EAS Journal of Nursing and Midwifery
Abbreviated Key Title: EAS J Nurs Midwifery
ISSN: 2663-0966 (Print) & ISSN: 2663-6735 (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-5 | Issue-6 | Nov-Dec -2023 | DOI: 10.36349/easjnm.2023.v05i06.001

Original Research Article

Nurses' Knowledge Regarding the Management of Blood Transfusion Patients at 250 Bedded Mohammad Ali Hospital, Bogura, Bangladesh

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Article History
Received: 14.10.2023
Accepted: 20.11.2023
Published: 29.11.2023

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: ***Background*:** Blood transfusion is essential and the most common therapeutic use in which transfused blood and its elements to save a patient's life. However, transfusion recovers a patient's life, but it is not without risk. Blood transfusion is a critical and standard therapeutic procedure in which patients are given blood and its components to preserve their lives. Millions of patients want blood and blood merchandise transfusions worldwide. Blood infusions may be a very important want for a few patients; however, while not cautious, it may be a grievous intervention. It is calculated that in every 13000 cases of Blood infusions, one error happens mainly because of preventable human errors through applicable education and reform in insertion protocols. ***Objective*:** The aim was to assess the level of Nurses' Knowledge Regarding the Management of Blood Transfusion patients at 250 Bedded Mohammad Ali Hospital, Bogura. ***Methodology*:** This descriptive type of cross-sectional study design was used, and a 110-sample size that was a purposive sampling technique followed those who met the inclusion criteria to assess the Nurses' Knowledge Regarding the Management of Blood Transfusion. The study was conducted from July 2021 to December 2021. The instruments for data collection were a semi-structured questionnaire composed of two parts: Demographic variables and a nurses' knowledge-related questionnaire. The respondents were assured that confidentially and anonymity were strictly maintained. ***Results*:** The findings of the present study revealed that 12.73% had a high level of knowledge score, 47.27% had a moderate level of knowledge, and 40% had a low level of knowledge regarding blood transfusion. ***Conclusion*:** It is concluded that the study provided baseline information for the current situations of the selected hospital. Nurses play an integral role in blood transfusion. Also, nurses must have adequate knowledge of all transfusion processes to maintain patients' safety. Nurses can play crucial roles in managing blood transfusion patients. The findings clear that nurses had a moderate level of knowledge.

Keywords: Knowledge, Blood transfusion, Management.

INTRODUCTION

Blood transfusion is a critical and common therapeutic procedure in which patients are given blood and its components to preserve their lives. Preparation before collecting blood units from the storage location, blood bag collection, pre-transfusion activities, and post-transfusion activities are the five interlaced phases or stages of blood transfusion administration, four of which are connected to nursing performance [1]. Blood transfusion has a well-established clinical effect in treating anemia, and improving oxygen delivery to tissues [2]. Millions of patients want blood and blood merchandise transfusions worldwide [3]. Blood infusions are outlined because of the method by which the blood of 1 person is injected into another one's circulation for medical functions. Within the early twentieth century, Blood infusions contributed to varied

