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ASSESSING NURSES` KNOWLEDGE OF SAFE BLOOD TRANSFUSION PRACTICES IN A TERTIARY CARE HOSPITAL IN PESHAWAR PAKISTAN: A CROSS-SECTIONAL STUDY

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Abstract

Introduction: *Blood transfusion is a critical medical procedure used to replace lost components of the blood, such as red blood cells, plasma, or platelets, in patients with conditions like anemia, trauma, or surgical blood loss. Ensuring safe transfusion practices is vital to prevent complications, including transfusion reactions and infections. Nurses play a key role in this process, requiring comprehensive knowledge and skills to maintain patient safety and improve outcomes.* ***Methodology:*** *A descriptive cross-sectional study was conducted in a tertiary care hospital in Peshawar, Pakistan, to assess nurses' knowledge of safe blood transfusion practices. A total of 152 registered nurses from ICU, surgical units, emergency, and medical wards were selected via convenience sampling. Nurses with at least six months of transfusion-related experience were included. Data were collected using a pre-tested, structured questionnaire covering demographics, knowledge, and safety practices. Statistical analysis was performed using SPSS v25, with a p-value <0.05 considered significant. Ethical approval and informed consent were obtained.* ***Result:*** *This study assessed the knowledge of 152 nurses on safe blood transfusion practices at a tertiary care hospital in Peshawar. The highest knowledge score was on transfusion indications (75.7%), while the lowest was on patient involvement (62.5%). Nurses with 16+ years of experience had significantly higher knowledge scores ($p = 0.041$). Gender and department showed no significant differences ($p > 0.05$). Gaps in recognizing transfusion reactions and patient involvement highlight the need for targeted educational interventions to improve transfusion safety practices.* ***Conclusion:*** *The study revealed that while 75.7% of nurses were knowledgeable about blood transfusion indications, there were notable gaps in understanding transfusion*

reactions and involving patients in the process. Although post-intervention knowledge scores improved significantly, indicating the effectiveness of educational programs, overall knowledge and practices still need enhancement. Continuous professional development, regular training, and practical workshops are essential to bridge these gaps, promote safe transfusion practices, and ensure patient safety in healthcare settings.

INTRODUCTION

Blood transfusion is a life-saving treatment when used appropriately and is indicated for managing various medical and surgical conditions. It is a complex, multi-step process involving multiple healthcare professionals, including physicians, nurses, and laboratory technologists [1]. Although several initiatives have been implemented to reduce transfusion-related errors, one critical intervention that remains underexplored is patient involvement. A study investigates the role of the patient in maintaining safe care from the time transfusion is requested to the conclusion of the procedure [2]. A prospective study monitored PRC transfusions during a two-month period in both the ICU of a large Level, trauma center and the tertiary cardiac unit. Nurses recorded the number of PRC units transfused per episode, proposed indications, and concurrent hemoglobin (Hb) levels. Analytical analysis of data was done, and transfusions given against the guidelines were recognized, average level of Hb at which the PRC unit was transfused, and also the average no. of units given per episode [3]. Blood transfusion is lifesaving but carries potential risks of harmful, even deadly reactions. Even today, debates are going in the medical literature regarding the correct use of blood and blood products [4]. Studies have proven that blood transfusions are associated with longer stays in the ICU, prolonged hospitalization, and higher death rates. To assess whether the practice of transfusing patients in the ICU reflects the best available clinical evidence, several studies were conducted, including those by the well-known TRICC trial. These studies indicate that ICU transfusions should be withheld unless the patient's Hb level is less than 7 g/dL or he suffers from acute hemorrhage [5]. Patient Blood Management (PBM) is an international implementation, which has taken on a multidisciplinary approach to the reduction of unnecessary transfusions. The work of the Transfusion Practitioner (TP) is highly profiled in countries like the United Kingdom and Australia [6]. In the UK, 87.3% of transfusion errors result from mismatched blood and mishandling of blood products. Unsafe transfusion practices can lead to life-threatening complications, such as adverse reactions and transmissible infections, underscoring the importance of stringent blood safety protocols [7]. Globally, approximately 117.4 million units of blood are transfused annually, equating to more than three transfusions every second. In India alone, around 12 million units are transfused each year. It is realized that patient safety in transfusion hinges on both proper matches of blood products and quality bedside nursing care [8]. Although transfusions may save lives, mistakes in the process can be deadly. There may be autologous blood samples whereby a patient's blood is collected for use during or after surgery, or allogenic, where blood is donated from others. The clinical requirement for blood remains constant, which is why errors in transfusions need to be addressed and reduced [9]. The objective of this research is to determine the level of knowledge among nurses regarding safe blood transfusion practices in a tertiary care hospital in Peshawar, Pakistan. The purpose of this study is to identify knowledge gaps regarding transfusion procedures, patient involvement, and adherence to established guidelines to inform future training programs and improve patient safety outcomes.

