MEDICAL SCIENCE

Blood transfusion knowledge among nurses in Karima: Teaching hospital experience

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ABSTRACT

Background: Blood transfusion is a crucial and prevalent medical treatment that involves administering transfused blood and its components to save a patient's life. *Objective:* To assess blood transfusion knowledge among nurses at karema teaching hospital and determine the factors associated with the knowledge level. *Methods:* Across-sectional descriptive study was carried out from january to march 2023, involving 53 participants, the chosen participants by using total sampling method. Data collection using questionnaire was entered into SPSS version. Utilizing frequency tables and graphs, analysis was performed. *Results:* The current study revealed that, most all nurses had diploma degree with 50.9 percent. And that is 38 nurses did not attended a course before about blood transfusion with 71.7. Questions that received high scores were focused, medications that should be given to the patient when complications occur during blood transfusion 100 percent and solution that can be given with Blood 100 percent, where as those the low scored symptoms indicate an allergic reaction 9.4. Only the association between the nurses' knowledge score and years of experience was statistically significant (P =.019). *Conclusion:* Evaluating the general quality of blood transfusion knowledge across different fields was suboptimal and needed to enhance. Therefore, it is advised that through Nurses' knowledge and skills in this area should be increased through in-service training and courses on blood transfusion.

Keywords: Blood transfusion, Blood transfusion reactions, Blood transfusion safety, Nurses, Knowledge, Training.

1. INTRODUCTION

Blood transfusion, which involves transfusing blood and its components, is a crucial and frequently used medical treatment to save the life of a patient. While this procedure can improve the patient's condition, it also comes with potential risks (Khalil et al., 2013). The successful administration of blood transfusions relies heavily on the competence of nurses who play an essential

role in the procedure. The safe and effective practice of blood transfusions is heavily reliant on the expertise and skillset of the nurse, which can ultimately lead to a reduction in the potential risks associated with the procedure (Al-Nser, 2016).

The process of administering blood transfusions can be divided into five separate yet interconnected phases, four of which involve the nursing staff. These stages encompass various activities such as preparation before blood unit collection from storage, blood bag collection, pre-transfusion preparations, post-transfusion activities and constant monitoring, all of which are designed to ensure patient safety (Aslani et al., 2010). The safety and effectiveness of this process will depend on their knowledge and skills. Without appropriate provisions during a blood transfusion, it could have followed with fatal reactions.

Acute hemolytic reactions, febrile reactions and allergic reactions are the most important acute reactions that appear immediately after the beginning of blood transfusion. In addition to, these reactions incidence is higher in comparison to the other complications and are associated with significant mortality and morbidity (Hijji et al., 2012). The studies conducted Nurses' performance and knowledge of blood transfusions and blood transfusion courses are low to moderate at home and abroad (Bielby et al., 2011). Although the patient's life may be seriously threatened by this. Therefore, training programs, control and supervision seem to be necessary to ensure safe transfusion, to correct the patient when necessary (Watson and Hearnshaw, 2010).

Studies between 1997 and 2000 show that the most common error of blood transfusion is the wrong blood product administration (Gray et al., 2007). Errors during blood transfusion can result in serious and potentially life-threatening consequences for patients (Graaf et al., 2009). The Dangerous Side Effects of Transfusion 2014 report (SHOT) identified a total of 278 cases of incorrect blood component transfusions, with a majority of 156 (56.1%) occurring in clinical settings. Common contributing factors to these errors were human mistakes such as incorrect patient identification during sampling or transfusion, wrong blood unit collection from storage and inaccurate patient information recorded on blood request forms (Kaplan, 2015).

These errors are typically attributed to inadequate nursing intervention or insufficient knowledge about the blood transfusion process (Saillour-Glenisson et al., 2002). Nurses are generally trained on the procedures of blood transfusion during their years of service. However, their level of knowledge varies from one to another (Gray et al., 2007), as well as from different health care centers. In al shamalia state there is limited study on assessment of nurses' knowledge regarding blood transfusion (Smith et al., 2010).

Thus, this addresses a knowledge gap between the nurse's knowledge and transfusion safety (Murphy et al., 2001). In this study, the knowledge of nurses as blood is infused at different stages will be assessed and the data collected shall pinpoint the area for improvements. In Karima there is limited study on assessment of nurses' knowledge on blood transfusion, our study will focus on assessment of nurses' knowledge and covers knowledge gap on competencies of nurses to assurance of transfusion safe

2. METHODOLOGY

Study Design
Cross section hospital base study, will be conducted aimed to find out what factors influence nurses' level of knowledge about blood transfusions at the karema teaching hospital and to assess their blood transfusion knowledge.

