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Assessment of awareness about safe blood transfusion practices among nurses in a tertiary care center in North Kerala

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Abstract

Background: Blood transfusion is a potentially life-saving procedure that has many consequences and complications. Most of the complications are due to clerical and technical problems. Hence, the proper knowledge and skills of the personnel involved in blood transfusion are critical. Nurses are an integral part of blood transfusion procedures. Our study aimed to evaluate nurses' knowledge about safe blood transfusion practices in a tertiary care center in North Kerala.

Methods: This was a descriptive, cross-sectional study of 113 registered nurses involved in a blood transfusion procedure in a tertiary care center in North Kerala. The knowledge of the nurses was evaluated by using a questionnaire comprising 20 questions, of which 10 questions were about theoretical knowledge and 10 were about practical knowledge. Scores>75%, between 50% and 75%, and <50% were considered as good, fair, and poor knowledge, respectively.

Results: In our study, 44.25% of the nurses showed fair knowledge, and 32.7% had poor knowledge of knowledge-based questions. Moreover, 48.6 % had fair knowledge, and 14.16% had poor knowledge of practice-based questions. No statistically significant association was found between nurses' years of experience and theoretical and practical knowledge. A statistically significant association was found between the place of work and theoretical and practical knowledge. Many of the nurses lacked proper knowledge regarding the key aspects of blood transfusion.

Conclusion: We recommend more training programs to improve the knowledge and skills of the nurses to ensure the quality and safety of blood transfusion.

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Introduction

In India, about 12 million units of blood are transfused annually, whereas it is around 117.4 million globally (1). Blood transfusion is a process involving many interlinking chains of events and a multidisciplinary team of health professionals. Nurses play an important role in the process of blood transfusion as they are involved in the initiation of safe blood transfusion and bedside monitoring for reactions during and after the termination of the process (1,2). Their skills and knowledge are crucial for them to transfuse blood safely and efficiently (3). Even though blood transfusion is a lifesaving procedure, it comes with a number of complications and hazards (4).

The most common complications of blood transfusion result from human errors, mainly due to incorrect patient identification or wrong bedside practices (5). The Haemovigilance Programme of India (HvPI) reported that among hemolytic transfusion reactions, 51.2% of errors were due to improper handling or bedside storage of blood and that 27.3% of ABO incompatibility hemolytic reactions were due to bedside sampling errors (6).

As they are at the frontline in the process of blood transfusion, nurses are expected to have a thorough knowledge of safe blood transfusion practices (1). The World Health Organization (WHO) recommends that training of healthcare workers is important to improve blood safety and quality (7).

There are few studies in Kerala to assess the knowledge of nurses about blood transfusion. Our study aimed to evaluate nurses' knowledge about safe blood transfusion practices in a tertiary care center in North Kerala.

Methods

This study was a descriptive, cross-sectional study conducted during February 2023 in a 500-bed tertiary care center in North Kerala. The study was approved by the Institutional Ethical Committee (Ref.No.IEC/MES/11/23). All the registered nurses who were diploma holders (General Nursing and Midwifery), graduates (bachelor of science), or postgraduates (master of sciences) working in the hospital were the subjects.

All registered nurses who were regular employees of the hospital and who were involved with direct patient care in any ward, intensive care unit, or other cancer care areas at the time of the study and gave consent to participate were included.

Nursing students and nurses who were not involved with bedside patient care were excluded.

A self-administered, structured, pretested, paper-based questionnaire comprising 20 questions was used to collect the data. General information like age, sex, type of ward in which they were currently working, and information regarding previous training programs regarding blood transfusion was also included in the questionnaire. All the items were multiple-choice questions, with 10 pertaining to theoretical knowledge and 10 related to practical knowledge. The questionnaire was developed by the researchers based on similar studies (1), and the answers were marked in accordance with the WHO's Clinical Use of Blood Handbook (8). A pilot study was conducted to examine content validity.

The questionnaire was given to nurses after their duty shifts. Their overall theoretical and practical knowledge was quantified based on their responses to the questionnaire. The correct response to each question was given a score of 1, and all the other responses were given a score of 0. Based on this, a score >75% was considered "good knowledge," a score of 50% to 75% was considered "fair knowledge," and a score of <50% was considered "poor knowledge."

The data were analyzed in SPSS v. 26.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used, and the results were expressed as frequency or percentage, whereas intergroup comparison of continuous variables was performed using the analysis of variance (ANOVA). A $P < 0.05$ was considered significant.

