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Research

Nurses' Perceptions of Patient Safety on Patient Safety Climate

Özlem Soyer ER, PhD, RN[a], Yasemin Altinbaş, PhD, RN[b,*]

[a] Afyonkarahisar Sağlık Bilimleri Üniversitesi, Sağlık Bilimleri Fakültesi, Hemşirelik Bölümü, Afyon, Turkey
[b] Department of Surgical Nursing, Adıyaman University, Faculty of Health Sciences, Adıyaman, Turkey

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A B S T R A C T

Purpose: The purpose of this study was to determine the relationship between nurses' perception of patient safety and the safety climate.
Design: Descriptive study.
Methods: The sample consisted of 262 surgical nurses. Data were collected with an online questionnaire system using the Leiden Operating Theatre and Intensive Care Safety (LOTICS) Scale and Patient Safety Climate (PSC) Scale.
Findings: Intensive care unit (ICU) nurses were found to have higher perceptions of patient safety *(106.0 ± 15.2* vs *102.6 ± 17.0)* and safety climate *(59.2 ± 20.9* vs *50.9 ± 24.3)* than Operating Room (OR) nurses.
According to ICU nurses, OR nurses stated that teamwork was weak, they did not feel like a part of the team, and teamwork was incompatible. They stated that there was no preliminary information about the operation, that they could not get enough information during the operation, that sufficient materials were not available in the OR in case of need, and that the worn-out materials were not replaced and repaired in a timely manner.
Conclusion: As nurses' perception of patient safety increases; patient safety climate perceptions also increased. Providing both professional and in-service trainings to raise awareness of patient safety, developing strategies that prevent team conflicts, providing preliminary information about the surgery, and eliminating material deficiencies can increase nurses' perception of PSC.

Among the issues that emphasize diversity and quality in providing health care services, the most important issue that comes to the forefront is "Patient Safety."[1] Patient safety is preventing errors and adverse effects in patient care.[2] Millions of patients are harmed every year by unsafe health care in low-and middle-income countries worldwide, with 2.6 million a year resulting in deaths due to avoidable errors.[3] Globally, it is estimated that approximately 10% of patients have been affected by at least one adverse event. In the United States, over 250,000 patients who receive medical care each year will experience an adverse effect.[4] The cost of medical errors in modern health care delivery is enormous, both financially and in terms of patient care.[5] Besides, examining the cost of harm to patients, Slawomirski, et al[6] stated that 15% of hospital activities and expenditures in the Organization for Economic Cooperation and Development (OECD) countries can be contributed to the treatment of failures in safety; that since many of the events that harm patients can be prevented; and that these failures show a waste of health care resources and cause a significant opportunity for cost savings. Patient safety is becoming an increasing problem not only because of medical errors, but also because of high costs.[7]

From the past to the present, operating rooms (OR) and intensive care units (ICU) are the areas where patient safety violations and medical errors mostly occur.[8-10] Medication errors, surgical site infections, wrong-side surgery, errors caused by medical and surgical equipment, and other surgical and diagnostic errors are common problems in the health system that threaten patient safety.[4,11] It is unacceptable for a patient to be harmed in health care.[3] As the nature of nursing is to protect the patient from danger and provide safe care in every environment, nurses must make effective efforts to perform their care while making it more visible by undertaking important responsibilities.[12] Studies suggest that many complications (adverse effects that develop during drug administration, health care-associated infection, unsafe injection, blood and blood product administration, falls in hospital, pressure ulcers, medical errors, errors due to the use of incorrect or inappropriate material, errors due to inadequate patient monitoring, errors caused by lack of communication) that threaten patient safety can be prevented with effective nursing care.[8,13-15] In this respect, the most significant barriers that affect patient safety can be listed as follows: excessive workload, failure to

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* Address correspondence to Yasemin Altinbaş, Department of Surgical Nursing, Adıyaman University, Faculty of Health Sciences, Adıyaman 02040, Türkey.
E-mail address: altinbasyasemin@gmail.com (Y. Altinbaş).

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allocate sufficient time to patients, lack of education, lack of manpower,[13] exceeded maximum performance limits, professional autonomy, difficulty in transition to teamwork approach, the lack of a systematic approach to patient safety, and the complexity of the rules and laws related to the profession.[16] Due to these barriers, it is necessary to analyze the patient safety climate in OR and ICU to improve patient safety.[17] Van Beuzukom et al[18] has suggested that comparing patient safety and safety climate perception will provide a concrete definition of the measures that should be taken for patient safety. Identifying the relationship between patient safety and safety climate perception is vital to preventing medical errors.