Study Area
Karima is located in the north of sudan away 423km from the Khartoum, the capital of sudan it is about 27km away from Merowe dam it is second city in the northern state in terms of area.

Study Sitting
The sitting of the study was conducted this study in: Karima hospital located in karema city, Karema hospital is educational hospital, it include many type of department such as (obstetric department, surgical ward, medical ward, dialysis department, pediatrics ward, ER and lab, diabetic center, refer clinics, vaccination center, doctors and nurses offices on any department) and other type the obese department include antenatal ward, postnatal ward, nursery, operation rooms and normal labour room. The care is provided in these wards by staff of nursing and mid wife.

Study Population
The study population include all nurses working in all departments of hospital and accepted to participate in the study.

Include
All nurses in all department who work in study area directly with patient during period of study.

Exclude

Nurses were not found during collect data and study to participate in the study.

Sample Size

Cover all nurses work in hospital. The total sample was (53).

Study period

The whole duration of the study will be in period from January to March 2023.

Method of Data Collection

The study was based interview questionnaire. The interview questionnaire was translated to Arabic.

Data Collection Tool

A questionnaire was designed for the purpose of the study which included the following: Demographic data and question about knowledge of blood transfusion, reaction and complication.

Data Analysis

The statistical package for the social science (SPSS).

Ethical Consideration

Ethical approve from the Merowe University of Technology, Abdulatif Alhamed No (23-345). The study was done after take Permission from karema hospital before data collection explaining the major aim of the research was said at the beginning of the interview in order to give the participants clarifications about the research. By agreeing to answer the survey, that has considered as approval of the participants to involving in the study. Additionally, all of the collected data were kept with the researchers in order to protect persons' confidentiality who involved in this study.

3. RESULTS

The sample size is 53 nurses their ages are distributed into three categories as in (Table 1). The distribution of educational qualification among nurses. The most frequent category is General Nursing Diploma with 50.9 percent, Bachelor of Science in Nursing with 15 percent and Diploma in Midwifery with 11 percent (Table 2).

Table 1 Distribution of age variable

Age	Frequency	Percent
Less than 25	2	3.8
From 25 to 30	14	26.4
More than 30	37	69.8
Total	53	100.0

Table 2 Distribution of educational qualification variable

Educational Qualification	Frequency	Percent
General Nursing Diploma	27	50.9
Bachelor of Science in Nursing	15	28.3
Diploma in Midwifery	11	20.8
Total	53	100.0

Demonstrates the distribution of blood transfusion course between the nurses. As it clears from the table 38 nurses did not attended a course before and 15 nurses of 53 has attended a transfusion course (Table 3, 4).

Table 3 Distribution of years of experience variable

Years of experience	Frequency	Percent
1 year or less	4	7.5
2-3 years	2	3.8
4-6 years	7	13.2
7-10 years	6	11.3
More than 10 years	34	64.2
Total	53	100.0

Table 4 the number of blood transfusions variable

How many blood transfusions were performed during the last six months?	Frequency	Percent
0	7	13.2
1	2	3.8
2	2	3.8
3	2	3.8
4	3	5.7
5	5	9.4
6	2	3.8
7	1	1.9
8	1	1.9
9	1	1.9
10	8	15.1
15	6	11.3
20	4	7.5
22	1	1.9
25	1	1.9
30	3	5.7
35	1	1.9
40	1	1.9
100	1	1.9
200	1	1.9
Total	53	100.0

The knowledge of nurses about the work that must be done after receiving the blood bag. Table 5 shows the flow of vital signs has a highest frequency with 34 percent.

Table 5 Nurses knowledge after receiving the blood bag

What is the nursing work that must be done after receiving the blood bag?	Frequency	Percent
Flow of vital signs	18	34.0
Identify the appropriate patient	17	32.1
Check the doctor's request with another nurse	13	24.5
Provide information to the patient and family	5	9.4
Total	53	100.0

Explains the knowledge of nurses about the appropriate time in which the vital signs must be recorded. As in the Table 6, 86.8 percent of nurses answered with (15 minutes) option and 13.2 percent answered with (30 minutes) option.

Table 6 Nurses knowledge about the vital signs

When should the vital signs be recorded before starting a blood transfusion?	Frequency	Percent
15 minutes	46	86.8
30 minutes	7	13.2
Total	53	100.0

Explains the nurses experience in dealing with the blood bag after receiving it, 42 of 53 of nurses saw (wrap the blood bag with a tissue or tissue) is the suitable process and 9 of them saw (start the blood transfusion directly) is the suitable process and just 2 nurses answered with (place the blood bag at room temperature) option (Table 7). All nurses saw that the solution that should be given to the patient is the normal local solution with a frequency of 53.

