

Appraisal of awareness of medical staff about preoperative patient blood management in Saudi Arabia: a questionnaire-based study

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Availability of data and materials: the datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Informed consent: each respondent provided informed consent after being made aware of the study's objectives, the confidentiality and privacy of the information collected, and the fact that the information would only be used for the study's intended purposes.

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ABSTRACT

Patient blood management (PBM) is a comprehensive approach to optimizing the care of patients who might need a transfusion. It involves the use of evidence-based strategies to reduce or avoid the need for allogeneic blood transfusions while ensuring that patients receive safe and appropriate care. PBM includes strategies such as preoperative autologous donation, intraoperative cell salvage, and minimally invasive techniques to reduce bleeding. The purpose of this study is to assess the medical staff's awareness of preoperative PBM in Saudi Arabia. Between April 2022 and July 2022, data was collected using a 10-minute online (Google Forms) self-administered, anonymous, researcher-structured questionnaire adapted from previous studies and translated into both English and Arabic. The questionnaire was divided into three sections. The first section contained sociodemographic data, while the second section was used to estimate physicians' and nurses' knowledge of preoperative PBM. Two questions in Part 3 of the questionnaire were used to assess doctors' and nurses' preoperative PBM attitudes and practices. The average relationship between patients' blood management attitudes and levels of awareness. It was revealed that there was a positive attitude ($P \leq 0.005$) as well as a high level of awareness ($P \leq 0.002$). The effect of job, gender, or geographical distribution on PBM awareness, attitude, and practice was not significant. Despite the fact that the majority of participants have a positive attitude and good awareness of PBM, more efforts should be implemented to improve PBM awareness, which was linked to increased transfusion practices and lower product costs.

Introduction

Blood transfusion is considered a useful tool in the management of many diseases especially anemia, and blood loss, being performed in approximately 10-15% of all hospitalizations worldwide, although many improvement policies have been implemented in the last decades, blood transfusion is still associated with mortal dangers.¹ Patient blood management (PBM) entails the correct and timely implementation of evidence-based notions that aim to keep hemoglobin concentration, optimize hemostasis, and reduce blood loss in order to increase patient outcomes.² In its wider definition, this inventive multidisciplinary approach includes the treatment of perioperative anemia and iron deficiency. In order to supply patient-centered services, the integration of PBM precepts into clinical practice and hospital-based procedures has been linked to enhancements in patient safety and clinical outcomes.^{2,3} These precepts are particularly important in emergency cases when the cornerstone of PBM (the physiological reserve of anemia) and its restrictive transfusion approaches are applicable.⁴ Furthermore, a meta-analysis found that, when compared to control management, PBM could be linked with a prospective reduction in post-operative problems, indicating the possible cost efficiency of its integration in daily practice.⁵ Nonetheless, because of specific barriers such as a lack of knowledge of the new standard operating procedures, and the reality that several hospitals still require guidelines to enforce PBM, which should be the norm of care in clinical routine, implementation of PBM has not been pervasive.^{6,7} PBM implementation is hindered by barriers primarily related to the difficulties involved of alteration traditional “physicians’ attitudes” toward transfusion and “transfusion behavior”.⁸

Despite the WHO endorsement call for PBM and many national policy suggestions,^{9,10} global PBM implementation stays worryingly slow. Significant inter-center and inter-country transfusion variance suggests that blood usage is influenced more by culture and behavior than by proof.^{11,12} The aim of our research is to measure the awareness of Kingdom of Saudi Arabia hospital’s doctors and nurses about preoperative PBM to reduce blood transfusions.

Materials and Methods

Data collection and tool

A 10-minute online (Google Forms), self-administered, anonymous, researcher-structured questionnaire that was adapted from earlier studies with translations into both English and Arabic was used to collect data between April 2022 and July 2022. Three sections made up the questionnaire. In the first section, sociodemo-

graphic information about the doctors and nurses was provided, including information on gender, specialization, occupation, and geographic location. The second section of the questionnaire, which included 16 questions, was used to gauge the knowledge of physicians and nurses regarding preoperative PBM to lower the need for blood transfusions. Two questions in Part 3 of the questionnaire were used to gauge preoperative PBM attitudes and practices among doctors and nurses.

A tool with 16 multiple-choice questions and zero points for each incorrect response and one point for each correct response was used to evaluate the awareness. The scoring scale went from zero to twenty points, with twenty being the highest possible score. Using yes/no questions, we practiced attitude assessment. Participants received one point for every activity they consistently practiced and zero points for not doing so. When participants received one point for a practice question, it was assumed that they had good practices, and when they received one point for an attitude question, it was assumed that they had a positive attitude.

