

# Evaluation of Implementation of the Principles of Patient Safety Standards by Surgical Team in Iranian Hospitals

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## Abstract

**Background:** Today, patient safety is one of the main concerns in the health care system; patient safety standards is very important in the Operating Room (OR).

**Aim:** The present study was performed with aim to evaluate the implementation of patient safety standards by the surgical team in Iranian hospitals.

**Method:** This descriptive cross-sectional study was performed in 2019 on 180 surgical cases in the OR of selected centers affiliated to Isfahan University of Medical Sciences. Data collection tools was a checklist (including patients' demographic characteristics and 134 items related to 4 dimensions of anesthesia care standards before, during and after surgery, observance of essential points in safe surgery, observance of the relationship between the surgical team and the standard of patient movement and position during surgery).

**Results:** The highest mean score was related to observing the standards of anesthesia care before, during and after surgery ( $70.76 \pm 10.58$ ), then observing the essential points in safe surgery ( $65.41 \pm 19.32$ ), observing the relationship between the surgical team ( $57.59 \pm 18.8$ ) and the standard of patient movement and position during surgery ( $25.73 \pm 7.95$ ) were in the next ranks. The performance of the surgical team in observing safety standards significantly increased with increasing age and weight ( $p < 0.05$ ).

**Implications for Practice:** According to the results of this study, all members of the surgical team should be aware of safe surgery and more training programs should be developed for them to compile with the standards of patient safety in OR.

**Keywords:** Medical errors, Medical mistake, Wrong procedure errors

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## Introduction

Patient safety, as one of the main components of the quality of health services, means avoiding any injury to the patient when providing health care that should be considered in health services organizations (1). The first goal of a health care institution is to prevent and reduce injury to the patient while receiving care services (2, 3). Unsafe medical care is a major cause of disability and death for many patients worldwide. Improving patient safety is an increasing priority for surgeons and hospitals as sentinel events can be catastrophic for patients, caregivers, and institutions. Recognizing that healthcare errors impact one every 10 patients around the world, the WHO calls patient safety an endemic concern. Therefore, the 'Safe Surgery Saves Lives' initiative was established by the World Alliance for Patient Safety as a part of the WHO efforts to reduce the number of surgical deaths around the world (4). Excluding the ethical and human aspects of unsafe care, the direct costs of unsafe care account for 5 and 10 percent of total health care costs. The indirect economic consequences of unsafe care, which lead to longer patient hospital stays, nosocomial infections, reduced incomes, disability, and increased patient complaints, should not be overlooked. These unfortunate and sometimes irreparable consequences of unsafe care have made the issue of patient safety as one of the most important and vital priorities of the health system in different countries and have started a global effort to implement its principles in providing health services (5).

The Operating Room (OR) is one of the most important work environments in health care due to the complexities of patients and treatment protocols and the high level of technology and need to coordination for effective management, especially in specific situations (6). As one of the main units of the hospital, OR is an important place for the treatment of the patient. Also, in terms of physical characteristics, the presence of medical gases and the use of various electrical devices, following safety instructions for patients and staff is very important (7). Errors are frequent and often consequential in OR. In reported studies on the incidence of adverse events in hospitals, the most occurs in OR. The proportion of adverse events in OR appears to be remarkably stable, comprising approximately 50 % of all adverse events in a hospital (8). Accordingly, the WHO has developed guidelines for safe surgery and a first edition (2008) checklist of surgical safety standards has been developed to be applicable in all countries and health settings with a recommendation for modification according to local needs. The revised (2009) checklist was issued in some languages. The checklist identifies crucial safety steps according to the following three stages: before induction of anesthesia (sign in); before skin incision (time out); and before the patient leaves the OR (sign out). The list is associated with an implementation manual (9).

In the study of Ongun and Intepeler, the results showed that OR professionals' attitudes towards patient safety were at moderate levels (10). In the study of Seif Hashemi and colleagues, it has been shown that 73.4% of safe surgery standards was observed which is less than the standard level announced by the World Health Organization (7). The study of Jalalvandi et al. showed low implementation level of safe surgery standards in OR of the selected hospital of Kermanshah University of Medical Sciences in 2018. Considering the importance of patient safety, the researchers recommend taking measures to explain the importance of the safety checklist items and developing educational programs for the surgical staff (11). Therefore, considering the importance of patient safety in the operating room, the current study was performed with aim to evaluate the implementation of patient safety standards by surgical team in Iranian hospitals.