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adverse effects, but today, these effects are preventable through educating medical aid suppliers and screening blood and blood merchandise [4]. Blood infusions may be a very important want for a few patients; however, while not cautious, it may be a grievous intervention [5]. It is calculated that in every 13000 cases of Blood infusions, one error happens largely because of preventable human errors through applicable education and reform in insertion protocols [6]. Concerning the vital role of nurses in very safe and effective Blood infusions, it is necessary to enhance their information and skills [3]. Blood infusions may be an advanced procedure, and nurses are concerned with making ready blood units, assembling blood packs, activities associated with before and after transfusion, and patient safety observance. *Blood infusions* are a critical medical intervention that needs enough information and skills [4]. Several studies have been conducted on the extent of information and awareness of nurses and physicians concerning Blood infusions. However, concerning the increasing demand for insertion in hospitals and its role in saving patients' lives, it appears necessary to enhance nurses' level of information and performance to ensure the security of this intervention. This study aimed to gauge the impact of instructional programs on blood and blood merchandise transfusion on nurses' level of information and skills in hospitals [7]. Blood medical aid plays a crucial therapeutic role in treating varied health issues. Innumerable efforts are created to ensure the standard of the transfusion method and, therefore, the security of receivers [8]. The latter determines the Technical rules for services associated with the rotary production of human blood and its elements and transfusion procedures. These rules establish rules that transfusion professionals must apprehend and follow Ministério and Portaria, 2011[9]. Nursing has a crucial role in ensuring transfusion safety; as a result, the nursing team is responsible for knowing the indications for transfusions, checking information to stop errors, guiding patients on transfusion, police investigation, and acting in compliance with transfusion reactions, and documenting the procedure [10]. Thanks to the complexity of the transfusion method, which they would like to experience throughout its development, this method needs competent and trained professionals to attain transfusion safety. Blood transfusion is essential and the most common therapeutic use in which transfused blood and its element to save patient life. However, transfusion recovers a patient's life; it is not without risk [1]. The main goal of blood transfusion is to treat recipients' underlying disorders and to replace blood loss [11]. The process of transfusion consists of five interrelated phases: blood grouping and cross-matching, patient preparation before blood bag collection, blood bag collection, pre-transfusion initiation of nursing activities, and post-transfusion nursing care [12]. A patient must be properly identified by asking them to state their name, address, or date of birth. To collect blood products from the storage site, nursing staff must transport proper documents to prove patients' identity. These details should be checked against the labels on the blood bag. Besides that, the nurse must also check on both patient and donor's ABO and RhD blood group and the compatibility results. Before initiating a transfusion, nurses must prepare the patient for transfusion therapy [13]. At the initiation of transfusion, the nurse must initiate the infusion rate of blood slowly during the first 15 minutes to prevent reactions during this period. Also, the nurse must monitor the patient for the first 10-15 minutes and record vital signs. Each transfusion should be completed within four hours from its beginning. Administration of intravenous normal saline and morphine 1.0 mg/ml is a harmless solution that can be used during blood transfusion, other solutions, or medication rejection. In addition, the nurse should be conscious of any signs and symptoms of reaction and how to deal with this condition to save the patient's life [14]. The issues connected with transfusion errors can be reduced by monitoring transfusion processes. Standard guidelines or rules addressing important procedures of blood transfusion management, such as screening donor blood for infectious diseases, establishing the necessity for transfusion, and determining ABO compatibility, are utilized in many countries [2]. Most transfusion errors are caused by human factors, which can be avoided with proper training and transfusion procedure updates [15]. Most errors happen in clinical wards, such as using the wrong blood units at the bedside and misidentifying the patient or the sample. Nurses play a critical part in these tasks, with more than half of the transfusion chain's steps relying on the nurse's knowledge and abilities [16]. Training was needed to instruct nurses on the blood transfusion risks, the most recent safety guidelines, nurse interventions, and decision-making. It was also emphasized that nurses' knowledge and practices should be regularly monitored [17]. Many studies have been conducted in many countries; some gaps exist in implementing blood transfusion. A study was conducted in Dhaka Medical College Hospital to assess the knowledge and practice of blood transfusion among the senior staff nurses. This study revealed that among the respondents, 57% had moderate knowledge, 41% had good knowledge, and 4% had poor knowledge of blood transfusion [18]. Nursing professionals are directly concerned with the care of patients submitted to transfusion. The proper storage of blood and its identification, while not failures, depends for the most part on the performance of the nursing team, highlighting the importance of the knowledge base on transfusion and, therefore, the technical skills of the nursing workers very important. Knowledge is crucial for humans because it permits attributing intending to the multiplicity of phenomena that surround them, whether or not those concerning physical objects, people, events, or abstract concepts. Several studies during this space show deficient data on the nursing workers and, therefore, the inappropriateness of the approaches used throughout the transfusion. However, there are few studies that time out the factors that will be associated with the data deficits during this space. Based on the

higher, the target of this analysis was to see whether or not there is an association between the data of the skilled nursing team regarding transfusion and, therefore, the variables associated with professional aspects [19].

