al., (2012) reported 70.9% and 85.6% of the respondents had not received any in-service training respectively. Lack of continuous and regular training in blood transfusion result in insufficient knowledge among nursing staff (Kabinda et al., 2014)

## V. Conclusion

The study showed that the overall nurse's knowledge and of various blood transfusion domains was not optimal for safe transfusion practice. Moreover, most of the nurses had not received any training in blood transfusion and they expressed the need for further training in various aspects of blood transfusion. It is therefore, recommended that, the nurses' knowledge and skills in in blood transfusion should be enhanced by way of in-service training and courses on blood transfusion. In addition, the content of blood transfusion in the curricular of various nursing training programmes in our set up need to be relooked. Furthermore, similar studies with larger sample sizes in multiple sites should be conducted and finally, research to determine the actual practices of the nurses need to be carried out in our set up.

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