INTERNATIONAL JOURNAL OF ADVANCED RESEARCH
International Peer-Reviewed Research Journal
ISSN (Online): 3106-7980 | ISSN (Print): 3106-7972
Volume 3 • Issue 5 • September 2026

ASSESSING NURSES KNOWLEDGE AND PRACTICES REGARDING SAFE BLOOD TRANSFUSION IN A TERTIARY CARE HOSPITAL OF ISLAMABAD

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DOI: https://doi.org/10.5281/zenodo.23204495

Keywords

Article History
Received: 01 June 2026
Accepted: 23 August 2026
Published: 19 September 2026

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Abstract

Background: *Safe blood transfusion is a crucial component of patient care, yet errors in transfusion practices remain a major cause of preventable complications. Nurses play a central role in ensuring transfusion safety; therefore, assessing their knowledge and practices is essential for improving patient outcomes.*

Objective: *This study aimed to assess nurses' knowledge and practices regarding safe blood transfusion in three tertiary care hospitals of Islamabad.*

Methods: *A descriptive cross-sectional study was conducted among 168 bedside nurses selected through convenient sampling from Pakistan Institute of Health Sciences, Capital Development Authority Hospital, and Farooq Teaching Hospital. Data were collected using a structured, adopted questionnaire consisting of sections on demographic characteristics, knowledge, and practices related to safe blood transfusion. Statistical analysis was performed using SPSS version 22, employing descriptive statistics and chi-square tests to determine associations.*

Results: *Findings revealed that 29.8% of nurses had low knowledge, 57.7% had moderate knowledge, and only 12.5% demonstrated high knowledge of safe blood transfusion. Knowledge level showed no significant association with age, gender, or hospital ($p > 0.05$). However, qualification was significantly associated with knowledge ($p = 0.005$), with master's-prepared nurses showing the highest proportion of high knowledge. Overall, the results indicate suboptimal knowledge among participants.*

Conclusion: *The study highlights the need for improved training and continuous professional development to enhance nurses' knowledge and practices regarding safe blood transfusion. Strengthening transfusion education and implementing regular competency assessments may help reduce transfusion-related errors and improve patient safety.*

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INTRODUCTION

Blood transfusions, which restore lost blood components, are an essential and life-saving procedure for patients with both acute and chronic illnesses. This procedure is performed annually on millions of people worldwide, and while it is generally regarded as safe, there are some potential side effects, such as immunological problems, immune modulation, or transfusion-transmitted infections. In blood transfusion procedures, numerous dangers related to human error have been documented; these risks account for around 85% of all preventable hazards. Acute hemolytic response is one of these outcomes, which is primarily brought on by ABO incompatibility and can be lethal. (1, 2) Globally, the number of blood transfusions is rising; in 2012, there were 85 million transfusions, but in 2016, there were 112.5 million donations. (3, 4) Despite its positive effects, blood transfusion procedures can occasionally have hazards that result in several negative outcomes. Acute hemolytic reactions, transfusion reactions, febrile reactions, and septic reactions are among the acute or delayed problems that could result from it. It increases the risk of syphilis, malaria, Chagas disease, HIV, and hepatitis viruses, among other transfusion-transmissible infections (TTI). (5, 6) In the year 2015, the Serious Hazard of Blood Transfusion (SHOT) report documented 3,288 cases. Just 10% of the total SHOT instances were unavoidable (mainly allergic/febrile reactions), with 77.7% of errors resulting from mistakes or "human factors." There
were 26 recorded deaths overall and there were 166 cases with significant morbidity. Transfusion-Associated Circulatory Overload (TACO), hemolytic transfusion responses, transfusion-transmitted infections, transfusion-related acute lung injury (TRALI), transfusion of the wrong blood product, and ABO-incompatible transfusion were the main morbidities that were reported.(7). Errors in blood transfusion procedures may have led to these consequences. The majority of these errors may be caused by a number of factors, including the challenge of transporting the blood component from the blood bank to the hospital, a lack of knowledge and cross-checking procedures at the bedside, and irregular patient monitoring both during and after the transfusion procedure.(8) Blood transfusion is covered in the curriculum of a few nursing degrees offered in Malaysia, including the three-year diploma, four-year bachelor's degree, and two to four-year master's degree. As nurses require knowledge to make appropriate decisions and sound knowledge is necessary to ensure blood transfusion safety along with high-quality patient care, new trends in nursing research have focused on investigating, assessing, training, and updating nurses' knowledge in order to develop an evidence-based clinical practice. (9, 10)