METHODOLOGY AND METHODS

A descriptive type of cross-sectional study design was carried out to assess the nurses' knowledge regarding the blood transfusion patients at 250 Bedded Mohammad Ali Hospital, Bogura, Bangladesh. The hospital provides nurses' services related to our study. It is a 250-bed public hospital and all kinds of treatment facilities for clients who suffered from blood transfusion-related patients available in the current study place. The study duration was one year, from July 2021 to December 2021. The study population was selected from all registered nurses working at 250 Bedded Mohammad Ali Hospital, Bogura. The sample was selected from the medicine department, surgery department, gynaecology department, Cabin unit, and post-operative ward at the hospital. The ethical approval was obtained from the ethics committee of the Bogura Nursing College.

Inclusion Criteria:

- Nurses are those who work in the selected area of the hospital.
- Nurses who were willing to participate.
- Respondents who were available on duty during the data collection period.

Exclusion Criteria:

- Nurses who were not willing to participate.
- Respondents who were not available during the data collection period.
- Nurses who work less than at least six months in the selected hospital wards.

Data Collection and Analysis:

According to the study's objectives and variables, the researchers prepared a semi-structured questionnaire. Research instruments consisted of two parts for collecting data. The questionnaire consisted of two parts; part a covered the demographic information about the respondents, including age, gender, marital status, religion, general educational qualification, professional educational qualification, current working placement, current working experience, and training. Moreover, section B, the Knowledge-based questionnaire on blood transfusion, includes 15 (fifteen) items of multiple responses questions. Researchers collected data after getting an approval letter from Bogura Nursing College, Bogura, and researchers met with the Hospital authority and nursing superintendent, then explained the purpose of this study of educational requirements. After obtaining permission, researchers asked for the cooperation of authority. Then, they explained the purpose of the study and asked for consent as their willingness. Researchers provided them with questionnaires and explained how to complete the questionnaire based on their understanding. Before data collection, the researchers obtained written consent from the respondents. The investigators collected data through a structured questionnaire and face-to-face interviews with the respondents. Collected data was checked, organized, coded, edited, and analyzed manually and computer-assisted by the researchers. The results were interpreted using descriptive statistics like- frequency, percentage, and mean with the help of a scientific calculator. The critical variables were considered and analyzed to fulfil the study's objectives. The results were calculated from the tabulated column.

RESULTS

Table 1 shows the demographic data of the study respondents. The provided statistics illustrate that 45.45% of respondents fell within the age range of ≤30 years, 42.73% were aged between 30-40 years, 6.36% were in the 41-50 age group, and another 5.45% were above 50 years old. The average age of respondents is 28.6 years. The majority of 70% of the study population were female, and the rest of the 30% were male. According to marital status, 5.45% were single, 93.64% were married, and the remaining 0.91% were divorced. A closer look at the religious affiliations of the respondents shows that 95.45 % identified as Muslim, 0.91% as Hindu, and 3.64% as Christian (Table 1). Table 2 discusses the educational qualifications of the respondents; 63.64% of participants had HSC qualifications, 30.91% of respondents had SSC qualifications, and 5.45% possessed a Master's Degree. Mostly, 74.55% of participants had completed a Diploma in nursing level education, 13.64% held a BSc in nursing/PHN level education, and 11.82% had pursued MSc/MPH level professional education. Examining the distribution across departments, 25.45% of respondents were placed in the medicine department, 20.91% in the surgery department, and 6.36% in the post-operative department, respectively. Regarding special training among participants, 58.18% answered no, and 41.82% answered yes. According to current working experience of the study population, 63.64% had ≤3 Years of experience: 30.91% had 4-7 years, and 5.45% had over 7 years of experience (Table 2). Table 3 outlines the distribution of knowledge on blood transfusion. From the indication of blood transfusion, 70% specified leukaemia, and 25.45% of respondents identified significant surgery, respectively. Sings and symptoms for blood transfusion: 50.91% of respondents reacted with fever, 30% had respiratory distress, 12.73% had hypotension, and 6.36% had bloody urine (Table 3). Table 4 discusses the distribution of knowledge on managing acute hemolytic transfusion reactions. The data indicates that 30.91% of respondents selected to notify the doctor and begin emergency treatment, while 54.55% opted to stop blood transfusion. Additionally, 11.82% of participants chose to check patient vital signs and the remaining 2.73% preferred hydration with 0.9% sodium chloride. Figure 1 shows the distribution of nurses by overall knowledge level regarding blood

transfusion; 47.27% of the study population had moderate, 40.00% had low, and 12.73% had a high level of knowledge.