Methodology:

This descriptive cross-sectional study was conducted to evaluate the knowledge of nurses about the safe transfusion of blood in a tertiary care hospital of Peshawar, Pakistan. The study was conducted in all departments where transfusions of blood are frequently carried out, including the ICU, surgical units, emergency department, and general medical wards. The study population consisted of registered

nurses directly involved in blood transfusion procedures, ensuring a comprehensive understanding of the knowledge levels across different clinical settings. A total of 152 nurses were selected using a convenience sampling technique, which facilitated access to participants during their shifts while accommodating the busy nature of hospital workflows. The inclusion criteria were that the participants had to be registered nurses with at least six months of clinical experience, directly involved in the administration of blood transfusions, and willing to give informed consent. Nurses not directly engaged in transfusion practices, nursing students, interns, and those on leave during the data collection period were excluded to maintain the focus on experienced professionals actively involved in transfusion procedures. Data were obtained using a pre-tested, structured questionnaire developed upon extensive literature reviews and international guidelines on blood transfusion safety. The questionnaire is divided into three sections: the demographic information form, the form for knowledge appraisal, and that for patient safety practices. Questions in the first section included a participant's age, gender, years of service, educational history, department working, and even previous training experience in blood transfusion practices. The knowledge assessment featured multiple-choice and true/false questions in such areas as indications for transfusion, pretransfusion checks, monitoring in the course of transfusion, identification and management of transfusion reactions, and post-transfusion care. The patient safety category was comprised of nurses' readiness to involve a patient and techniques to avoid transfusion-related errors. The questionnaire was pre-tested on a small group of nurses not included in the final study to ensure clarity, relevance, and reliability with modifications made based on feedback from the pilot phase. Data collection was conducted over a four-week period following ethical approval from the hospital's Institutional Review Board (IRB). All participants provided informed consent with assurances of confidentiality and anonymity. Questionnaires were administered at the end of shifts or during breaks so as not to inconvenience patients. Completed documents were collected in envelopes sealed to maintain anonymity. Access was obtained from nursing management to visit various units of the hospital where data collection was conducted. After the data collection, responses were screened for completeness and accuracy before any entry in the Statistical Package for the Social Sciences (SPSS) version 25 for analysis. Descriptive statistics, which included frequencies, percentages, means, and standard deviations, summarized the demographic characteristics and knowledge scores. Inferential statistical tests, which were employed to examine relationships between knowledge levels and demographic variables, included the application of Chi-square tests on categorical variables as well as the comparison of knowledge scores across various groups, like nurses with or without prior training on transfusions. A p-value of less than 0.05 was considered statistically significant. Ethical considerations were strictly observed throughout the study. Approval was obtained from the hospital's IRB, and all participants provided written informed consent. Confidentiality was ensured by anonymizing data and securely storing completed questionnaires. Participants were informed of their right to withdraw from the study at any point without any repercussions to their employment. The results of this study seek to identify the knowledge gaps that exist among nurses in relation to safe blood transfusion practices and inform future training programs and policy development to improve patient safety and clinical outcomes of transfusion procedures.