Objective:

- To assess the knowledge of nurses regarding safe blood transfusion.
- To assess practices of nurses regarding safe blood transfusion

Research Questions:

- What is the level of knowledge of nurses regarding safe blood transfusion
- What are the practices of nurses regarding safe blood transfusion

Operational definition:

Nurse's level of Knowledge:

Participants who score above mean score on knowledge questionnaire were be considered good level of knowledge and participants who score less than mean score on knowledge questionnaire will be considered poor level of knowledge toward safe blood transfusion

Practice of Nurse's:

Participants who score above mean score on practice questionnaire were be considered to have good practices toward safe blood transfusion and participant who score below mean score on practice questionnaire was consider poor practice

towards safe blood transfusion.

Methodology:

Study design:

In this study, a descriptive cross-sectional research design was used.

Study setting:

The study was carried out in three tertiary cares hospitals. Names Pakistan institute of health sciences, capital development authority hospital, Farooq teaching hospital.

Sample size: a sample size of 168 nurses working at in three tertiary cares hospitals in Peshawar Pakistan were selected With A 95% confidence interval and a 05% margin of error and having total population of 330 nurses. The sample size calculated using sample size calculator.

Sampling Technique:

A convenient sampling technique were applied to select study participant in Names Pakistan institute of health sciences, capital development authority hospital, Farooq teaching hospital.

Study duration: The study were complete in three months between 10th to 31th December 2024.

Sampling selection:

Inclusion criteria: include all the bed sided nurses who are working in Pakistan institute of health sciences, capital development authority hospital, Farooq teaching hospital.

Exclusion criteria: All nurses who are not directly involve\ in patient management (Nursing supervisor, on annual leave, sick leave, novice nurses, and other health workers) will not include in the study of Pakistan institute of health sciences, capital development authority hospital, Farooq teaching hospital.

Data collection:

Ethical consideration: Approval of the study was obtain before carrying out this study from the ethical committee of Bashir medical institute. Formal permission was obtained from the authorities for the collection of data. The data was collected from Pakistan institute of health sciences, capital development authority hospital, Farooq teaching hospital.

The investigator first introduced him and were explain the need and purpose of the study, the knowledge and practice level assessed after obtained permission from all nurses in Pakistan institute of health sciences, capital development authority hospital, Farooq teaching hospital.

Data collection procedure:

The data where be collect by using Structure adopted questionnaire (3) items and (20) question for assessing knowledge and practice of nurses working in different units of Pakistan institute of health sciences, capital development authority hospital, Farooq teaching hospital.

like general ward (Ent, Gynae, ,Ortho, Pediatric, , Surgical) and Critical area (CCU, ER, HDU, Hem dialysis, , Neuro, Nicu, one tool used in this study to collect data..

Tool I: A questionnaire adopted from: (Encan, B., & Akin, S. (2019)) this questionnaire consists of three parts:

Part i: Socio-demographic characteristics: was covered hospital and department name, marital status, educational level, age, years of experience.

Part II: is knowledge questionnaire. This part was used to assess the knowledge of nurses regarding safe blood transfusion.

Part III: is practice questionnaire. This part will use to assess the practice of nurses regarding safe blood transfusion

Data Processing and Statistical Analysis: The Statistical Package for Social Sciences (SPSS version 22) were used to code, analyze, and calculate the frequency and percentages from the obtained data. Various characteristics were described using descriptive statistics such as frequency, distribution, mean, and standard deviation.

GENDER OF THE PARTICIPANTS					
	Frequency		**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Male	93	55.4	55.4	55.4
	Female	75	44.6	44.6	100.0
	Total	168	100.0	100.0	

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RESULTS

Table 01) presents a breakdown of the participant demographics. In total, 168 participants took part in the study. The gender distribution was as follows:
Male participants: 93 (55%)
Female participants: 75 (45%)

STATISTICS						
		Age of the particapents	gender of the particapent s	hospital to which the particapent s belong	qualificati on of the participant s	knowledgenof the particapents regarging safe blood transfusion
N	Valid	168	168	168	168	168

	Missing	0	0	0	0	0
Mean		1.7321	1.4464	1.9464	1.5655	1.8274
Median		2.0000	1.0000	2.0000	1.0000	2.0000
Std. Deviation		.55233	.49861	.89080	.67140	.62863
Variance		.305	.249	.794	.451	.395
Minimum		1.00	1.00	1.00	1.00	1.00
Maximum		3.00	2.00	3.00	3.00	3.00

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These numbers indicate that males comprised the majority of the participant pool, accounting for 55% of the total, while females made up 45%.