Table 1: Demographic data of respondents (n=110)

Variables	Frequency (n)	Percentage (%)
Age group (years)		
≤ 30	50	45.45
31-40	47	42.73
41-50	7	6.36
>50	6	5.45
Gender		
Male	33	30.00
Female	77	70.00
Marital status		
Single	6	5.45
Married	103	93.64
Divorced	1	0.91
Religion		
Muslim	105	95.45
Hindu	1	0.91
Christian	4	3.64

Table 2: Educational qualification of the study respondents (n=110)

Variables	Frequency (n)	Percentage (%)
General education		
SSC	34	30.91
HSC	70	63.64
Masters	6	5.45
Highest Professional Educational status		
Diploma in Nursing	82	74.55
BSc in Nursing/PHN	15	13.64
MSc in nursing /MPH	13	11.82
Departments		
Medicine department	28	25.45
Surgery department	23	20.91
Post-operative ward	7	6.36
Cabin	15	13.64
Gynaecology department	25	22.73
OPD	12	10.91
Special training		
Yes	64	58.18
No	46	41.82
Working experience (years)		
≤3	70	63.64
4-7	34	30.91
>7	6	5.45

Table 3: Distribution of knowledge on blood transfusion (n=110)

Variables	Frequency (n)	Percentage (%)
The Blood transfusion is-		
Process of transferring blood products into a person's circulation	60	54.55
Process of transferring blood or its components from one person to sick person	34	30.91
Process of transferring pack cell blood product in the body	13	11.82
Process of transferring white blood cells in the human body	3	2.73
The indication of Blood transfusion is-		
Major surgery	28	25.45
Leukaemia	77	70.00

Variables	Frequency (n)	Percentage (%)
Road Traffic Accidents (RTAs)	4	3.64
Acute blood loss	1	0.91
The Steps of identifying the right patient for blood transfusion is-		
Blood grouping and Rh factor	84	76.36
Registration number	21	19.09
Patient name	4	3.64
Prescription by doctor	1	0.91
The Steps of blood transfusion followed in the first half an hour is-		
Check vital sign	91	82.73
Inform the patient to avoid chills, itching, rash or unusual symptoms	11	10.00
Record the time	1	0.91
Start slowly	7	6.36
The Regulate blood flow rate in the first 15 minutes is		
A rate 1-2ml/minute	34	30.91
150ml per hour	21	19.09
As per order sheet	54	49.09
Start slowly	1	0.91
The Slow blood transfusion considered for the following patient is		
Patients with heart disease	65	59.09
Patient with severe anaemia	29	26.36
Patient with bronchial asthma	13	11.82
Patient with chronic kidney disease	3	2.73
The blood transfusion reactions is-		
Anaphylactic reactions	25	22.73
Simple allergic reactions	74	67.27
Transfusion-associated circulatory overload reactions	6	5.45
Febrile non-hemolytic reactions	5	4.55
The Signs and symptoms of blood transfusion reactions are-		
Fever	56	50.91
Bloody urine	7	6.36
Respiratory distress	33	30.00
Hypotension	14	12.73

Table 4: Distribution of knowledge on the management of acute hemolytic transfusion reaction