Results

The questionnaire was distributed among 140 nurses. Only 113 nurses filled out the questionnaire completely and, hence, were included in the final analysis. Women (n=110, 97.3%) were the majority, and most had a work experience of 1 to 5 years (n=65, 57.5%). A summary of the characteristics of the participants is presented in (Table 1).

Table 1. General characteristics of the participants

Variables	Categories	Frequency
Sex	Male	3
	Female	110
Work experience (y)	Less than 1 year	21
	1-5 years	65
	5-10 years	15
	More than 10 years	12
Place of work	*ICU	47
	Ward	37
	**Others	28

*ICU: Intensive care unit
**Others include nurses working in the operation theater, oncology wards, and emergency department

Of the nurses, 44.25% (n=50) showed fair knowledge, 23% (n=26) had good knowledge, and 32.7% (n=37) demonstrated poor knowledge in theoretical knowledge-based questions. (Table 2) summarizes the responses to individual theoretical knowledge-based questions.

Table 2. Summary of responses to theory-based questions by the participants

Knowledge-based questions	Correct responses	Incorrect responses
Do we have a written blood transfusion policy?	99 (88.76%)	14 (12.4%)
Type of sample tube to collect blood for cross-matching	102 (90.3%)	11 (9.7%)
Time required for routine cross-matching	44 (38.9%)	69 (61.1%)
Type of cross-matching that takes the least time	15 (13.3%)	98 (86.7%)
The shelf life of properly stored platelet concentrate	30 (26.5%)	83 (73.5%)
The temperature at which PRBC is stored in the blood bank	38 (33.6%)	75 (66.4%)
The shelf life of thawed FFP when stored at 2-6 ℃	9 (8%)	104 (92%)
Desired dosage of FFP	23 (20.4%)	89 (78.8%)
Are you aware of the Haemovigilance Programme of India?	28 (24.8%)	85 (75.2%)
For each unit of packed red cell transfusion, we expect an increment of…(g/dL) of Hemoglobin.	38 (33.6%)	75 (66.4%)

PRBC: Packed red blood cell; FFP: Fresh frozen plasma

Besides, more than 80% of nurses gave incorrect responses for the type of cross-matching that takes the least time and the shelf life of thawed fresh frozen plasma (FFP). Most of the nurses were not aware of the HvPI.

Moreover, 48.6 % (n=55) had fair knowledge, 37.7% (n=42) possessed good knowledge, and 14.16% (n=16) showed poor knowledge in practice-based questions. (Table 3) summarizes the responses to individual practice-based questions.

Table 3. Summary of responses to practical knowledge-based questions by the participants

Practice-based questions	Correct responses N (%)	Incorrect responses N (%)
Transfusion of one unit of red cells should not take longer than… hours.	74 (65.5%)	39 (34.5%)
The only compatible IV solution that can be used along with red cell transfusion…	54 (47.8%)	59 (52.2%)
If you observe a transfusion reaction, what should be performed first?	85 (75.2%)	28 (24.8%)
Can you mix medications along the red cell unit?	95 (84.1%)	18 (15.9%)
Can blood units be stored in the refrigerators in the ward?	93 (82.3%)	20 (17.7%)
If the blood is not used for any reason, it should be returned to the blood bank within … minutes, as per our hospital's policy.	66 (58.4%)	47 (41.6%)
Is pre-warming of blood required during routine transfusion?	30 (26.5%)	83 (73.5%)
The ideal method for pre-warming blood products is…	8 (7.1%)	105 (92.9%)
Which color-coded biomedical waste disposable bag/bin will you discard used blood bags in?	47 (41.6%)	66 (58.4%)
Can platelet products be refrigerated? Yes/No	61 (54%)	52 (46%)

IV: Intravenous

Furthermore, 73.5% (n=83) of the nurses gave incorrect responses for a key practical aspect of bedside blood transfusion, i.e., regarding the prewarming of blood products. Table 4 summarizes the overall knowledge levels of the participants based on the questionnaire provided.

A statistically significant association was found between the place of work and theoretical (P<0.001), practical (p=0.006), and total score (P<0.001). Intensive care unit (ICU) nurses and nurses working in the operation theater, oncology department, and emergency department (ED) had more theoretical, practical, and total scores compared to nurses working in general wards. (Table 5) summarizes the comparison of knowledge and the place of work.