Result:

The aim of the study was to investigate nurses' knowledge on the practice of safe blood transfusions at a tertiary care hospital in Peshawar, Pakistan. The total participants for this study were 152 nurses showed in table 01, which included a diverse demographic composition. Below are the results of the study, with both descriptive and inferential analyses.

Demographic Characteristics table 01

Demographic Variable	Frequency (n = 152)	Percentage
Gender		
Male	45	29.6%
Female	107	70.4%
Age (years)		
20-30	62	40.8%
31-40	58	38.2%
41-50	22	14.5%
51+	10	6.6%
Years of Experience		
1-5	48	31.6%
6-10	54	35.5%
11-15	30	19.7%
16+	20	13.2%
Department		
ICU	40	26.3%
Surgical Unit	45	29.6%
Emergency Department	33	21.7%
General Medical Wards	34	22.4%

Knowledge scores of nurses about safe blood transfusion practices were measured. Results are presented in Table 2. The knowledge test included questions on indications for transfusion, monitoring during transfusion, reactions to transfusion, and care after transfusion.

Knowledge table 02

Knowledge Area	Correct Responses (n = 152)	Percentage
Indications for Blood Transfusion	115	75.7%
Pre-transfusion Checks	110	72.4%
Monitoring During Transfusion	104	68.4%
Recognition of Transfusion Reactions	100	65.8%
Post-transfusion Care	112	73.7%
Patient Involvement in Transfusion	95	62.5%

The highest observed level of knowledge was in transfusion indications with a score of 75.7%, whereas the lowest score was in the aspect of patient involvement in transfusion practices at 62.5%.

To evaluate whether demographic variables affected the knowledge of safe blood transfusion practices among nurses, a series of statistical analyses were conducted. Table 3 summarizes the results of chi-square tests that were performed to examine the association between nurses' gender, years of experience, and department with their knowledge of blood transfusion practices.

Table 03

Variable	Knowledge Score (Mean ± SD)	p-value
Gender		
Male	68.5 ± 6.2	0.342
Female	70.3 ± 5.9	
Years of Experience		
1-5 Years	65.2 ± 7.5	0.041*
6-10 Years	70.1 ± 6.3	

11-15 Years	72.3 ± 6.0	
16+ Years	74.5 ± 5.4	
Department		
ICU	67.9 ± 6.8	0.056
Surgical Unit	69.5 ± 5.9	
Emergency Department	70.4 ± 6.1	
General Medical Wards	71.2 ± 6.3	

There was a statistically significant difference in the knowledge scores based on the years of experience ($p = 0.041$), with nurses having 16 or more years of experience scoring the highest. Gender and department did not show any significant associations with the overall knowledge scores ($p > 0.05$).

The study identified knowledge gaps in various areas that would be useful in informing future training interventions. In the areas concerning the recognition of transfusion reactions and patient involvement in the process, nurses have a lower level of awareness. These gaps require targeted educational programs to enhance the understanding and management of transfusion-related complications among nurses.

Discussion:

The results of this study show that nurses have a good understanding of transfusion indications and post-transfusion care, but there is still room for improvement in monitoring during transfusion and recognition of transfusion reactions. Experience also played a role in enhancing knowledge, as more experienced nurses had better knowledge scores. The findings point out the need for continuous education and the necessity to address knowledge deficits through targeted training programs. A cross-sectional study found that there were 63.6% females, of which 52.4% were between 31-40 years of age. Even though 89.3% recognized the use of a blood transport box and 90.77% checked labels, some moderate knowledge gaps were seen in transfusion practices [10]. Here in our study, 70.4% were female, and 40.8% came under the category of 20-30 years. High knowledge was reported in the transfusion indications 75.7%, while a gap remained on transfusion reactions 65.8% and patient involvement 62.5%, both areas requiring more education in the studies. A study revealed a mean compliance of 69.1% with variation according to age, gender, and experience [11]. Our study also had significant knowledge gaps in the areas of transfusion reactions and patient involvement and requires targeted education and training. A survey indicated that 72% of the respondents considered hepatitis B and C to be serious, and 94% were aware of sources of transmission; however, they were less knowledgeable about screening and immunoglobulin use. The nurses had more knowledge about blood transfusion than students, with education, work experience, and marital status as predictors. Both call for specific education and training [12]. Another study reported that 72% of participants perceived hepatitis B and C to be serious conditions, with 94% reporting knowledge of transmission sources, though fewer knew of screening and use of immunoglobulin. In our study, most nurses, 90%, had unsatisfactory practices related to blood transfusion safety. Education, experience, and training were significant predictors of safe practices. Both studies point out that there is a need for improvement in training and practices to ensure safety in the blood transfusions [13]. A study conducted among Malaysian nurses revealed an overall blood transfusion knowledge of 54.9%, with individual scores varying between 45.4% and 90% across different areas of transfusion practices. Our study showed that 75.7% of nurses were aware of blood transfusion indications, but there were gaps in knowledge regarding transfusion reactions (65.8%) and patient involvement (62.5%). Both studies emphasize the need for improved education and training to enhance nurses' knowledge and ensure better blood transfusion practices [14]. In a study reviewing 238 transfusions among 95 patients, blood transfusions were most commonly indicated for malignancy (31.7%) and sepsis (15.1%), with 96.4% receiving the appropriate volume of blood. Our study, however, found that 89.3% of nurses correctly identified blood transport box usage, and 90.77% checked the details on the blood bag label. While transfusions in the other study showed some adverse events (10%), our study highlights gaps

in knowledge, particularly regarding transfusion reactions (65.8%) and patient involvement (62.5%), which both studies suggest need further education to improve blood transfusion practices [15]. A study with a 96% response rate showed that over 90% of nurses consistently followed two-person checks for patient identification and blood sample collection, as well as two-person administration with a doctor–nurse pair using electronic pre-transfusion checks. In contrast, our study found that while 90.77% of nurses checked blood bag labels and request forms, gaps remained in understanding transfusion reactions (65.8%) and involving patients in the process (62.5%), indicating areas needing improvement in safe blood transfusion practices [16]. In a study, it was noted that blood transfusions were not appropriate in all cases, particularly with single-unit transfusions, highlighting the need for awareness and regular training among healthcare professionals. Similarly, our study revealed moderate knowledge among nurses regarding blood transfusion practices, with specific gaps in recognizing transfusion reactions (65.8%) and involving patients (62.5%). These findings emphasize the necessity of continuous education and training to enhance safe transfusion practices among nurses [17]. In a study, the mean age of participants was 27.36 (± 5.31), with 72% aged 18-30. Nurses showed a significant improvement in knowledge scores post-course (42.86 ± 13.84 to 68.90 ± 6.08, *P* = 0.000). Similarly, our study found that while 75.7% of nurses knew the indications for blood transfusion, there were notable gaps in recognizing transfusion reactions (65.8%) and patient involvement (62.5%), highlighting the need for further training to enhance knowledge and safe practices [18].

Conclusion:

The study revealed that while 75.7% of nurses were knowledgeable about blood transfusion indications, there were notable gaps in understanding transfusion reactions and involving patients in the process. Although post-intervention knowledge scores improved significantly, indicating the effectiveness of educational programs, overall knowledge and practices still need enhancement. Continuous professional development, regular training, and practical workshops are essential to bridge these gaps, promote safe transfusion practices, and ensure patient safety in healthcare settings.

Conflict of interest:

The authors declare no conflict of interest.

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