FREQUENCY TABLE

AGE OF THE PARTICIPANTS					
		Frequency	Percent	Valid Percent	Cumulative Percent
GENDER OF THE PA	20 to 24	54	32.1	32.1	32.1
	25 to 29	105	62.5	62.5	94.6
	30 to 35	9	5.4	5.4	100.0
	Total	168	100.0	100.0	

Valid	Male					
	Female					
	Total					
Valid						

Table 2 Presents the age distribution of the participants. The results are as follows:
- 54 participants (32.1%) were between 20-24 years old.
- 105 participants (62.5%) were between 25-29 years old.
- 9 participants (5.4%) were between 30-35 years old.

Table 3 shows that out of the total participants, 93 were male and 75 were female.

HOSPITAL TO WHICH THE PARTICIPATE BELONGS TO;

		Frequency	Percent	Valid Percent	Cumulative Percent
	Pakistan				
	institute of	71	42.3	42.3	42.3
	health sciences				
	Capital				
	development				
	authority	35	20.8	20.8	63.1
	hospital				

Qualification of the participants

	Islamabad	Frequency	Percent		Valid Percent	Cumulative Percent
	Farooq					
	teaching	62	36.9	36.9	100.0	
Valid	BSN	90	53.6	53.6		53.6
	diploma	61	36.3	36.3		89.9
	Total	168	100.0	100.0		
	master in nursing	17	10.1	10.1		100.0
	Total	168	100.0	100.0		

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Table 4 presents the educational qualifications of the participants. The results are as follows:

- Total participants: 168
- Bachelor of Science in Nursing (BSN): 90 participants (53.6%)
- Diploma in Nursing: 61 participants (36.3%)
- Master's degree in Nursing: 17 participants (10.1%)

knowledge of the participant's regarding safe blood transfusion					
		Frequency	Percen t	Valid Percent	Cumulative Percent
Valid	'low knowledge'	50	29.8	29.8	29.8
	moderate knowledge'	97	57.7	57.7	87.5
	high knowledge'	21	12.5	12.5	100.0
	Total	168	100.0	100.0	

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Table 5 presents the knowledge levels of the participants. The results are as follows:

- Low knowledge: 50 participants (29.8%)
- Moderate knowledge: 97 participants (57.7%)

		hospital to which the particapents belong	knowledgenof the particapents regarging safe blood transfusion
hospital to which the particapents belong	Pearson Correlation	1	.005
	Sig. (2-tailed)		.951
	N	168	168
knowledgenof the particapents regarging safe blood transfusion	Pearson Correlation	.005	1
	Sig. (2-tailed)	.951	

	N	168	168

- Good knowledge: 21 participants (12.5%)

Gender of the Participants * knowledge of the participant's regarding safe blood transf

Crosstab					
Count					
		knowledge of the participant's regarding safe blood transfusion			Total
		low knowledge'	moderate knowledge'	High knowledge'	
gender of the participant's	male	27	54	12	93
	female	23	43	9	75
Total		50	97	21	168

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Descriptive Statistics			
	Mean	Std. Deviation	N
hospital to which the participant's belong	1.9464	.89080	168
Knowledge of the participant's regarding safe blood transfusion	1.8274	.62863	168