Table 7 Nurses knowledge about dealing with the blood bag

In the department after receiving a blood bag, how do you deal with it?	Frequency	Percent
Wrap the blood bag with a tissue or tissue	42	79.2
Place the blood bag at room temperature	2	3.8
Start the blood transfusion directly	9	17.0
Total	53	100.0

Table 8 Nurses Knowledge about patients to whom blood moves slowly in transfusion

Who are the patients to whom blood moves slowly in transfusion?	Responses	
	N	Percent
Heart patients	44	64.70%
Asthmatic patients	4	5.90%
Kidney stone patients	5	7.40%
Anemia patients	15	22.10%
Total	68	100.00%

Table 9 Nurses Knowledge about solutions can be given with a blood transfusion

Which of the following solutions can be given with a blood transfusion?	Frequency	Percent
Normal local solution	53	100.0

Monitoring period of the patient during the blood transfusion variable, it founded that 31, 5, 17 nurses answered with 10-15 minutes, the first hour, along the blood transfusion process respectively with a total of 53 nurses (Table 8, 9, 10).

Table 10 Monitoring period of the patient during the blood transfusion variable

How long should the patient be monitored to prevent a reaction during blood transfusion?	Frequency	Percent
10-15 minutes	31	58.5
The first hour	5	9.4
Along the blood transfusion process	17	32.1
Total	53	100.0

Table 11 The symptoms that indicate an allergic reaction when blood transfusion variable

What are the symptoms that indicate an allergic reaction when blood transfusion?		Responses		Percent of Cases
		N	Percent	
Symptoms indicate an allergic reaction	Pain in the arm	3	3.20%	5.70%
	Skin rash	46	49.50%	86.80%
	Pain in the flank	1	1.10%	1.90%
	Decrease in blood pressure	5	5.40%	9.40%
	Mild shortness of breath	38	40.90%	71.70%
Total		93	100.00%	175.50%

Table 12 The symptoms that indicate an allergic reaction when blood transfusion variable

What is the first procedure that the nurse should take to deal with the patient's condition in the previous question?		Responses	
		N	Percent
The first procedure that should be taken	Stop the blood transfusion and inform the doctor	52	96.30%
	Check the patient's vital signs and notify the doctor of that	2	3.70%
Total		54	100.00%

The suitable medications for the patient that should be given to the patient during transfusion process when complications occurs as it shown in the table all nurses (with 100 percent) consider the adrenaline or histamine and cortisone is the suitable kind of medications rather than anti-inflammatories and paracetamol or insulin, ibuprofen and nitroglycerin (Table 11, 12, 13).

Table 13 Medications that should be given to the patient when complications occur during a blood transfusion variable

What are the medications that should be given to the patient when complications occur during a blood transfusion?	Frequency	Percent
Adrenaline or histamine and cortisone	53	100

Hypothesis Test

The relationship was tested between the years of experience of the nurse and his ability to identify the patients to whom blood moves slowly in transfusion process. It founded that for nurses with 1 year or less, 2-3, 4-6, 7-10, more than 10 years of experience there was 3, 2, 6, 5, 28 nurses respectively identified the heart patients as the patients to whom blood moves slowly in transfusion (Table 14).

Table 14 Years of experience * heart patient Cross tabulation

Years of experience	Heart patient		Total	P value
	No	Yes		
1 year or less	1	3	4	
	11.1%	6.8%	7.5%	
2-3 years	0	2	2	
	.0%	4.5%	3.8%	
4-6 years	1	6	7	
	11.1%	13.6%	13.2%	.019
7-10 years	1	5	6	
	11.1%	11.4%	11.3%	
More than 10 years	6	28	34	
	66.7%	63.6%	64.2%	
Total	9	44	53	
	100.0%	100.0%	100.0%	

Spearman Correlation test was conducted to test the below hypotheses.

H0: There is a relationship between years of experience and the nurse knowledge in patients to whom blood moves slowly in transfusion.

H1: There is no relationship between years of experience and the nurse knowledge in patients to whom blood moves slowly in transfusion.

It found that the p-value is equal to .019 which is greater than 5% level of significance, this makes us accept the null hypothesis which says (there is a relationship between years of experience and the nurse knowledge in patients to whom blood moves slowly in transfusion).

In the Table 15 the relationship was tested between (Have you attended a blood transfusion course) variable and (What are the symptoms that indicate an allergic reaction when blood transfusion). It founded that 28.3% of nurses were able to identify the symptoms and 71.7% were unable to identify the symptoms.

