

Perceptions of Patient Safety Culture among Operating Room Staff in Iran: A Questionnaire-Based Study

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ARTICLE INFO	ABSTRACT
<p>Article type: Original Article</p> <hr/> <p>Article History: Received: 05 Jun 2024 Accepted: 30 Jun 2024</p> <hr/> <p>Keywords: Health Personnel, Operating Rooms, Patient Safety, Safety Culture, Safety Management.</p>	<p>Introduction: This study aimed to assess the operating room (OR) staff's perception of patient safety culture in a dynamic and demanding setting where reducing human errors is critical.</p> <p>Materials and Methods: This cross-sectional, descriptive study was conducted between June and October 2022, employed a census sampling method involving surgical technologists and anesthesia technicians. Data collection instruments included the Hospital Survey on Patient Safety Culture (HSOPSC) questionnaire and demographic information. Data analysis was performed using SPSS version 22.</p> <p>Results: The findings revealed a moderate level of patient safety culture, with 85.4% of respondents reporting no errors in the past year. Supervisor/manager expectations and actions received the highest mean score, while non-punitive response to errors scored the lowest. The overall patient safety culture was determined to be at a moderate level, with an average score of 116.26 ± 12.98.</p> <p>Conclusion: This study highlights the crucial need for strategic management interventions to improve patient safety culture, particularly in operating rooms. Health policymakers and nursing managers must prioritize implementing standardized and updated checklists for every surgical procedure, promoting a culture of transparency and accountability. By fostering cooperation, empathy, and a non-punitive response to errors, significant improvements in patient safety can be achieved. Recognizing and addressing these needs is essential for health policymakers and nursing managers to ensure safer operating environments and enhance overall healthcare quality.</p>
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Introduction

Establishing a safe environment is crucial for enhancing healthcare quality (1,2). The operating room (OR) serves as a collaborative space where multiple disciplines converge to provide safe and high-quality care (3). Patient safety in the OR remains a persistent challenge due to the increasing impact of surgical interventions on healthcare systems, including traumatic injuries, cancers, heart diseases, and advanced technologies. Modern surgery's complexity introduces various hazards, from equipment and electrical devices to storing surgical necessities and instruments (2). The OR is an essential part of the hospital environment where specialized professionals conduct anesthesia, diagnosis, and treatment. The preoperative environment is dynamic and bustling, making the OR a high-risk setting susceptible to human errors (4). Improving patient care safety in the perioperative environment is a top priority to reduce avoidable mortality, postoperative complications, and adverse incidents (5). In response to these challenges, the World Health Organization has developed a secure surgery checklist to decrease errors, adverse events, and promote collaboration and communication among surgeons, anesthesia technicians, and nurses (6).

Nursing managers play a pivotal role in shaping organizational culture and operational efficiency within hospitals. Their leadership style significantly impacts various aspects of hospital functionality, including fewer patient adverse events, increased nurse error reporting, and overall healthcare quality (7). Transformational leadership, which emphasizes inspiring and motivating staff, has been shown to improve patient safety and nurse job satisfaction. For instance, a study by Alanazi et al. (2022) demonstrated that transformational leadership behaviors directly and indirectly enhance nurses' work environments through increased organizational commitment and job satisfaction, ultimately leading to better patient outcomes (8). Another study by Ystaas et al. (2023) found that transformational leadership positively influences the safety culture by reducing error rates and fostering a non-blame

culture conducive to learning and professional growth (9).

Safety culture within the operating room (OR) encompasses critical aspects such as patient safety, staff support, and system identification. These concepts hold immense significance within the broader healthcare domain, particularly in the high-risk environment of the OR (10). A poor perception of the safety climate correlates with increased errors and inadequate clinical outcomes, including prolonged hospital stays, higher readmission rates, surgical site infections, and mortality (11). The dynamic safety culture within healthcare facilities is closely linked to staff's perception of commitment, error reporting, learning from mistakes, promoting patient safety culture, embracing teamwork activities, and encouraging employees to prioritize these issues (12).