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Chi-Square Tests

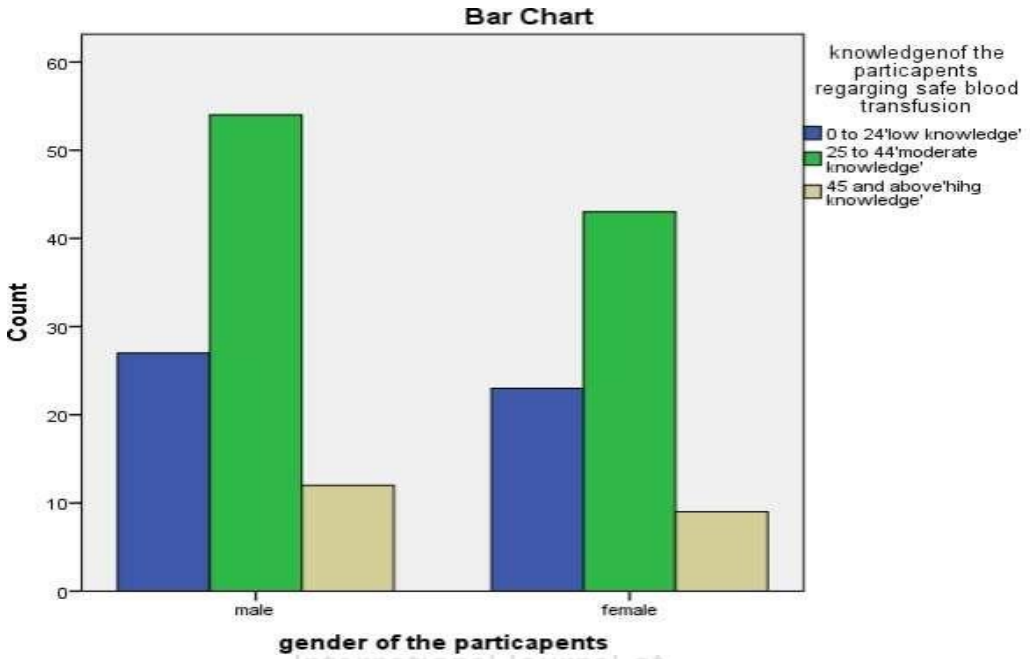
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.068[a]	2	.966
Likelihood Ratio	.068	2	.966
Linear-by-Linear Association	.068	1	.795
N of Valid Cases	168		

The Chi-Square results show that there is **no significant association between gender and nurses' knowledge levels** regarding safe blood transfusion (p = 0.966).

Symmetric Measures

			Value	Asymp. Error[a]	Std.Approx. T[b]	Approx. Sig.
Interval by Interval		Pearson's R	-.020	.077	-.259	.796[c]
Ordinal by Ordinal		Spearman Correlation	-.020	.077	-.260	.796[c]
N of Valid Cases			168			

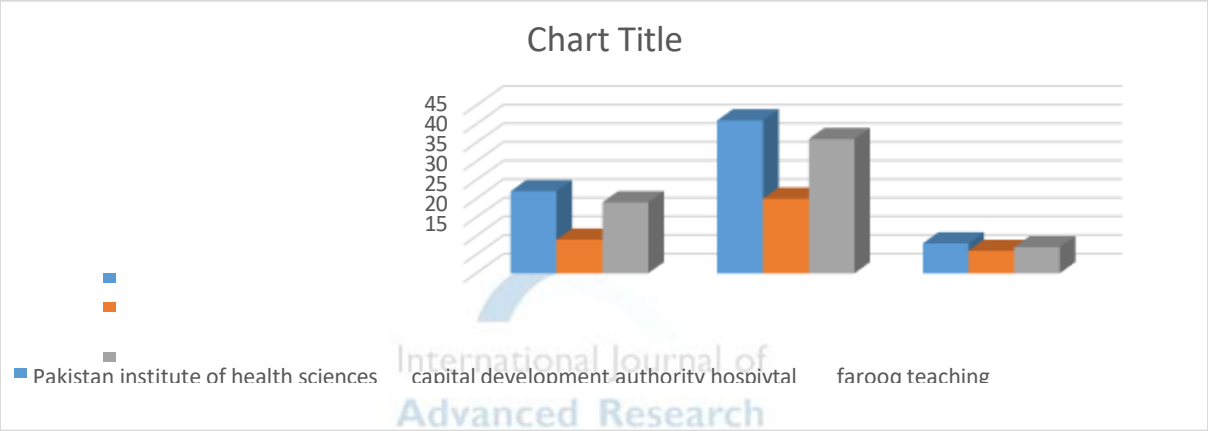
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Hospital to which the participants belong * knowledge of the participant's regarding safe blood transfusion

		knowledge of the participants regarding safe blood transfusion		
		low knowledge'	moderate knowledge'	High knowledge'
hospital to which the participants belong	Pakistan institute of health sciences	22	41	8
	Capital development authority hospital	9	20	6

	Farooq teaching hospital	19	36	7
Total		50	97	21



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Pakistan institute of health sciences	22	41	8
capital development authority hospiytal	9	20	6
farooq teaching hospital	19	36	7

Crosstab		
Count		
		Total
hospital to which the participant's belong	Pakistan institute of health sciences	71
	Capital development hospital	35
	Farooq teaching hospital	62
Total		168

This table shows that there is no significant association between the hospital where nurses work and their knowledge level regarding safe blood transfusion, as indicated by the very high p-values ($p > 0.90$).