Table 15 Have you attended a blood transfusion course? * What are the symptoms that indicate an allergic reaction when blood transfusion Cross tabulation

| | | Symptoms knowledge | | | | Total | P value |
		0	1	2	3		
Have you attended a blood transfusion course?	Yes	0	6	6	3	15	-.079
		.0%	31.6%	20.7%	75.0%	28.3%	
	No	1	13	23	1	38	
		100.0%	68.4%	79.3%	25.0%	71.7%	
Total		1	19	29	4	53	
						100.0%	

Spearman Correlation test was conducted to test the below hypotheses.

H0: There is a relationship between blood transfusion course attendance and What are the symptoms that indicate an allergic reaction when blood transfusion variables

H1: There is no relationship between relationship between blood transfusion course attendance and What are the symptoms that indicate an allergic reaction when blood transfusion variables.

It founded that the p-value is equal to -.079 which is less than 5% level of significance, this makes us refuse H0 hypothesis and accept H1 hypotheses which says (there is no relationship between relationship between blood transfusion course attendance and What are the symptoms that indicate an allergic reaction when blood transfusion variables). More than 10 years category has the highest frequency with 34 nurses between the other categories (Figure 1, 2).
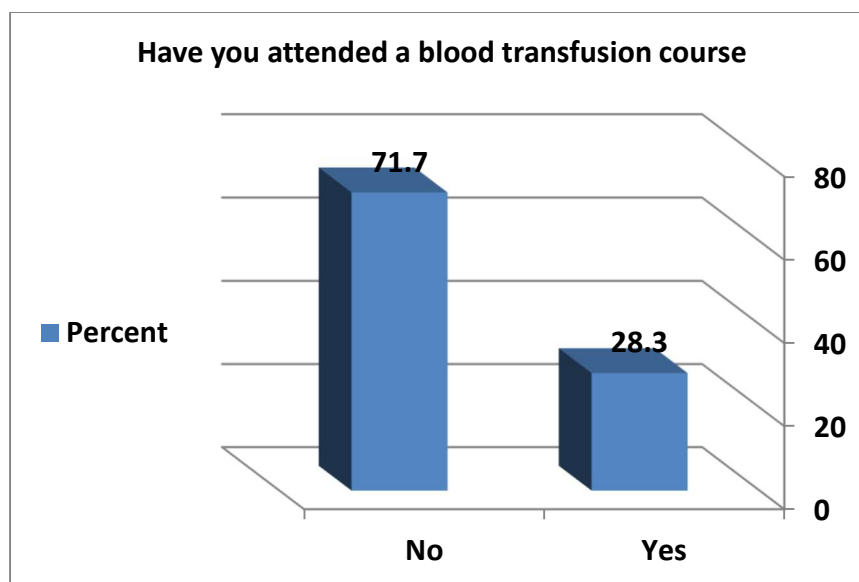

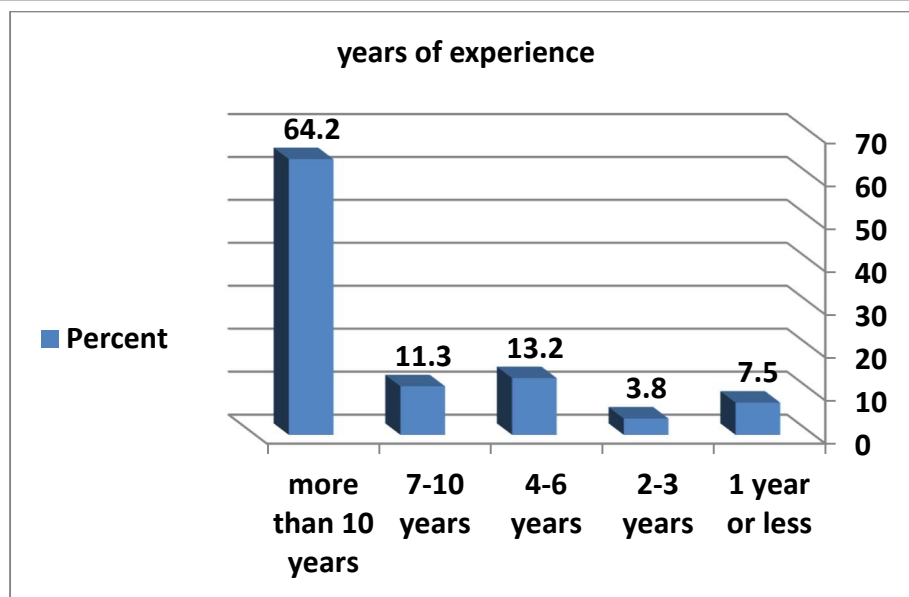**Figure 1** Shows the distribution of blood transfusion course variable