Variables	Frequency (n)	Percentage (%)
The management of acute hemolytic transfusion reaction is-		
Notify the doctor and begin emergency treatment	34	30.91
Stop blood transfusion	60	54.55
Check patient's vital signs	13	11.82
Hydration with 0.9% sodium chloride	3	2.73
The aspects of information given to the patients by the on-duty nurse is-		
Information to ensure collection of the right blood	96	87.27
Reasons for blood transfusion	5	4.55
Risks of blood transfusion	7	6.36
Reaction symptoms	2	1.82
The Vital signs' recorded after starting the transfusion (start transfusion at 2:00 p.m.) are-		
2:05 p.m	13	11.82
2:15 p.m	34	30.91
3:15 p.m	60	54.55
4:15 p.m	3	2.73
The Signs and symptoms of acute hemolytic transfusion reaction (AHTR) is-		
Tachycardia	72	65.45
Chest pain	28	25.45
Hypotension	7	6.36
Nausea/vomiting	3	2.73
The Nursing management of acute hemolytic transfusion reaction (AHTR) is-		
Stop blood transfusion	85	77.27

Variables	Frequency (n)	Percentage (%)
Keep the vein open with Normal Saline	9	8.18
Check the patient's vital signs	13	11.82
Notify the doctor and begin emergency treatment	3	2.73
The Nursing interventions to minimize the risk of transfusion reaction are-		
Administration of compatible blood	68	61.82
Starting transfusion within 20 min	27	24.55
Total transfusion duration not more than 4 h	12	10.91
Avoid incompatible drug/solution	3	2.73
The Transfusion policy Availability of written policy for blood transfusion in the ward is-		
Yes	22	20.00
No	78	70.91
Don't know	10	9.09

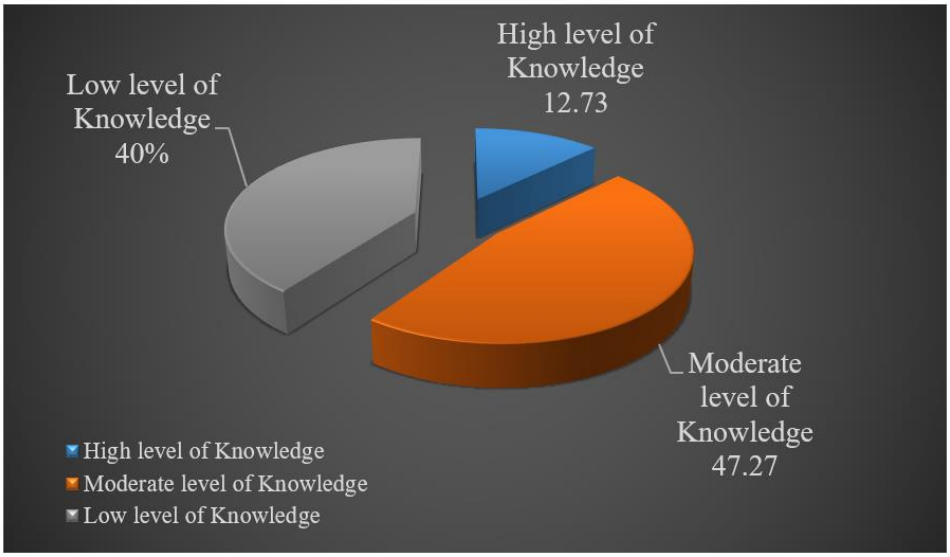

Figure 1: Distribution of nurses by Overall Knowledge level regarding blood transfusion