Chi-Square Tests			
Symmetric Measures	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.010[a]	4	.908
Likelihood Ratio	.961	4	.916
Linear-by-Linear Association	.004	1	.951
N of Valid Cases	168		

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Volume 3 • Issue 5 • September 2026

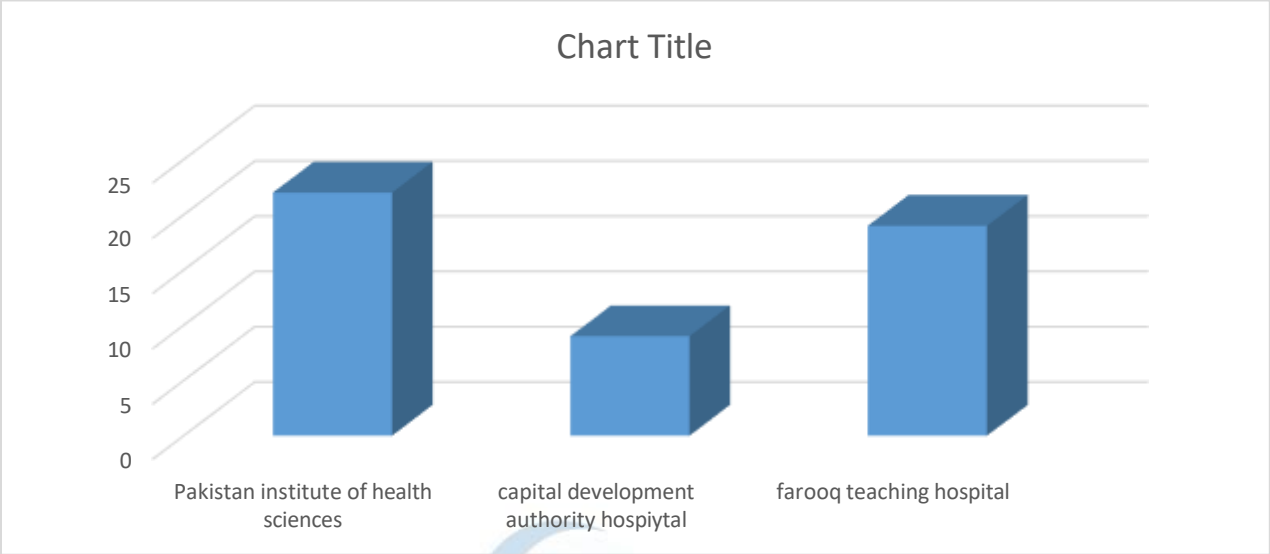
		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.005	.076	.062	.951[c]
Ordinal by Ordinal	Spearman Correlation	.006	.077	.080	.936[c]
N of Valid Cases		168			

This table shows that both the Pearson's R and Spearman's correlation values are **very close to zero** with **high p-values (p > 0.93)**, indicating that **there is no** meaningful correlation between hospital type and nurses' knowledge level regarding safe blood transfusion.

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		knowledge of the participant's regarding safe blood transfusion		
		low knowledge'	moderate knowledge'	high knowledge'
qualification of the participants	BSN	28	58	4
	diploma	20	29	12
	master in nursing	2	10	5
Total		50	97	21

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This study examined the knowledge levels of participants based on their qualifications. Among the 90 participants with a Bachelor of Science in Nursing (BSN), 28 (31.1%) demonstrated low knowledge, 58 (64.4%) showed moderate knowledge, and only 4 (4.4%) exhibited high knowledge. In contrast, the 61 participants with a diploma in nursing displayed a slightly different distribution, with 20 (32.8%) having low knowledge, 29 (47.5%) having moderate knowledge, and 12 (19.7%) having high knowledge. Notably, the 17 participants with a Master's degree showed the highest proportion of high knowledge, with 5 (29.4%) demonstrating this level, while 2 (11.8%) had low knowledge and 10 (58.8%) had moderate knowledge.