Figure 2 Shows the distribution of years of experience variable

4. DISCUSSION

This study was done to the nurses to assess their knowledge regard blood transfusion, we used descriptive cross-sectional study in karima hospital, the study group was involved 53 nurses, the present study shows that 69.8% of sample were more than 30 years old, 50.9% of them had general nursing diploma and 64.2% of them were more than 10 years of experience. We found that 71.7% of nurses did not attend a blood transfusion course and 15.1% of nurses were transfused 10 times during the last six months. We found that most of nurses (34%) were flow of vital signs as the first work done after receiving the blood bag and 86.8% of nurses were record the vital signs in the first 1 minutes before starting a blood transfusion.

The most of nurses (79.2%) saw wrap the blood bag with a tissue in the department after receiving it and all nurses saw that the safe solution given with blood is normal saline solution. We found (58.5%) were monitoring the patient during first 10-15 minutes, 64.7% of nurses saw that blood transfused slowly for heart's patient and 49.5% of nurses saw that skin rash is most symptoms indicates an allergic reaction of blood transfusion.

The study was tested the relationship between the years of experience of the nurse and his ability to identify the patients to whom blood slowly in transfusion process Hypothesis zero: There is a relationship between years of experience and the nurse knowledge in patients to whom blood moves slowly in transfusion. There is no relationship between years of experience and the nurse knowledge in patients to whom blood moves slowly in transfusion it found that the p-value is equal to .019 which is greater than 5% level of significance, this makes us accept the null hypothesis which says (there is a relationship between years of experience and the nurse knowledge in patients to whom blood moves slowly in transfusion).

The relationship was tested between (Have you attended a blood transfusion course) variable and (What are the symptoms that indicate an allergic reaction when blood transfusion). That found the p-value is equal to -.079 which is less than 5% level of significance, this makes us refuse hypothesis zero and accept hypotheses (1) which says (there is no relationship between relationship between blood transfusion course attendance and What are the symptoms that indicate an allergic reaction when blood transfusion variables). The cross-sectional study included 200 registered nurses who administered blood transfusions at the Hospital Universiti Sains Malaysia.

Using a five-part regular knowledge test on blood transfusions, the nurses' knowledge was assessed, with 50%, 50-74% or 75% of their answers being classified as low, moderate or high, respectively. Considering the rating system, it was determined that Malaysian nurses (33.2 8.4 years) had a basic knowledge of blood transfusions of 54.9 7.6%. The scores for the individual questions on prior knowledge for blood transfusion, pre-transfusion, post-transfusion, complications and transfusion policies were, respectively, 81.0%, 45.4%, 49.2%, 63.0% and 90.0%. The results of the survey revealed that the majority of nurses had a low degree of general understanding about blood transfusion (Mohd-Noor et al., 2021).

To identify the practices and expertise of 100 nurses from three hospitals in Ankara, Turkey, another descriptive study was planned, regarding blood transfusions, a study was designed. Utilizing percentages, the 2 formula and correlation techniques, the information gathered from observation and interviews was assessed. Blood transfusion-related nursing expertise and practice were

evaluated using a 100-point scale. Only a few of the participating nurses' scores exceeded 50 and none of them reached a perfect 100. Knowledge and practice of nurses' ratings showed a positive correlation; however, the correlation coefficient was negligible. The correlation between the experience and knowledge ratings was statistically significant, but not the scores based on practice and experience. The study's findings indicated a lack of understanding about blood transfusions, which was evident in unsatisfactory practice (Bayraktar and Erdil, 2000).

The pre-transfusion compatibility check when receiving blood units (PR = 34.5%), the bedside blood compatibility test (proportion of responses (PR) with potential life threat between 12.7 and 35.5%), the delay between screening for red cell antibodies and transfusion (PR = 20.5%) and the delay in maintaining blood units in the ward (PR = 33.4%), The areas with the highest frequency of inadequate knowledge and practice in the sample of 1090 nurses were and the identification of aberrant reactions. The variables that most closely linked with scores on hazardous knowledge and practice were transfusion frequency and training (Saillour-Glenisson et al., 2002).

5. CONCLUSION
The results of this study showed that the majority of nurses had a modest degree of overall blood transfusion knowledge and that knowledge needs to be improved. This includes understanding the nursing tasks that must be completed after receiving the blood bag and the symptoms that indicate an allergic reaction.

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