Routine assessment of safety culture is common in healthcare organizations to identify necessary interventions and provide support (10). Understanding safety culture variations across different departments, units, and service delivery levels is crucial when formulating strategies to enhance safety culture and improve patient care quality. Few studies have evaluated patient safety culture in Iran's ORs using the Hospital Survey on Patient Safety Culture (HSOPSC). Assessing patient safety culture in the unique context of ORs is crucial, given the critical role staff plays in ensuring patient safety during surgical procedures. This study aims to assess the current state of patient safety culture as perceived by OR staff, identifying strengths and weaknesses in selected hospitals affiliated with Alborz University of Medical Sciences in 2022.

Materials and Methods

This cross-sectional, descriptive, questionnaire-based study was conducted between June and October 2022. The study population consisted of all surgical technologists (STs) and anesthesia technicians (ATs) in four educational hospitals affiliated with Alborz University of Medical Sciences. A census sampling method was employed, and participants were included based on the following criteria:

having a minimum of six months of operating room (OR) experience and willingness to participate. Data were gathered through the Hospital Survey on Patient Safety Culture HSOPSC questionnaire, encompassing 42 items across 12 dimensions, including demographic variables age, gender, occupational group, work experience, and weekly work hours. This questionnaire was developed by the U.S. Agency for Healthcare Research and Quality AHRQ in 2004, and measures various aspects of patient safety culture. Six of these dimensions, including *overall perceptions of patient safety, expectations and actions of supervisors/managers promoting safety, teamwork within units, staffing, teamwork across hospital units, and hospital handoffs and transitions*, consist of four items each. The scores for these items range from 4 to 20 and are categorized into three levels: weak <10, moderate 10 to 15, and favorable >15. Additionally, the remaining six dimensions, which include *organizational learning-continuous improvement, frequency of error reporting, communication openness, feedback and communication about errors, non-punitive response to errors, and hospital management support for patient safety*, consist of three items each. The scores for these items range from 3 to 15. A weak level refers to scores below 7.5, a moderate level refers to scores ranging from 7.5 to less than 11.25, and a favorable level refers to scores greater than 11.25. The overall patient safety culture scores range from 42 to 210, with a weak level defined as scores below 98, a moderate level defined as scores ranging from 99 to 154, and a favorable level defined as scores above 155.

Most of the items in the questionnaire utilize a 5-point Likert response scale to measure agreement ranging from "strongly disagree" to "strongly agree" or frequency ranging from "never" to "always". However, two items in the questionnaire do not utilize these scales.

These two items inquire about *the number of adverse events reported during the previous year* with response options ranging from 1 = no events to 6 = ≥ 21 events and *the overall patient safety grade* with response options ranging from 1 = failing to 5 = excellent. The validity and reliability of the Persian version of the questionnaire have been confirmed through previous study conducted in Iran (13). Upon receiving approval, one of the co-authors personally administered the questionnaire to eligible surgical technologists (STs) and anesthesia technicians (ATs). The collected data were analyzed using the SPSS software version 22, with both descriptive and inferential statistical analyses including independent T-test, Pearson correlation, and ANOVA being conducted at a significance level of $P < 0.05$.

Results

Out of the 221 eligible STs and ATs who were invited to the study, 162 completed and returned the questionnaire response rate was 73.3%. The age range of the participants was 22-49, with an average of 30.33 ± 6.94 years.

In addition, the majority of the participants 87.7% were female, and 53.7% were ST. Moreover, 67.3% had work experience between 1-10 years. The average number of work hours per week was 50.14 ± 11.96 . The demographic characteristics are displayed in (Table 1).

Table 1. Frequency distribution of the participants according to demographic characteristics

Characteristics	Variables	No. (%)
Occupational groups	Surgical technologist	87(53.7)
	Anesthesia technician	75(46.3)
Gender	Male	20(12.3)
	Female	142(87.7)
Work hours per week	<50 hours	111(68.5)
	>50 hours	51(31.5)
Work experience	<1 year	7(4.3)
	1-10 years	109(67.3)
	10-20 years	42(25.9)
	>20 years	4(2.5)

The Mean±SD score of the participants' overall patient safety culture was 116.26±12.98, which falls within the moderate range 99-154. No significant relationships were found between safety

culture and most variables, except for age, showing a weak negative correlation $r = -0.157$, $P = 0.04$. This suggests that as work experience increases, the perception of safety culture decreases (Table 2).