Ammouri et al[19] in Oman, found a relationship between some dimensions of nurses' patient safety culture and general patient safety perception. Similar relationships were found in studies on nurses' perception of patient safety in hospitals in Jordan[20] and hospitals in Kuwait.[21] These studies indicated that a positive patient safety climate in health services it can increase the safe behavior of health personnel, reduce the occurrence of undesirable events and medical errors, and increase event reporting and patient safety in the working environment. As a result, it can reduce complications, morbidity, and mortality, improve the experience of patients and their relatives, and increase their satisfaction, reduce length of hospital stay, and reduce readmissions.[19-22] Studies examining the relationship between patient safety and patient safety climate perceptions of OR and ICU nurses are limited[23,24] and there have been no studies in which this issue has been examined from the nurses' point of view. This study aims to determine the relationship among patient safety and patient safety climate perception of OR and ICU nurses.

Methods

Design and Participants

A descriptive design was used. This study was conducted between March-April, 2021 through the online survey system of surveey.com. This survey system is open access and made available to researchers as members without paying any fee. This study consisted of OR and ICU nurses at work in Turkey. Nurses in Turkey have been receiving basic nursing education at the undergraduate level since 2007 within the scope of the nursing law. However, due to the high need for nurses in Turkey, there are different levels of nurse graduates who have graduated before.[25] Students who are successful in the theoretical and practical fields determined in nursing education with the national nursing core education program receive professional qualification.[26] The education period in nursing undergraduate programs includes at least 4 years and 4600 hours of theoretical and practical training.[27] Between the specified dates, nurses living in 40 different provinces, over the age of 18, volunteering to participate in the study, and capable of using the internet were included in the study. The GPower 1.3.9.2 program was used for power analysis concerning the research of Van Beuzekom et al[18] to determine the number of nurses needed to participate in the study. Accordingly, with the data obtained in the study, the significance level was taken as α = 0.05 (5%). The effect size was accepted as d = 0.15, and the number of nurses was calculated as 245 for power the level of 1-β = 0.80. 262 nurses participated in the study.

Outcomes

Patient safety is the prevention of health care-related errors and adverse effects that may develop in patients.[2] Patient safety culture, on the other hand, determines the ability of health care organizations to address and reduce patients' risks.[28] Perceptions of patient safety and patient safety climate are important components of the safety culture desired to be created in health care services.[29] The patient safety perception is the perception of an individual[30] and the safety climate describes perceptions of an organizational commitment to safety.[31]

The primary outcomes of the study were to determine the perceptions of patient safety and patient safety climate. The secondary outcomes were to reveal the latent system factors determined in patient safety and the relationship between OR and ICU nurses.

The following hypotheses were tested:

Hypothesis 1: There is a significant relationship between nurses' perceptions of patient safety and patient safety climate.

Hypothesis 2: There is a significant difference in patient safety and patient safety climate perceptions between OR and ICU nurses.

Data Collection Tools

"Sociodemographic and Professional Characteristics Form," "Leiden Operating Theatre and Intensive Care Safety (LOTICS) Scale," and "Patient Safety Climate (PSC) Scale" were used for data collection in this study.

Sociodemographic and Professional Characteristics Form: this form includes sociodemographic characteristics of nurses and professional characteristics that are thought to affect the working environment. These characteristics have seven questions created by researchers that contained information about nurses' age, gender, educational status, marital status, the unit in which they work, the year of work in the profession, and institution.[18,30]

Leiden Operating Theatre and Intensive Care Safety (LOTICS) Scale: The LOTICS scale was developed as a comprehensive measurement tool to evaluate latent system risk factors that lead to undesirable events in the OR and ICU by comparing employee responses to system factors in units and medical disciplines.[18,30] Turkish validity and reliability study was conducted by Altınbaş et al.[32] In this scale, five sub-dimensions are "Teamwork and Awareness," "Resource Management and Planning," "Employee Resources and Supervision," "Teamwork Instructions and Preparations," and "Education and Access to Information" and it consists of 40 questions in total. Responses to the scale are scored on a 4-point Likert scale (1 = totally disagree, 2 = disagree, 3 = agree, 4 = totally agree). High scores indicate a more positive perception of patient safety.[32] The Cronbach α coefficient was found to be 0.748.