Table 4. Assessment of the overall knowledge of nurses

Knowledge level	Frequency for theoretical questions (N)	Percentage	Frequency for practical-based questions (N)	Percentage	Frequency for total score (N)	Percentage
Poor	37	32.74%	16	14.16%	33	29.20%
Fair	50	44.25%	55	48.67%	57	55.44%
Good	26	23.01%	42	37.17%	23	20.35%
Total	113	100.00%	113	100.00%	113	100.00%

Table 5. Comparison of knowledge based on place of work

Place of work	N	Mean for theoretical knowledge	SD for theoretical knowledge	P-Value	Mean for practical knowledge	SD for practical knowledge	P-Value	Mean for a total score	SD for a total score	P-Value
*ICU	47	2.26	0.77	< 0.001	2.47	0.69	0.006	2.32	0.66	< 0.001
Ward	37	1.54	0.56		2.08	0.64		1.51	0.51	
**Others	29	1.79	0.68		2.03	0.63		1.76	0.64	

*SD: Standard deviation; ICU: Intensive care unit

**Others include nurses working in the operation theater, oncology wards, and emergency department.

No statistically significant association was found between the years of experience of nurses and theoretical knowledge (p=0.442), practical knowledge (p=0.081), and the total score (p=0.58) summary in (Table 6). As expected, there was no increased theory knowledge in nurses who had graduated recently and no increased practical knowledge in nurses with more work experience.

Table 6. Comparison of knowledge based on level of experience

Experience	N	Mean for theory questions (n)	SD for theory questions	P-value	Mean for practical questions	SD for practical questions	P-value	Mean for a total score	SD for a total score	P-value
Less than 1 year	21	3.90	2.095	0.442	4.76	2.300	0.081	1.81	0.81	0.58
1-5 years	65	3.66	2.033		5.32	1.961		1.89	0.71	
5-10 years	15	4.47	2.134		6.27	1.335		2.13	0.74	
More than 10 years	12	3.33	1.155		6.17	2.167		1.92	0.29	

SD: Standard deviation

Discussion

The key aspect of any successful transfusion is the involvement of nurses in the procedure and their skills and practical knowledge. From the initiation of the transfusion to the post-transfusion care of the patient, nurses are directly involved in patient care. Their skills and knowledge may vary from hospital to hospital based on the number of transfusions taking place in the hospital, the training they receive, and their ethical attitudes. Therefore, it is important to assess their knowledge regarding different aspects of transfusion and to plan training programs accordingly to ensure a safe blood transfusion process for every patient who requires it.

In this study, 67.26% of the nurses scored >50% in theory-based questions, and 86.4% scored >50% in practical-based questions. A similar study conducted by Irene et al. found that 84.2% of the nurses scored ⩾50% in the theoretical aspect, and 65.94% scored ⩾50% in the practical knowledge-based questions.

A study by Suhrud J et al. in a tertiary care center in Pune found that the theoretical knowledge and total scores differed significantly with years of experience, whereas the practical score did not (9). According to that study, nurses tended to forget the basics of blood grouping, donation, blood products, collection, and handling with increasing years of experience because experienced nurses are more involved in administration and supervision and are likely to forget the fundamentals. In our study, we did not find any association between theoretical, practical, or total scores and years of experience, similar to the study results of Irene et al. (1) and Talati et al. (10).

Only a few studies assessed nurses' knowledge based on the workplace. In one such study by Suhrud J et al. (9), the nurses who worked in the ICU had significantly higher practical knowledge and total scores than their counterparts in the wards, similar to the findings of our study. Intensive care unit nurses, nurses working in oncology wards, operation theaters, and ED, deal with blood and blood product transfusion more frequently than nurses in general wards. The nurse-to-patient ratio in ICU and ED is less compared to general wards, enabling them to provide more patient care during the transfusion process.

In theory-based questions, the majority of the nurses gave incorrect responses to questions regarding saline cross-matching. Only a few nurses in the ED gave correct responses to this question. Perhaps nurses in the other

departments rarely encounter emergency needs for blood and blood products. Most nurses (73.5%) were unaware of the shelf life of thawed FFP stored at 2-6 ℃. It's important for nurses to know that FFP should be administered immediately after thawing or within 24 hrs when stored at 2-6 ℃; otherwise, the clotting factors will gradually decline after thawing.

The HvPI was launched on December 10, 2012, in India to ensure safe blood transfusion practices in the country (11). In this study, 75.2% of the nurses were not aware of HvPI, which shows a lack of continued training programs for nurses.

In practical-based questions, 73.5% of the nurses think prewarming is required during routine transfusion. This shows a general misconception among nurses that blood issued from blood banks is too cold to transfuse directly. A few nurses even think keeping the blood in the incubator is the ideal method for prewarming.

As per the Biomedical Waste Management Rules (2016), used blood bags should be discarded in yellow bags (12). However, 58% of the nurses were unaware of this, which again highlights the significance of continued training programs for nurses.