The questionnaire was pilot examined among a small random sample of doctors and nurses to verify its format, language, sequence, comprehension of the questions, and duration in order to confirm the clarity and relevance of the questions and to determine the amount of time needed to respond to all items. Using the results of the Cronbach’s alpha test, the tool’s validity and reliability were evaluated (0.83).

Statistical analysis

The Statistical Package for Social Sciences version 24 was used to analyze the data. Descriptive statistics, such as the mean for continuous variables and frequency and percentage for categorical variables, were used to tabulate and describe the data according to the type of variables. To ascertain the relationship between study participants’ awareness, sociodemographic background, and attitudes and practices, inferential statistics like the chi-square test were used. The association between awareness level, attitudes, and practices of patients’ blood management, as modified by sociodemographic factors, was determined using binary logistic regression. The level of significance for all statistical tests was set at ≤ 0.05 and the confidence interval at 95%.

Results

Table 1 shows the socio-demographic characteristics of the participants in the study. Most of the participants were from the nursing specialization, which constituted 26.4% of the total, followed by the specialty of medicine and surgery, which constituted 24.5% of the total number of participants. In terms of geograph-

ical distribution, the percentage of participants from the western region constituted the highest percentage, which was 64.1, while the percentage of female participants in the study was the highest at 67.9% compared to males, and in terms of the profession of the participants, the highest percentage was doctors at 52.6%.

Table 2 shows the percentage of awareness of doctors and nurses in the Kingdom of Saudi Arabia hospital about managing the patient's blood before surgery to reduce blood transfusions. Only 46.2% had heard of PBM.

Table 3 presents the degree of awareness by gender,

Table 1. Socio-demographic characteristics of the study participants (n=78).

Variables	Count	%
Specialty		
Medicine and surgery	13	24.5
ER	6	11.3
Diabetes specialist	1	1.9
Nursing Specialist	14	26.4
Dental	2	3.8
Midwifery	1	1.9
Biochemistry	1	1.9
Anatomical pathologist	1	1.9
Obgyn	2	3.8
Service resident	4	7.5
OPD	1	1.9
ICU	1	1.9
Pediatric	1	1.9
Haemodialysis	1	1.9
Oncology	1	1.9
Hematology	1	1.9
Laboratory	1	1.9
NICU	1	1.9
Geographical area		
Central	10	12.8
Northern	5	6.4
Southern	6	7.7
Western	50	64.1
Eastern	7	9.0
Gender		
Male	25	32.1
Female	53	67.9
Occupation		
Medical doctors	41	52.6
Nurses	37	47.4

ER, emergency room; OPD, outpatient department; ICU, intensive care unit; NICU, neonatal intensive care unit.

occupation, and geographic region. As the results showed that there were no significant results as we used the confidence interval test.

Figure 1 shows the percentage of good and poor practices in PBM among the participants, both doctors and nurses. Figure 2 displays the percentage of good and poor attitudes toward PBM among the participating doctors and nurses. Also, the doctors had the best attitude (37.2%) and the worst attitude (15.4%), compared to the nurses' staff.

Table 4 presents the averaged association between PBM attitude and awareness level (logistic regression). It has been found that a positive attitude was observed ($P \leq 0.005$), as well as a good awareness level ($P \leq 0.002$). As for the effect of job, gender, or geographical distribution on awareness, attitude, and practice of PBM, the results were not significant.

Discussion

Blood transfusion is still associated with a number of dangers for patients. Although advances in blood transfusion safety have been made since the introduction of new-generation infectious disease investigations, leukoreduction, and donor selection criteria, blood transfusions are still linked to dangerous reactions.¹³

The majority of participants in the current study were from the nursing specialty, which composed 26.4% of the total. This was followed by the specialty of medicine and surgery, which comprised 24.5% of the total. Participants from the western region made up the highest percentage (64.1%), while female participants made up the highest percentage (67.9%) compared to male participants, and participants' occupations made up the highest percentage (52.6%), with doctors.

The reality is that the vast majority of physicians favor a restrictive transfusion strategy, which seems to be related to fewer blood transfusions and a higher level of patient safety than a more open approach.¹⁴

PBM implementation is hindered by obstacles primarily associated with the impedance of changing traditional "doctors' behaviors" to transfusion and "transfusion attitude".¹⁵⁻¹⁷

In the present study, doctors and nurses in KSA hospitals had average knowledge of preoperative PBM. When asked about basic information about the role and benefits of PBM, such as the minimization of iatrogenic (unnecessary) blood loss, optimizing the patient-specific physiological tolerance of anemia, decreasing mortality and morbidity, decreasing costs, and decreasing in-hospital length of stay.