Crosstab		
Count		
		Total
qualification of the participants	BSN	90
	diploma	61
	master in nursing	17
Total		168

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	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.968[a]	4	.005
Likelihood Ratio	15.658	4	.004
Linear-by-Linear Association	6.969	1	.008
N of Valid Cases	168		

This table shows that there is a statistically significant relationship between nurses' qualifications and their knowledge levels regarding safe blood transfusion, as indicated by the Pearson Chi-Square ($p = 0.005$), Likelihood Ratio ($p = 0.004$), and Linear-by-Linear Association ($p = 0.008$). These low p-values (all < 0.01) demonstrate that nurses with different educational qualifications—diploma, BSN, and master's—differ significantly in their knowledge levels,

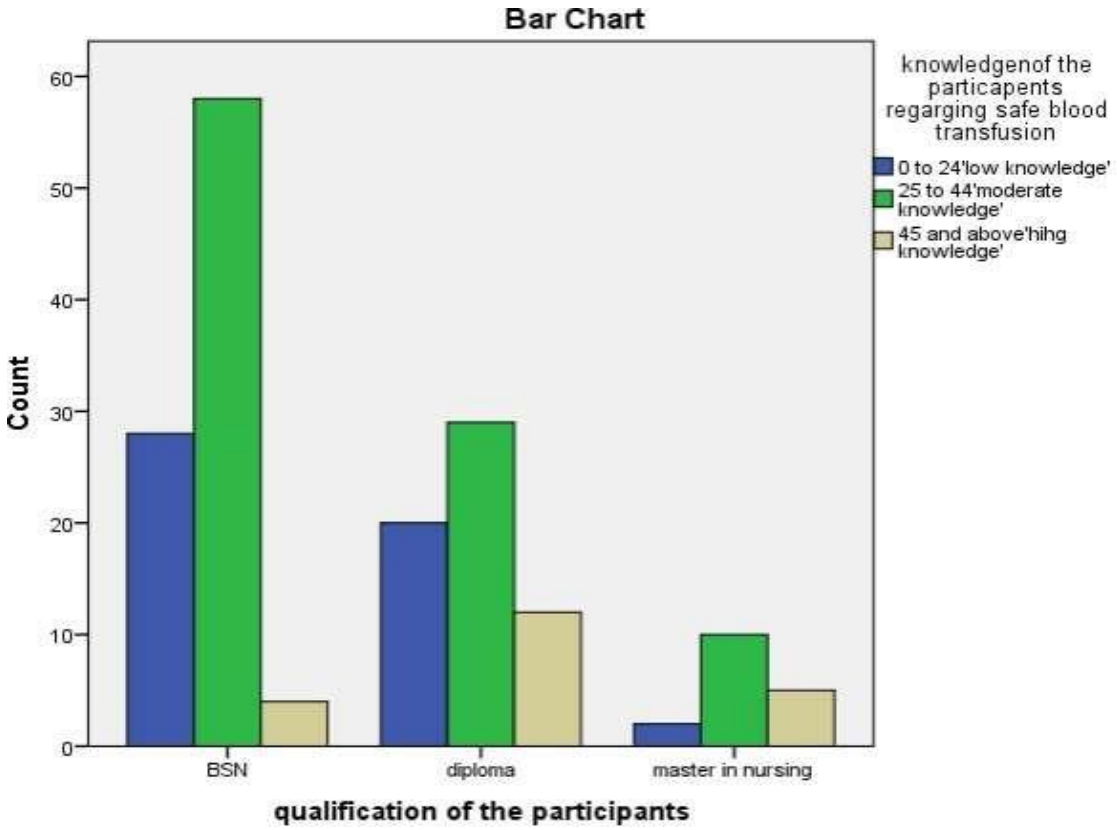
Symmetric Measures					
		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.204	.073	2.689	.008[c]
Ordinal by Ordinal	Spearman Correlation	.175	.075	2.286	.023[c]
N of Valid Cases		168			

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meaning that qualification plays an important role in determining how much nurses know about safe blood transfusion.

This table shows that both Pearson's R ($r = 0.204$, $p = 0.008$) and Spearman's correlation ($r = 0.175$, $p = 0.023$) indicate a significant positive correlation between nurses' qualifications and their knowledge levels regarding safe blood transfusion. The statistically significant p-values (both < 0.05) suggest that as the educational qualification of nurses increases—from diploma to BSN to master's—their knowledge about safe blood transfusion also tends to improve.