Patient Safety Climate (PSC) Scale: The PSC scale includes questions on Safety Attitudes Questionnaire that was developed by Sexton et al[31], and Turkish validity and reliability were conducted by Budak.[33] The scale was developed for use in clinical areas (including intensive care units, ambulatory clinics, inpatient settings, and operating rooms). The Scale consists of a total of seven questions. Measurements are evaluated on a five point Likert scale (1 = strongly disagree, 5 = strongly agree). The PSC Scale total score is obtained by subtracting one from the average of the answers to the questions and multiplying by 25; scores of 75 and above constitute a positive perception of a safety climate.[31,34,35] The Cronbach α coefficient of the scale was 0.852.

Data Collection

An electronic survey form created through an online survey system, "Survey.com," was used as a data collection tool in this study (http://www.surveey.com/SurveyStart.aspx?lang=1&surv=e62d93b6888d4749951cdd10537c22c6). The "Sociodemographic and Professional Characteristics Form" was used to evaluate sociodemographic and professional characteristics of OR or ICU nurses; the "LOTICS Scale" was used to determine patient safety perceptions; and the "PSC Scale" was used to determine patient safety climate perceptions. An invitation letter was sent via the link created from the researchers' instagram, facebook, and twitter accounts. Firstly, the

name and purpose of the study and then the ethics committee approval were shared. Instagram, facebook and twitter were preferred due to their ease of access, their widespread use in Turkey, and the presence of professional groups belonging to nurses. The surgical environment is a stressful environment because it requires long-term physical proximity with the team, life-threatening situations, and rapid decision-making. Therefore, patient safety problems may develop rapidly in this area.[36] Surgical areas were chosen because it was thought to encounter many events related to patient safety. A reminder message was sent to nurses two weeks after the first invitation to increase participation in the study after the first invitation. An I.P. check was provided to enable a participant to complete a single survey. Answering data collection forms took an average of 11 minutes. Data collection forms filled out online were backed up daily by the researchers.

Data Analysis

SPSS (Statistical Package for the Social Sciences) for Windows 21.0 (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) package program was used to analyze the data. The nurses' sociodemographic and professional characteristics were reported using frequencies, percentage distribution, mean and standard deviation. Normal distribution was evaluated using the Kolmogorov −Smirnov Test. The Kruskal Wallis test and Mann Whitney U test were used to examine the effect of nurses' sociodemographic variables on the perception of patient safety. The Mann Whitney U test was performed to compare the perception of patient safety and patient safety climate in OR and ICU nurses. Spearman correlation test was applied to measure the relationship between perception of patient safety and patient safety climate. In all results, values with a *p*-value less than .05 were considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Non−Interventional Ethics Board of a University to conduct the research (February 5, 2021 and 2021/87). In the data collection form, nurses were given information about the study, and permission was asked from those who participated in the survey by clicking on the "I accept" and "I do not accept" buttons.

Results

The mean age of nurses was 30.6 ± 7.5 years, and 75.6% were women. 67.2% of nurses were graduates of a bachelor's degree, and 55.7% were single. 63.7% of nurses worked in ICU and 36.3% in OR. 32.5% of nurses worked in the profession, and 38.9% in the institution were employed between 1 and 5 years (Table 1).

When examining the effect of nurses' sociodemographic variables on patient safety perception, there was no statistically significant difference between gender, educational status, and marital status ($P > .05$). There was a statistically significant difference between the groups of the unit in which they work (Z = -2.248, $P < .05$), the working time in the profession ($X^2 = 17.157$, $P = .001$), the working time in the institution in which they were employed ($X^2 = 12.006$, $P = .007$) and the patient safety perception scores ($P < .05$). ICU nurses had higher patient safety perception scores than OR nurses. Employees in the profession and the institution working less than 1 year had a higher perception of patient safety.