DISCUSSION

A descriptive cross-sectional study assessed the nurses' knowledge regarding managing blood transfusion at 250 Bedded Mohammad Ali Hospital, Bogura. The study was conducted from July 2021 to December 2021. The instruments for data collection were a semi-structured questionnaire composed of two parts: Demographic variables and knowledge-based Information on blood transfusion. This section discusses the results of the variables and the specific objectives. The result revealed that 45.45% were within ≤30 years of age, 42.73% were within 30-40 years, 6.36% were 41-50 years and 5.45% were >50 years of age. The mean age of respondents is 28.6 years. Most of them, 70 %, were female, and the rest, 30%, were male. The participant was mostly 93.64% married, 95.45% were Muslim, 0.91% were Hindu, and 3.64% were Christian. Moreover, 30.91% were SSC, 63.64% were HSC, and 5.45% were Masters Degree. Of the nurses, 74% had a diploma in nursing, 14% had a B.Sc in nursing, and 12% had MSc/MPH degree. Among all participants, 25.45% were in the placement of the medicine department, 20.91% were in the surgery department, 6.36% were in the post-operative Dept., 13.64% were in the cabin department, 22.73% were in the gynaecology department, and 10.91% were OPD. Furthermore, 41.82% were answered yes, and 58.18% were answered No for special training. 63.64% were within ≤ 3 years of working experience, 30.91% were within 4-7 years, and 5.45% were > seven years of current working experience among the respondents. The findings also showed that 30.91% answered the option of Notifying the doctor and beginning emergency treatment, 54.55% answered the option of Stopping blood transfusion, 11.82% answered the option of Check Patient's vital signs, and the rest of 2.73% answered the option of Hydration with 0.9% sodium chloride. The present study also revealed the findings of the knowledge-based questionnaire showed that 54.55% responded to the option Process of transferring blood products into a person's circulation, 30.91% responded Process of transferring blood or its components from one person to a sick person, 11.82% responded Process of transferring pack cell blood product in the body and rest of 2.73% were responds the option Process of transferring white blood cell in the human body. Nurses' knowledge assessment regarding blood transfusion to ensure patient safety found adequate knowledge only in blood transfusion. 25.45% responded to option Major surgery, 70% answered Leukemia, and 3.64% responded to Road Traffic Accidents (RTAs)

[17]. The average level of nurses' knowledge regarding blood transfusion 76.36% answered the option of Blood grouping and Rh factor, 19.09% answered the Registration number, 3.64% were answered the Patient name, and were as 0.91% were answered the option of Prescription by a doctor. Moreover, 82.73% answered the option of Checking vital signs, 10% answered the option of Informing the Patient about chills, itching, rash, or unusual symptoms, 0.91% answered the option of recording the time, and the rest of the 6.36% have answered the option of Start slowly, and 30.91% were answered the option of A rate 1-2ml/minute, 19.09% were answered the option of 150ml per hour, 49.09% were answered the option of as per order sheet and the rest of 0.91% were answered the option of Start slowly. Furthermore, 59.09% answered the option of a Patient with heart disease, 26.36% answered the option of a Patient with severe anemia, 11.82% answered the option of a Patient with bronchial asthma, and the rest of the 2.73% answered the option of Patient with chronic kidney disease. Regarding complication, 22.73% have answered the option of anaphylactic reactions, 67.27% have answered the option of Simple allergic reactions, 5.45% have answered the option of Transfusion-associated circulatory overload reactions, and the rest of the 4.55% have answered the option of febrile non-hemolytic reactions. Regarding aspects of given Information, 87.27% have answered the option of Information to ensure collection of right blood, 4.55% have answered the option of Reasons for blood transfusion, 6.36% have answered the option of Risks of blood transfusion, and the rest of 1.82% have answered the option of Reaction symptoms. Regarding vital sign recording after blood transfusion, 11.82% answered the option of 2:05 p.m., 30.91% answered the option of 2:15 p.m., 54.55% answered the option of 3:15 p.m., and the rest of 2.73% answered the option of 4:15 p.m. regarding sign and symptoms of hemolytic reaction of blood transfusion, 65.45% have answered the option of Tachycardia, 25.45% have answered the option of Chest pain, 6.36% have answered the option of Hypotension and the rest of 2.73% were answered the option of Nausea/vomiting. Regarding nursing management of acute hemolytic blood transfusion reaction, 77.27% answered the option of Stopping blood transfusion, 8.18% answered the option of Keeping the vein open with Normal Saline, 11.82% answered the option of Check the Patient's vital signs, and the rest of 2.73% have answered the option of Notify doctor and begin emergency treatment. Regarding nursing interventions to minimize the risk of transfusion reaction, 61.82% answered the option of Administration of compatible blood, 24.55% answered the option of Starting Transfusion within 20 minutes, 10.91% answered the option of Total transfusion duration not more than four hours, and the rest of 2.73% have answered the option of Avoid incompatible drug/solution. Moreover, for the Transfusion policy and availability of written policy for blood transfusion, 20% answered the option of Yes, 70.91% answered the option of No, and the rest of the 9.09% answered the option of do not know among the respondents. Blood transfusion is both a life-saving practice and a high-risk invasive procedure. Although blood transfusion supports the clinical condition of the Patient, poor practices may occur, resulting in serious adverse reactions. Nurses in transfusion therapy require evidence-based professional knowledge and skills. Improving nurses' blood transfusion knowledge and therapy-related knowledge and improving their competence to perform transfusion therapy is likely to improve the therapeutic effects of transfusion therapy and decrease transfusion-related adverse reactions. In ensuring safe blood transfusion, monitoring, and safe practices are of great importance. A study revealed that nurses had a moderate level of blood transfusion knowledge. Similarly, previous studies have revealed that nurses' overall blood transfusion knowledge scores have been poor to moderate in general [20-26]. The nurses' knowledge of transfusion therapy appears incomplete, and only approximately half of the nurses correctly undertook the nursing procedures [24]. One study reported that nurses' knowledge was moderate [7]. Knowledge deficits among nurses have been identified in several key aspects of blood transfusion [27,28]. These findings underline the need to improve nurses' blood transfusion knowledge. Clinical training should emphasize indications for blood transfusion, the Transfusion of whole blood or blood components, blood storage and transport, and the administrative processes for blood transfusion. The mean knowledge score regarding blood components revealed that nurses in this study had a moderate level of knowledge. Two other studies reported that nurses had poor knowledge of dosage requirements for cryoprecipitate, symptoms of transfusion reactions in unconscious patients, and the storage temperature for cryoprecipitate after thawing, and had been using invalid and potentially harmful methods for thawing blood [7,29]. The erythrocyte suspension should start to be transfused within the first 30 minutes post removal from the refrigerator, and the Transfusion should end within 4 hours [30]. In the current study, the nurses' knowledge levels regarding the maximum length of time that could be taken to start transfusing the patient post-removal of blood from the refrigerator were found to be low (35.1%). This important finding of the current study needs to be considered when developing in-service training. Consistent with our research results, another study reported that only a small percentage of nurses (38.7%) responded correctly to the question regarding the maximum duration to start Transfusion after removing the suspension from the refrigerator [31]. Another study reported that the rate of correct answers given by nurses to the same question was 55% [32]. These study results reveal that nurses do not have sufficient knowledge of the storage conditions of blood and blood components. Instead of whole blood transfusion, some clinicians may prefer to undertake Transfusion of necessary blood components only. In this study, more than half of the nurses correctly answered the Blood Transfusion and