Table 2. Relationship between safety culture and study variables

Variables		Mean±SD	Test result
Occupational groups	Surgical technologist	116.89±13.27	t=0.665 p=0.50
	Anesthesia technician	115.53±12.69	
Gender	Male	117.20±13.91	t=0.343 p=0.73
	Female	116.13±12.89	
Work hours per week	<50 hours	116.24±11.89	t=-0.032 p= 0.97
	>50 hours	116.31±15.23	
Work experience	<1 year	115.14±16.72	F (3,158) =1.082 P=0.35
	1-10 years	117.49±12.19	
	10-20 years	113.28±14.67	
	>20 years	116.00±3.46	

Table 3 presents the categorization of the total patient safety culture into weak, moderate, and favorable levels. No significant differences were observed in the

mean scores of patient safety culture between surgical technologists and anesthesia technicians (Table 4).

Table 3. Frequency distribution of the level of safety culture and its dimensions from the participants' perception

PSC * and its dimensions	Weak	Moderate	Favorable
	No(%)	No(%)	No(%)
Frequency of error reporting	49(30.2)	109(67.3)	4(2.5)
Overall perceptions of patient safety	43(26.5)	114(70.4)	5(3.1)
Supervisor/manager expectations and actions promoting safety	18(11.1)	118(72.8)	26(16)
Organizational learning-continuous improvement	54(33.3)	97(59.9)	11(6.8)
Teamwork within units	92(56.8)	55(34)	15(9.3)
Communication openness	39(24.1)	103(63.6)	20(12.3)
Feedback and communication about error	73(45.1)	69(42.6)	20(12.3)
Non-punitive response to error	90(55.6)	66(40.7)	6(3.7)
Staffing	118(72.8)	41(25.3)	3(1.9)
Hospital management support for patient safety	56(34.6)	90(55.6)	16(9.9)
Teamwork across hospital units	68(42)	91(56.2)	3(1.9)
Hospital handoffs and transitions	61(37.7)	87(53.7)	14(8.6)
Total PSC	10(6.2)	151(93.2)	1(0.6)
* Patient safety culture			

Table 4. Comparison of dimension’s means of patient safety culture from the perception of operating room staff

Dimensions	Mean±SD	STs	ATs	t	df	P
	Level					
Frequency of error reporting	8.26±1.75 Moderate	8.10±1.77	8.45±1.72	-1.26	160	0.20
Overall perceptions of patient safety	11.65±2.17 Moderate	11.94±2.07	11.32±2.24	1.83	160	0.06
Supervisor/manager expectations and actions promoting safety	13.09±2.53 Moderate	13.20±2.37	12.96±2.72	0.61	160	0.07
Organizational learning-continuous improvement	8.19±2.09 Moderate	8.33±2.24	8.04±1.90	0.88	160	0.37
Teamwork within units	10.56±3.15 Moderate	10.52±2.98	10.61±3.36	-0.17	160	0.86
Communication openness	9.01±2.27 Moderate	9.20±2.44	8.78±2.05	1.17	160	0.24
Feedback and communication about error	8.27±2.38 Moderate	8.14±2.45	8.41±2.30	-0.70	160	0.48
Non-punitive response to error	7.06±2.24 Weak	7.28±2.26	6.81±2.20	1.34	160	0.18
Staffing	9.25±2.28 Weak	9.19±2.27	9.32±2.30	-0.34	160	0.73
Hospital management support for patient safety	8.61±2.12 Moderate	8.74±2.11	8.45±2.13	0.87	160	0.38
Teamwork across hospital units	11.00±1.60 Moderate	11.04±1.66	10.96±1.55	0.33	160	0.73
Hospital handoffs and transitions	11.26±3.00 Moderate	11.14±3.11	11.40±2.87	-0.52	160	0.59
Total PSC	116.26±12.98 Moderate	116.89±13.27	115.53±12.69	0.66	160	0.50

Most participants >85% reported no adverse events in the last year, and the

overall patient safety grade results are detailed in Table 5.