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH
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Volume 3 • Issue 5 • September 2026



Age the participant's * knowledge of the participant's regarding safe blood transfusion

Crosstab					
Count					
		knowledge of the participant's regarding safe blood transfusion			Total
		0 to 24'low knowledge'	25 to 44'moderate knowledge'	45 and above'hihg knowledge'	
age the participant's	20 to 24	18	28	8	54

	25 to 29	32	61	12	105
	30 to 35	0	8	1	9
Total		50	97	21	168

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.109[a]	4	.276
Likelihood Ratio	7.564	4	.109
Linear-by-Linear Association	.519	1	.471
N of Valid Cases	168		

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This table shows that there is no statistically significant association between nurses' age and their knowledge level regarding safe blood transfusion, as all p-values (p = 0.276, p = 0.109, and p = 0.471) are greater than 0.05, indicating that age does not influence nurses' knowl

Symmetric Measures

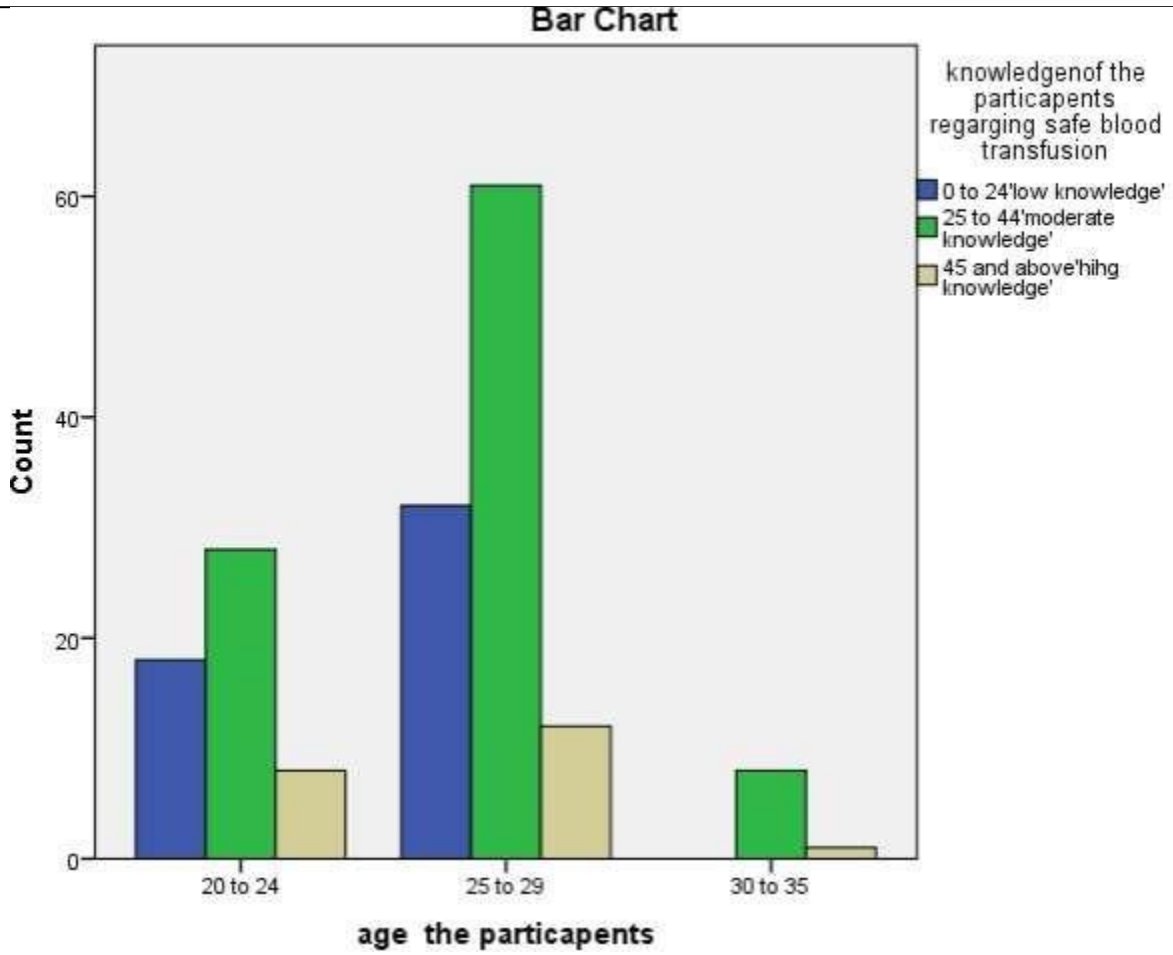
	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.

Interval by Interval	Pearson's R	.056	.074	.719	.473[c]
Ordinal by Ordinal	Spearman Correlation	.055	.076	.705	.482[c]
N of Valid Cases		168			

This table shows that there is no significant correlation between nurses' age and their knowledge level regarding safe blood transfusion, as both Pearson's R (r = 0.056, p = 0.473) and Spearman's correlation (r = 0.055, p = 0.482) are very close to zero and have p-values greater than 0.05. This indicates that age does not meaningfully affect nurses' knowledge in this study.