Blood Components section questions. In an Iranian study, the nurses had moderate knowledge of blood and blood components (66.7%) and blood components transfusion techniques [33]. Another study demonstrated that 74% of nurses reported that in cases in which the blood scheduled for Transfusion was deemed to be cold, murky, different in color, clotted, or contained inside a bag with disrupted integrity, the blood could not be transfused to the patients [34]. Many nurses had insufficient knowledge of patient preparation before blood bag collection, the importance of accurate confirmation of patient identification, and how best to ensure this [7]. Only one-third of nurses (33.3%) in our study correctly answered the question concerning checking the blood bags ("Blood component bags should be checked by one nurse prior to initiation blood transfusion."). These study results indicate an insufficient knowledge level among the nurses concerning blood transfusions and blood components. During a blood transfusion, no medication should be administered via the venous pathways or through the blood sets under any circumstances, and no fluids, except for a normal saline (0.9% NaCl) solution, should be administered [35]. In this study, only three-quarters (75.4%) of the study participants knew that only normal saline (0.9% NaCl) solution could be administered concurrently with a blood transfusion. In Benli's (1996) study, 71.7% of nurses stated that a dextrose (5%) solution could be administered concurrently with transfused blood [36]. Two other studies found that the majority of nurses (> 80%) responded that only normal saline (0.9% NaCl) solution could be transfused simultaneously during blood transfusion [31, 32]. It is vital to note that normal saline solution is the only fluid or solution that can be transfused simultaneously during whole blood or blood component transfusion. Compatibility tests are mandatory to prevent blood transfusion reactions due to incorrect blood transfusions and resulting deaths. Performing compatibility tests and administering blood to the correct Patient is one of the main principles of blood transfusion [37]. Another study stated that more than half of the nurses (64.9%) incorrectly responded to the question regarding the characteristics of a blood set. Similar to the current study, another study reported that only 66.7% of nurses correctly answered the question regarding a blood set's characteristics [36]. The nurses knew about using standard blood transfusion sets for all blood components, 88.7% [29]. In France, nurses' knowledge and performance in this field were reported to be weak, and the lowest level of knowledge was at the time of blood transfusion, which was related to a lack of identifying patients and identifying the required components in 54% of cases [38]. A study also found that the nurses' knowledge of blood transfusion techniques is average. Teymouri *et al.,* (2006) showed that nurses' knowledge and performance of using needles with appropriate diameter was good [39]. However, they did not have correct and scientific knowledge of indications and methods of heating blood. In the study of Tabiei *et al.,* (2010), just 26 nurses (25%) knew that beginning a blood transfusion half an hour after the blood was delivered [40]. A study in Turkey related to the same issue reported a 17.2% statistic. In addition, nurses' knowledge of blood transfusion indications and complications was average. The study's results showed that the average knowledge of nurses can increase the probable incidence of risks related to blood transfusion and reduce the quality of health care. Finally, the researchers clarified that without basic Information about each step of blood transfusion and the importance of each one related to the other, the Patient will be threatened with complications, so the nurse must have excellent knowledge to promote safety. Therefore, researchers recommend the activation of a blood transfusion committee in hospitals to control reports of blood transfusion and its components as well as possible complications inwards and to develop and execute in-service training programs for personnel emphasizing the weak points to increase their Information and knowledge and continuously supervise this task.