Table 5. Overall patient safety grade from the perception of operating room staff

Level of overall patient safety grade	N (%)
Excellent	2 (1.2)
Very good	20 (12.3)
Acceptable	97 (59.9)
Poor	40 (24.7)
Failing	3 (1.9)

Discussion

This study examined the operating room (OR) staff’s perception of patient safety culture in selected hospitals in Alborz

province. Few studies have evaluated patient safety culture in Iran’s ORs using the Hospital Survey on Patient Safety Culture (HSOPSC). Assessing patient safety culture

in the unique context of ORs is crucial, given the critical role staff plays in ensuring patient safety during surgical procedures.

The results revealed an overall moderate level of patient safety culture, aligning with findings from several previous studies (14-20). However, no domains assessed using the HSOPSC were deemed favorable, indicating a need for improvement across all dimensions. The highest score was observed in supervisor/ manager expectations and actions promoting safety, consistent with similar studies (20,21).

Interestingly, the teamwork within the unit dimension, often identified as a strong point in other studies (14,15,18,20,21), did not receive the highest score in this investigation. This discrepancy may be attributed to differences among the study population and the management style. Teamwork in hospital units determines the level of mutual support, respectful behavior, and cooperation (19). Strengthening teamwork can significantly improve patient safety and satisfaction. Consequently, promoting a spirit of cooperation and empathy among employees should be a top priority for management.

A concerning finding was the lowest perception associated with the *non-punitive response to errors*, aligning with results from other studies (14,15,18,20). The non-punitive response to error dimension evaluates the extent to which respondents perceive that their errors and event reports are not used against them and that these errors are not permanently recorded in their personnel files (19). A study revealed that employees often refrain from reporting errors due to fear of facing repercussions (23). This highlights the need for organizations to cultivate a culture where staff feel comfortable reporting errors without fear of reprisals. A non-punitive response to errors promotes organizational learning and significantly contributes to an overall improvement in safety culture.

The *staffing* dimension was also identified as a weakness, consistent with previous studies highlighting staffing concerns in various healthcare settings (15, 18, 19, 24). Addressing staffing-related challenges is essential for improving patient safety and overall satisfaction. Strengthening

teamwork, cooperation, and empathy among staff members emerged as a priority for management to enhance patient safety.

However, conflicting results have been reported in other studies (17,18). Communication openness is associated with a sense of security and comfort in alerting other employees to errors, as well as providing feedback and communication about errors. Effective communication is essential for ensuring patient safety, as it enables critical information exchange among staff members and fosters a culture of transparency and accountability. Therefore, promoting open communication should be a key focus for management to improve the overall safety culture within operating rooms. Regarding *organizational learning-continuous improvement*, this finding aligns with other studies (14,15,18,24). However, a study by Abreu et al. (2019) found that this dimension received the highest average score (17).

The present study's results are consistent with other studies concerning *hospital management support for patient safety, teamwork across hospital units, hospital handoffs and transitions, overall perceptions of patient safety, and the frequency of error reporting* (15,20,24). These similarities underscore the importance of addressing patient safety concerns across various aspects of healthcare operations. Prioritizing patient safety requires a comprehensive approach encompassing management support, cross-unit teamwork, seamless transitions of care, and a culture that encourages error reporting. By tackling these issues, hospitals can work towards enhancing the overall safety culture and achieving better patient outcomes.

The study highlights the significance of encouraging a culture that promotes error reporting as it contributes to organizational learning, quality improvement, and patient safety. Concerning *error reporting*, over 80% of participants reported not submitting any errors in the past 12 months, aligning with similar studies (16,18-20). A study identified several barriers preventing doctors and nurses from reporting errors, such as a lack of knowledge and awareness, the nature of errors, low confidence in receiving appropriate feedback, fear of blame, and

potential loss of assigned tasks. The study emphasizes the importance of fostering a culture that encourages error reporting, as it contributes to organizational learning, quality improvement, and patient safety (25). The findings also revealed that over 60% of participants rated the patient safety score as acceptable or higher, which is consistent with other studies' results (16,18,20). The analysis of the correlation between patient safety culture and demographic characteristics revealed a weak negative correlation with age. These results differ from some previous findings, emphasizing the importance of considering individual and contextual factors that may influence the perception of patient safety culture. For instance, a study by Lee et al. (2020) found that younger male participants with less work experience and fewer working hours per week displayed a lower perception of patient safety culture (25).