Over the last few decades, a variety of transfusion and non-transfusion measures have been implemented to reduce perioperative blood loss. Among PBM-related transfusion approaches, the matter of the best red cell transfusion policy is essential. A multitude of random-

ized controlled experiments comparing restrictive (transfusing when the hemoglobin concentration is 7-8 g/dL) and more liberal (transfusing when the hemoglobin concentration is 9-10 g/dL) blood transfusion approaches have been conducted on patient outcomes.^{18,19} The fact that the vast majority of experts support a re-

strictive transfusion policy, which appears to be associated with fewer blood transfusions and a greater level of patient safety than the liberal approach.¹⁴

Only 46.2% of medical staff was aware of PBM in the current study, and the level of awareness did not differ by gender, occupation, or geographic region.

Table 2. Awareness of Kingdom of Saudi Arabia hospital's doctors and nurses about preoperative patient blood management to reduce blood transfusions (n=279).

SR	Awareness questions/PBM	Yes No./%	No No./%	Significance (P)	
				Gender	Job
1	Have you ever heard about PBM	36 (46.2)	42 (53.8)	0.161	0.060
2	Are you aware that PBM represents an international initiative in best practice for transfusion medicine?	29 (37.2)	49 (62.8)	0.384	0.099
3	What do you know from the following regarding PBM?				
	- Comprehensive anemia managements	38 48.7	40 51.3	0.562	0.245
	- Minimization of iatrogenic (unnecessary) blood loss	34 43.6	44 56.4	0.575	0.568
	- Optimize the patient-specific physiological tolerance of anemia	26 33.3	52 66.7	0.173	0.064
4	What are the benefits of PBM?				
	- Decrease mortality and morbidity	46 59.0	32 41.0	0.086	0.441
	- Decrease costs	21 26.9	57 73.1	0.333	0.408
	- Decrease in-hospital length of stay	42 53.8	36 46.2	0.308	0.052
5	Are you aware that PBM optimizes the care of patients who need blood transfusion?	27 34.6	51 65.4	0.330	0.057
6	Are you aware about benefits of applying PBM including preventing unnecessary blood usage?	34 43.6	44 56.4	0.248	0.568
7	Have you ever heard about maximum surgical ordering schedule (MSOS)?	20 25.6	58 74.4	0.311	0.299
8	Are you aware that hemoglobin level is one of the factors influencing the decision of operation?	61 78.2	17 21.8	0.520	0.196
9	If patient's hemoglobin result is low, do you repeat the test for confirmation?	45 57.7	33 42.3	0.300	0.349
10	If confirmed hemoglobin level is low, do you consider referring the patient to hematologist?	52 66.7	26 33.3	0.272	0.189
11	According to your knowledge, what is the normal range of adult female levels of Hemoglobin (g/dl)?	28 35.9	50 64.1	0.392	0.094
12	According to your knowledge, what is the normal range of adult male levels of Hemoglobin (g/dl)?	25 32.1	53 67.9	0.094	0.255
13	According to your knowledge, what is the acceptable lowest hemoglobin level preoperatively?	28 35.9	50 64.1	0.409	0.459
14	Do you recommend determining hemoglobin levels in patients with elective surgeries 28 days or more before an intervention?	47 60.3	31 39.7	0.039	0.537
15	Do you think that there are types of anemia that could be treated with supplements instead of blood transfusion?	59 75.6	19 24.4	0.598	0.216
16	Are you aware that Anemia of chronic disease (ACD) and iron deficiency (ID) are the most frequent causes of preoperative anemia?	58 74.4	20 25.6	0.526	0.299
17	Overall level of awareness				
	Poor awareness	33	42.3	0.324	0.472
	Good awareness	45	57.7		

Mean awareness score mean±SD: (11.5±4.8) out of 20, Range: (0-20). PBM, patient blood management.

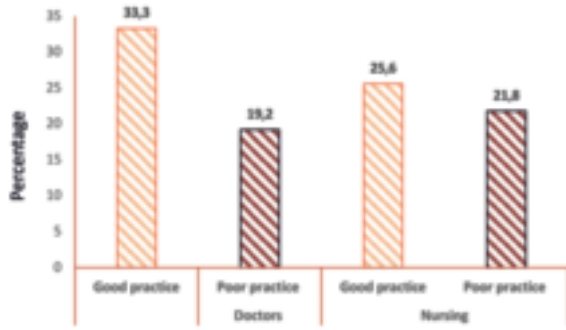


Figure 1. Good and poor practice of patient blood management in doctor and nurse participants.