Limitations of the Study

There was a small sample size of the study. This is a small representation of nurses at 250 Bedded Mohammad Ali Hospital, Bogura, and, as such, the study's results may be limited to one particular area. The small sample size and selecting samples only from the limited population. Thus, the large-scale studies with a more significant sample size selected convenience from all parts of the society are recommended to obtain more generalizable results for further study in the health sector.

CONCLUSION AND RECOMMENDATION

In conclusion, Nurses play an integral role in blood transfusion. Also, nurses must have adequate knowledge of all transfusion processes to maintain patient safety. Blood transfusion is a life-saving practice and a high-risk invasive procedure. Although blood transfusion supports the clinical condition of the patient, poor practices may occur, resulting in severe adverse reactions. Nurses in transfusion therapy require evidence-based professional knowledge and skills. Improving nurses' blood transfusion knowledge and therapy-related knowledge and improving their competence to perform transfusion therapy is likely to improve the therapeutic effects of transfusion therapy and decrease transfusion-related adverse reactions. In ensuring safe blood transfusion, monitoring, and safe practices are of great importance. Nurses can play crucial roles in the management of blood transfusion. The present study's findings revealed that 13% had a high level of knowledge score, 47% had a moderate level of knowledge, and 40% had a low level of knowledge regarding blood transfusion. It was clear that nurses had a moderate level of knowledge regarding managing blood transfusion in the current study place.

Based on the study results, the following recommendations were made:

- The study can be replicated on a large sample to validate and generalize the findings.
- The study can be conducted in different settings, like the national level.
- The study can be conducted on both genders in the community.
- The level of nurses' knowledge was assessed.
- A comparative study can be conducted to assess the nurses' knowledge regarding blood transfusion at 250 Bedded Mohammad Ali Hospital, Bogura.
- A similar study can be undertaken on a large scale.

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Cite This Article: Md. Badsha Miah, Anjuara, Md. Sohidul Islam, Mst. Hashi Khatun, Mst. Zakia Sultana, Tumpa Datta Roy, Mst. Zebun Naher, Mt. Sonia Aktar, Shamima Nasrin, Samima (2023). Nurses' Knowledge Regarding the Management of Blood Transfusion Patients at 250 Bedded Mohammad Ali Hospital, Bogura, Bangladesh. *EAS J Nurs Midwifery*, *5*(6), 160-169.