Previous studies (14,26) have shown a positive correlation between work experience and the perception of patient safety culture. However, conflicting results have been reported in another research (27). Additionally, a significant association between occupational groups and patient safety culture was observed, with anesthesia technicians (ATs) receiving higher ratings (14,27). A specific study indicated that individuals in nursing and Surgical Technologist (ST) groups had significantly lower mean scores in patient safety culture compared to those in medical groups (11).

Another study showed that males, individuals aged 20-30 years, those with higher education, those with 1-5 years of work experience, and individuals in management positions in nursing displayed a significantly higher percentage of favorable responses (17). These differences may be due to individual and personality factors, cultural and contextual nuances of the study, and the management approaches implemented in operating rooms

Study limitations

A potential limitation of this study is its exclusive focus on operating room staff within selected hospitals in Alborz Province. As a result, the generalizability of the findings is limited, and caution should

be exercised when extrapolating these results to other populations or contexts. Additionally, the reliance on self-reported questionnaires as the primary data collection method may introduce recall bias and individual interpretation bias, potentially impacting the study's outcomes.

Conclusion

This study provides valuable insights into the patient safety culture among operating room (OR) staff in Alborz province. The results indicate an overall moderate level of patient safety culture, with particular areas, such as *non-punitive response to errors* and *staffing*, requiring further attention and improvement.

Notably, over half of the respondents considered the patient safety score to be acceptable, and more than 80% reported no errors in the past 12 months. The analysis of the relationship between patient safety culture and demographic characteristics did not reveal any significant correlations. Furthermore, no significant differences were identified when comparing the two occupational groups – surgical technologists and anesthesia technicians.

It is crucial for health policymakers and nursing managers to acknowledge and address these needs to ensure safer operating environments and improve overall healthcare quality. By implementing targeted interventions and fostering a culture of continuous learning and improvement, healthcare organizations can create a more robust safety culture that benefits both staff and patients alike.

Recommendations

Prioritize Training Programs: Develop comprehensive plans for both initial and ongoing training programs, emphasizing the critical importance of error reporting among operating room employees. Ensure that these programs instill a culture of transparency and accountability.

Revamp Error-Reporting Processes: Streamline the error-reporting process by shifting the focus away from punitive measures, reprimands, and blame. Encourage a culture that promotes individuals to willingly report both their own errors and those of their colleagues, fostering a more

open and accountable environment. Optimize Operating Room Personnel: Consider augmenting the number of operating room personnel and empower them through effective management strategies. Adequate staffing, along with strategic empowerment, can significantly contribute to enhancing overall safety levels in the operating room. Cultivate Cooperation and Empathy: Prioritize initiatives aimed at fostering a spirit of cooperation and empathy among operating room employees.

A supportive and collaborative work environment can contribute positively to communication, teamwork, and ultimately, patient safety. Implement Standardized Checklists: Introduce and consistently implement strategies such as the utilization of standardized and regularly updated checklists for each surgical procedure. This approach has proven effective in improving safety levels and minimizing errors in operating room settings.

Ethics approval and consent to participate

The study approval was received from the ethical committee of Alborz University of Medical Sciences (Ethic code: IR.ABZUMS.REC.1401.068).

The study subjects voluntarily participated in the study and were provided with all the necessary information on the first page of the questionnaire. Informed consent was obtained from all the participants. The questionnaires were filled out anonymously, and participants were assured of the confidentiality of their information.

Consent for publication

Not Applicable

Availability of data and materials

The datasets used in this study are available from the corresponding author on reasonable request.

Competing interests

The authors declared no conflicts of interest.

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Author contribution

R. N, L. S, H.GH, contributed to the study's conception and design. Data collection was performed by H.GH, and data analysis was done by R.N. The first draft of the manuscript was written by R.N. and all authors commented on previous versions of the manuscript.

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