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Volume 3 • Issue 5 • September 2026



Discussion

This study examined the knowledge levels of participants based on their qualifications. Among the 90 participants with a Bachelor of Science in Nursing (BSN), 28 (31.1%) demonstrated low knowledge, 58 (64.4%) showed moderate knowledge, and only 4 (4.4%) exhibited high knowledge. In contrast, the 61 participants with a diploma in nursing displayed a slightly different distribution, with 20 (32.8%) having low knowledge, 29 (47.5%) having moderate knowledge, and 12 (19.7%) having high knowledge. Notably, the 17 participants with a Master's degree showed the highest proportion of high knowledge, with 5 (29.4%) demonstrating this level, while 2 (11.8%) had low knowledge and 10 (58.8%) had moderate knowledge.

Overall, our study revealed that the knowledge levels of participants were relatively low. Interestingly, we found that diploma students had a higher proportion of low knowledge (32.8%) compared to BSN holders (31.1%). This suggests that diploma students may require additional training or education to enhance their knowledge and skills.

the low knowledge levels among participants, particularly diploma students, may have implications for nursing practice and patient care. It highlights the need for ongoing education and professional development programs to improve nurses' knowledge and competencies. Furthermore, nursing education programs may need to reassess their curricula and teaching methods to ensure that graduates are adequately prepared for practice.

A similar study conducted in Iran among five

hospitals in Tehran yielded intriguing results. The study found that newly graduated nurses possessed good knowledge, whereas diploma holders and experienced nurses demonstrated low knowledge levels.

This finding suggests that newly graduated nurses in Iran may be better equipped with knowledge and skills, possibly due to recent updates in nursing education curricula. In contrast, diploma holders and experienced nurses may require ongoing education and training to enhance their knowledge and stay current with best practices.

The disparity in knowledge levels between newly graduated nurses and experienced nurses in Iran may be attributed to various factors, such as differences in education and training, variations in clinical experience, or inadequate opportunities for continuing education.

These findings have implications for nursing education, practice, and policy in Iran. They highlight the need for ongoing education and professional development programs to support nurses throughout their careers. Additionally, nursing education programs may need to reassess their curricula and teaching methods to ensure that graduates are adequately prepared for practice and that experienced nurses are supported in maintaining their competence.

Furthermore, healthcare organizations and policymakers in Iran may need to invest in staff development programs, workshops, and conferences to enhance nurses' knowledge and skills. By doing so, they can promote high-quality patient care, improve health outcomes, and support the ongoing professional development of nurses.

A study conducted by researchers at Arailang University in Australia yielded similar results. The study found that 70% of nurses demonstrated good knowledge of blood transfusion procedures.

However, a significant proportion of nurses, 40%, were unable to identify correct blood transfusion reactions. Furthermore, 60% of nurses reported that they had not received adequate training on blood transfusion. These findings suggest that while nurses may have a good understanding of blood transfusion procedures, there are significant gaps in their knowledge and training, particularly regarding transfusion reactions.

Future Planes

Based on the findings of this study, several future steps can be undertaken to improve nurses' knowledge and practices regarding safe blood transfusion. Regular, evidence-based training programs and workshops should be implemented to enhance nurses' understanding of transfusion procedures, recognition of transfusion reactions, and adherence to established guidelines. Continuing professional education sessions and hands-on simulation exercises can further strengthen practical skills, particularly for diploma and BSN nurses who demonstrated lower knowledge levels. Periodic assessments of nurses' competency, along with reinforcement of hospital transfusion policies and standard operating procedures, will help ensure safe and effective practice. Additionally, integrating comprehensive blood transfusion education into undergraduate and postgraduate nursing curricula will prepare new graduates for clinical practice. Future research could expand to other hospitals and regions, as well as longitudinally assess the impact of training interventions on nurses' knowledge and patient outcomes, ultimately promoting safer transfusion practices across healthcare settings.

Conclusion

This study assessed the knowledge of safe blood transfusion among 168 nurses and found that, on average, participants had a relatively low level of knowledge. The findings suggest that there is a need for ongoing education and training programs to improve nurses' knowledge and practices regarding safe blood transfusion. Healthcare organizations and nursing education programs should prioritize providing nurses with the necessary knowledge and skills to ensure safe and effective blood transfusion practices

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