## Methods

This descriptive cross-sectional study was performed in Al-Zahra and Ayatollah Kashani hospitals affiliated to Isfahan University of Medical Sciences. The participants were selected by Convenience Sampling method. Al-Zahra Hospital had 900 beds and 21 operating rooms and Kashani Hospital had 200 beds and 9 operating rooms. The study population consisted of 180 surgical cases in the OR of selected centers; the surgical team participated in the surgical case. Sampling was conducted from May to July 2019. Inclusion criteria were all surgical procedures that entered the OR admission department and exclusion criteria were cancellation of surgery and cardiac arrest. In this study, two researchers collected information. So that, in the morning and evening shifts, they selected the ORs as available (the first OR which was prepared for the patient's surgery). Then, the researchers introduced themselves and provided the consent form to the surgical team and then enter the OR reception and along with the OR nurse accompanied the

patient candidate for surgery. Then, they assessed the performance of the OR team in surgical processes from the moment the patient was admitted to the OR until the patient was delivered to recovery using a checklist of 134 items. Sampling was continued until the end of the sample size. Data collection tool was a checklist consisting of two parts. The first part includes a form for collecting patients' demographic characteristics, such as gender, education level, weight, age and type of surgery. The second part includes 134 items, the first part: standards of pre- and postoperative anesthesia care (items 1-20), the second part: essential points in safe surgery (items 21-60), the third part: the standards of patient's movement and position during surgery (items 61-191) and the fourth part: the standards for observing the relationship of the surgical team (items 120-134). To calculate the score, a standard score of 100 was considered. In this tool, each subscale that was done as standard was selected as a "Yes" option and each "Yes" was given a score of one, and the standards that were not met were selected as a "No" option and a score of zero was assigned. A subscale which was not used for the surgical procedure was considered, but no points were assigned to it. The scores of the standard items in each dimension were added together and then multiplied 100 and divided by the number of items.

The validity of the checklist was confirmed through a survey by 10 members of the faculty members of the operating and nursing room department of Isfahan Nursing and Midwifery Faculty and the reliability of the checklist was determined by calculating the Coder-Richardson test (0.84).

Observational data were analyzed by the Statistical Package for Social Sciences (SPSS; V.16, IBM). The researcher cleaned the data and checked a random sample of 20% for accuracy. Descriptive analyses included absolute (n) and relative frequencies (%) were used to analyze categorical variables, while means/SD were applied for continuous data (numbers in check-list and number of items used). The researcher calculated the mean compliance rate for each section of the checklist through the sum of the number of items in each section divided by the total number of items in the checklist. Inferential analysis using t-tests were employed to examine mean differences across time points. Inter-rater reliability was calculated using interclass correlation coefficient (ICC) for observational data.  $P < 0.05$  was considered statistically significant and 95% CIs was used.

The study was approved by the Ethics Committee of Isfahan University of Medical Sciences, Isfahan, Iran. The patient and surgical team were informed about the research objectives and procedures. Written informed consent was obtained. They were assured of the confidentiality of their information. They were also informed about their right to leave the study at any time.

## Results

In this study, 73 (41.2%) of the participants were female and 104 (58.8%) were male. The mean age of the subjects was  $43.31 \pm 18.7$  years and mean weight was  $69.97 \pm 19.84$  kg. Also, 40.6% of surgeries were performed in general surgery group, 23.6% in orthopedic surgery group, 12.7% neurosurgery, 9.7% ENT surgery, 7.9% gynecological surgery, 2.4% urological surgery and 3% pediatric surgery group (Table 1).

**Table 1. Demographic characteristics of the study population**

variable		Frequency (%)
Gender N (%)	Female	73 (41.2)
	Male	104 (58.8)
Education N(%)	Below high-school	64 (39.5)
	Diploma	67 (41.4)
	Associate degree	7 (4.3)
	Bachelor degree	21 (13)
	Master's degree and higher	3 (1.8)
Type of surgery N(%)	Orthopedics	39 (23.6)
	General	67 (40.6)
	ENT	16 (9.7)
	Urology	4 (2.4)
	Gynecological	13 (7.9)
	Neurosurgery	21 (12.7)
	Pediatric	5 (3)

**Table 2. Score of OR team in observing the patient safety standard (criterion of 100 points)**

Variable	Mean $\pm$ SD	minimum value	maximum value
Observing the standards of safe surgery checklist	65.43 $\pm$ 19.31	16	100
Observance of the standard of the patient's position during surgery	25.73 $\pm$ 7.97	11	59
Observance of anesthesia care standards, before, during and after surgery	70.76 $\pm$ 10.56	42	88
Observing the relationship of the surgical team	57.56 $\pm$ 18.85	13	100
Overall performance score	54.71 $\pm$ 11.82	19	74

In addition, the highest mean score in compliance with the standards of anesthesia care before, during and after surgery was (70.76  $\pm$  10.56), followed by the essential points in safe surgery (65.43  $\pm$  19.31), observing the relationship between the surgical team (57.56  $\pm$  18.85) and the standard of patient movement and position during surgery (25.73  $\pm$  7.97) were in the next ranks (Table 2).

Pearson test showed that increasing the weight and age of patients has a significant effect on increasing the implementation of patient safety standard of OR team operation. Also, analysis of variance found that there is a significant relationship between the performance score of OR team in all dimensions with the type of surgery ( $p < 0.05$ ) (Table 3).