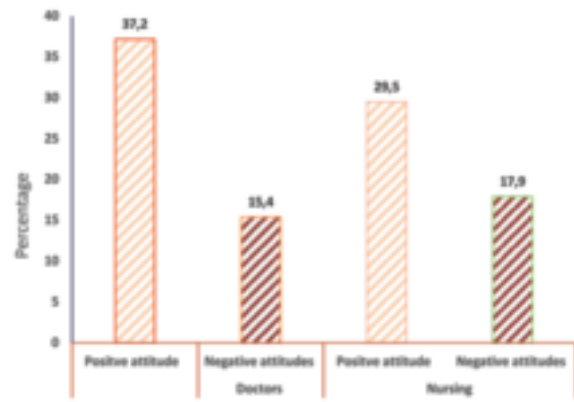


Figure 2. Good and poor attitude toward patient blood management in doctor and nurse participants.

Table 3. Awareness score by gender, occupation and geographical area.

Demographic variables	Counts (No. %)	Mean±SD	Sig., 95% CI
Gender			
Male	25 (32.1)	11.1±4.9	0.637, 95% [-2.94-1.82]
Female	53 (67.9)	11.6±4.8	
Occupation			
Doctors	41 (52.6)	11.1±5.4	0.515, 95% [-2.87-1.44]
Nursing	37 (47.4)	11.8±4.1	
Geographical area			
Central	10 (12.8)	11.4±3.9	0.616, 95% [-7.6-8.82]
Northern	5 (6.4)	10.8±3.3	0.940, 95% [-8.82-7.62]
Southern	6 (7.7)	13.3±5.2	0.960, 95% [-5.82-9.68]
Western	50 (64.1)	11.9±4.9	0.999, 95% [-4.74-5.66]
Eastern	7 (9.0)	7.6±5.1	0.852, 95% [-12.02-5.56]

Table 4. Adjusted association between awareness level and attitudes and practices of patient blood management (logistic regression).

Variables	Awareness level and practices					Attitudes and practices					
	β	Sig.	OR	95.0% CI		β	Sig.	OR	95.0% CI		
Types of attitude	Negative	R	-	-	-	-	-	-	-	-	
	Positive	-	-	-	-	-	1.59	0.005	4.89	1.62	14.79
Awareness level	Poor awareness	R	-	-	-	-	-	-	-	-	
	Good awareness	1.73	0.002	5.62	1.93	16.39	-	-	-	-	
Gender	Male	R	-	-	-	-	-	-	-	-	
	Female	0.95	0.129	2.58	0.76	8.78	1.13	0.070	3.11	0.91	10.61
Jobs	Medical doctor	R	-	-	-	-	-	-	-	-	
	Nursing	-0.66	0.282	0.52	0.15	1.72	-0.45	0.450	0.64	0.20	2.04
Geographical area	Central	R	-	-	-	-	-	-	-	-	
	Northern	-0.32	0.792	0.73	0.07	7.83	-0.52	0.681	0.60	0.05	7.02
	Southern	1.15	0.407	3.14	0.21	47.23	1.03	0.454	2.81	0.19	42.06
	Western	0.89	0.275	2.42	0.49	11.88	0.59	0.465	1.81	0.37	8.82
	Eastern	0.68	0.536	1.98	0.23	17.07	-0.05	0.962	0.95	0.11	8.42

β, beta values in a logistic regression model are the parameters that determine the relationship between the independent variables and the dependent variable; R, reference group; OR, odd ratio; CI, confidence interval.

Implementing clinical guidelines to encourage physician education is a necessary but inadequate measure to ensure their correct application. The demands audit is a crucial tool for assessing protocol implementation. A retrospective post-transfusion audit could provide data for additional clinical staff education, but it cannot prevent the development of inadequate transfusion. A pre-transfusion, a concurrent audit is effective in preventing unwanted blood transfusions, but it is a time-consuming and cumbersome process.²⁰

Clinical Decision Support (CDS) systems, in which treatment strategies are linked to e-prescription software, may aid in notifying the doctors who prescribe, depending on available laboratory results, radiology tests, and clinical information, whether the required transfusion is compliant with quality standards or should be reviewed. This process prevents the utilization of unnecessary blood components, resulting in a 20% reduction in the volume of red blood cells transfused.²⁰

In the current study, the percentages of good practice and positive attitude were low (33.3% and 37.2%, respectively). Nonetheless, a significant relationship between good awareness and a positive attitude and patients' blood management practices has been revealed, indicating that a CDS program is desperately needed. The CDS system is becoming more popular in the developed world, but there are still some obstacles to be resolved before it can be used in developing countries. Segmented healthcare systems, the lack of a national patient medical archive, and the presence of various software modes that are not incorporated into the patient-care structure limit its widespread use.¹³

Conclusions

More efforts should be made to ensure that the PBM program realizes its maximum potential, including continuing medical education, pre-operative anemia management, a multidisciplinary peri-operative staff, and an incorporated CDS system with best practice notifications.

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