Platelets are delicate cells that have to be handled in the most appropriate way. Colder storage will lead to irreversible changes in the platelet membrane, resulting in phagocytosis of the platelets following transfusion (13). In this study, 46% of the nurses thought that platelets could be refrigerated. If platelets are refrigerated and then transfused to the patient, they will do more harm than good to the patient.

In this study, 96% of the nurses did not attend any in-house training programs or continuing professional education regarding blood transfusion. This may be the reason why most nurses lack knowledge regarding many key aspects of transfusion. More in-house training and continuous assessment of the knowledge of nurses and motivating them to attend more continuing professional education can significantly increase the standard of transfusion practices.

This study assessed knowledge regarding a few aspects of transfusion. It would have been better if knowledge regarding patient identification steps before transfusion, patient monitoring during transfusion, and questions pertaining to knowledge about complications of blood transfusion had been included in the study.

Conclusion

The majority of the nurses lacked proper knowledge regarding some key aspects of transfusion, e.g., proper handling of blood products and the prewarming of blood. Therefore, we recommend that nursing training curricula include more about modern transfusion methods. Hospitals should implement more training programs and evaluate their results to improve the quality and safety of blood transfusion.

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Ethical statement

Institutional Ethical Committee (Ref.No.IEC/MES/11/23)

Conflicts of interest

The authors declare that they have no conflict of interest.

Author contributions

Aneesha Asok Kumar-Concept and writing the article
Deepak Panasseril Jayapradeep-Questionnaire preparation
Gayathri GangadharanNair-Data collection
Sebina Asmi-Writing the article
Ashid Salim-Statistical analysis

References

1. Jogi IE, Mohanan N, Nedungalaparambil NM. Bedside Blood Transfusion–What Nurses Know and Perform: A Cross-Sectional Study from A Tertiary-Level Cancer Hospital in Rural Kerala. Asia Pac J Oncol Nurs. 2021;8(2):197-203. [View at Publisher] [Google Scholar] [DOI] [PMID]
2. Bielby L, Stevenson L, Wood E. The role of the transfusion nurse in the hospital and blood centre. ISBT Science Series. 2011;6(2):270-6. [View at Publisher] [Google Scholar] [DOI]
3. Hijji B, Parahoo K, Hussein MM, Barr O. Knowledge of blood transfusion among nurses. J Clin Nurs. 2013;22(17-18):2536-50. [View at Publisher] [Google Scholar] [DOI] [PMID]
4. Mohammad OS. Assessment the Nurses Knowledge towards Blood Transfusion Procedure in Karbala City Hospital/Iraq. Ann Roman Soci Cell Biol. 2021;25(6):10021-9. [View at Publisher] [Google Scholar]
5. Bolton-Maggs PH, Watt A. Transfusion errors—can they be eliminated? Br J Haematol. 2020;189(1):9-20. [View at Publisher] [Google Scholar] [DOI] [PMID]
6. Bisht A, Marwaha N, Kaur R, Gupta D, Singh S. Haemovigilance Programme of India: Analysis of transfusion reactions reported from January 2013 to April 2016 and key recommendations for blood safety. Asian J Transfus Sci. 2018;12(1):1-7. [View at Publisher] [Google Scholar] [DOI] [PMID]
7. World Health Organization. Blood Safety and Availability. World Health Organization; 2023. [View at Publisher] [Google Scholar]
8. World Health Organization. The Clinical use of blood in medicine, obstetrics, paediatrics, surgery and anaesthesia, trauma and burns. 1st ed. World Health Organization; 2001. [View at Publisher]
9. Panchawagh SJ, Melinkeri S, Panchawagh MJ. Assessment of knowledge and practice of blood transfusion among nurses in a tertiary care hospital in India. Indian J Hematol Blood Transfus. 2020;36(2):393-8. [View at Publisher] [Google Scholar] [DOI] [PMID]
10. Talati S, Gupta AK, Jain A. Knowledge and awareness among nurses regarding the blood transfusion services and practices in a tertiary care teaching hospital. Asian J Transfus Sci. 2016;10(2):166-8. [View at Publisher] [Google Scholar] [DOI] [PMID]
11. Bisht A, Singh S, Marwaha N. Hemovigilance program–India. Asian J Transfus Sci. 2013;7(1):73-4. [View at Publisher] [Google Scholar] [DOI] [PMID]
12. Bansod HS, Deshmukh P. Biomedical Waste Management and Its Importance: A Systematic Review. Cureus. 2023;15(2):e34589. [View at Publisher] [Google Scholar] [DOI] [PMID]
13. Thomas S. Platelets: handle with care. Transfus Med. 2016;26(5):330-8. [View at Publisher] [Google Scholar] [DOI] [PMID]

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