**Table 3. Relationship between demographic information and overall performance score by dimension**

Variable	Age		Weight		Type of surgery	
	r	p-value	r	p-value	F	* p-value
Observing the standards of safe surgery checklist	0.146	0.055	0.111	0.147	9.32	0.035
Observance of the standard of the patient's position during surgery	0.235	0.002	0.293	0.001	3.86	0.001
Observance of anesthesia care standards, before, during and after surgery	0.113	0.14	0.155	0.043	3.72	0.002
Observing the relationship of the surgical team	0.052	0.503	0.087	0.257	5.33	0.001
Overall performance score	0.151	0.047	0.158	0.039	4.82	0.001

\*Analysis of variance.

## Discussion

The purpose of this study was to investigate the Implementation of patient safety in hospitals. According to the results of this study, the mean score of the surgical team in compliance with the standards of safe surgery checklist was 65.43. In the study by Seif Hashemi et al. (2014), the rate of observance of safe surgical standards was reported to be 73.6%. The reason for this difference may be the number of samples studied and the research environment and to the method of scoring the implementation of a safe surgical checklist (7).

In the present study, the mean overall score of the standard of the patient's position during surgery was 25.73. Studies have been published in the literature about the occurrence of injuries deriving from surgical positioning. In a descriptive study to identify the risk factors for the emergence of this type of lesion, the results evidenced that, in the research sample (n=50), 74% of the patients were affected by pressure ulcer (stage I) (12). In the study of Bagheri et al. (2011), 90% of in-hospital transfers were non-standard and the overall quality of transfer was satisfactory in 9% of cases. These results show that in general, the standards related to the transfer and position of the patient are not satisfactory (13).

In the present study, the mean score of the surgical team in observing the standards of anesthesia care before, during and after surgery was 70.76. In the study of Zadi Akhule et al. (2021), observing safety standards by anesthesia nurses was at moderate level (28.2) (14). In the study of Montaseri et al., the rate of observing safe surgery principles by anesthesia nurses was 14.27 (15). This rate is not consistent with the present study. The reason for the difference in the observance of anesthesia standards can be related to the type of hospitals. Other obstacles to the non-successful implementation of some safe surgical checklist items include differences in cultural and organizational factors in each

center (16). So, it is expected that the anesthesia safety score will be more complete to rule out the possibility of any event.

In the present study, mean score of observing the relationship of the surgical team was 57.56, which is an average score. In the study of Kalantari et al. (2016), the mean score of teamwork was 3.60 out of 6, which is a high average score, and is almost consistent with the current study. In the OR, a number of specialized professions together provide services. The more coordination causes more secure service. In other words, specialized operations in the OR require teamwork between all OR staff, and those who have more teamwork have a higher safety attitude towards the patient (17). Therefore, considering the impact of teamwork on patient safety, it should be considered in the OR. Also, educational strategies and policies can be effective in improving teamwork and increasing the quality of behaviors in the OR (8).

The results of the present study showed that the overall performance score of the OR team was 54.71. The highest score was 74 and the lowest score was 19, which is far from the score of 100. In the study by Asefzadeh and colleagues (2013), the overall safety status was about 64% and moderate performance was reported (18). The results of this study are almost consistent with the present study. Regarding the relationship between the score of performance in compliance with standards, the results of independent t-test in the present study showed that the difference between male and female was not statistically significant ( $p > 0.05$ ). There was also no significant relationship between patients' education and the score of the surgical team in observing patients safety ( $p > 0.05$ ), but significant relationship was found between performance score and type of surgery ( $p < 0.05$ ). The highest score of performance based on the type of surgery was related to the neurosurgery group (59.12) and the lowest score related to the pediatric group surgery (36.99). In the research of Seif Hashemi et al. (2014), independent t-test showed a significant difference between observing the criteria of safe surgery and the total score (safe surgery checklist) in the heart and plastic surgery room with the general OR ( $P \leq 0.001$ ) (7). The standard of safe surgery is more observed in cardiac and plastic surgery rooms, which confirms that in specialized surgeries, the surgical team performs better in complying with patient safety standards (7).

The results of this study also indicated that the increase in patient weight and age of patients has a significant effect on increasing the score of performance of the surgical team. In other words, increasing the age and weight of patients increases the compliance of the standards by the surgical team. In relation to this finding, no similar study was found for comparison.

This study had limitations. The sample size was small, so studies with more samples are recommended to be done. In addition, the type of surgery varied in hospitals which may have affected the results of the study. It is suggested to conduct similar studies in single specialty hospitals.

### **Implications for practice**

The results of this study showed that the performance of the surgical team in the studied hospitals is far from optimal. Therefore, people who work as a surgical team should periodically undergo the necessary training to implement safety standards in surgical positions, patient transfer and safe surgery during the work period. It can also be concluded that the specialization of the surgical team can affect the results of patient safety standard story.

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### **Conflicts of interest**

The authors declared no conflict of interest.

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