The mean score on OR nurses' LOTICS scale was 102.6 ± 17.0 (min.65-max.155). When examining the Scale's subscale dimensions, the mean scores were found as follows: teamwork and awareness 30.6 ± 6.0 (min.11-max.44), resource management and planning 23.8 ± 5.3 (min.9-max.36), employee resources and supervision 14.8 ± 4.1 (min.6-max.24), teamwork instructions and preparation 13.1 ± 2.3 (min.7-max.20), education and access to knowledge 20.2 ± 4.8 (min.8-max.32). The mean LOTICS scale of ICU nurses was 106.0 ± 15.2 (min.65-max.143). In the study of the Scale's subscale dimensions, the mean scores were as follows: teamwork and awareness 31.9 ± 6.2 (min.11-max.44), resource management and planning 24.7 ± 4.6 (min.9-max.36), employee resources and supervision 14.7 ± 3.3 (min.6-max.24), teamwork instructions and preparation 13.6 ± 1.8 (min.8-max.18), education and access to knowledge 20.8 ± 4.1 (min.8-max.32). Statistically, a significant difference was found between means of the teamwork and awareness, teamwork instructions and preparation and their total scale between the OR and ICU nurses ($P < .05$), but no significant difference between their other sub-dimensions was found ($P > .05$) (Table 2).

Table 1
Socio-demographic and Professional Characteristics of Nurses

Socio-demographic and professional characteristics	n (%)
Age (Mean ± SD) years (y)	30.6 ± 7.5
Gender	
Female	198 (75.6)
Male	64 (24.4)
Educational Status	
High School Degree	19 (7.3)
Associate Degree	16 (6.0)
Bachelor Degree	176 (67.2)
Postgraduate Degree	51 (19.5)
Marital Status	
Married	116 (44.3)
Single	146 (55.7)
Working Unit	
Operating Room	95 (36.3)
Intensive Care Unit	167 (63.7)
Working Time in the Profession	
<1 y	47 (17.9)
1-5 y	85 (32.5)
6-10 y	47 (17.9)
>10 y	83 (31.7)
Working Time in the Institution	
<1 y	70 (26.7)
1-5 y	102 (38.9)
6-10 y	40 (15.3)
>10 y	50 (19.1)

When the effect of nurses' sociodemographic variables on PSC perception was examined, there was no statistically significant difference between gender and educational status ($P > .05$). There was a statistically significant difference between their marital status (Z = -3.509, $P < .001$), the unit they work (Z = -2.752, $P = .006$), the working time in the profession ($X^2 = 14.081$, $P = .003$), the working time in the institution in which they were employed ($X^2 = 11.811$, $P = .008$) and their total PSC scores ($P < .05$). The PSC scale's total scores were higher for nurses who are single than married nurses, nurses working in ICU than nurses working in OR, and nurses working less than 1 year in their profession and institution compared to nurses with more professional experience.

The mean of PSC Scale score of OR nurses was 50.9 ± 24.3 (min.0-max.100). The mean of PSC Scale score average of ICU nurses was 59.2 ± 20.9 (min.0-max.100). There was a statistically significant difference in the means of PSC scale score between OR and ICU nurses ($P < .05$) (Table 2).

There was a positive, weak and significant correlation between the sub-dimensions of the LOTICS scale such as teamwork and awareness ($r = 0.231$), resource management and planning ($r = 0.365$), education and acess to knowledge ($r = 0.237$) and PSC total score ($r = 0.344$) of OR nurses. No relationship was found between the other sub-dimensions. A positive, weak and significant correlation was found between the total score of the LOTICS scale and the PSC scale ($r = 0.344$) of OR nurses (Table 3).

Table 2
Distribution of mean scores of LOTICS and PSC Scale and Sub-dimensions of OR and ICU Nurses

	OR (N = 95) M ± SD	ICU (N = 167) M ± SD	Test Statistics; *P* Values
Teamwork and Awareness	30.6 ± 6.0 (11-44)	31.9 ± 6.2 (11-44)	***Z = -2.426; P = .015***
Resource Management and Planning	23.8 ± 5.3 (9-36)	24.7 ± 4.6 (9-36)	*Z = -1.672; P = .095*
Employee Resources and Supervision	14.8 ± 4.1 (6-24)	14.7 ± 3.3 (6-24)	*Z = -0.111; P = .912*
Teamwork Instructions and Preparations	13.1 ± 2.3 (7-20)	13.6 ± 1.8 (8-18)	***Z = -2.001; P = .045***
Education and Access to Knowledge	20.2 ± 4.8 (8-32)	20.8 ± 4.1 (8-32)	*Z = -1.410; P = .159*
LOTICs Scale	102.6 ± 17.0 (65-155)	106.0 ± 15.2 (65-143)	*Z = -2.248; P = .025*
PSC Scale	50.9 ± 24.3 (0-100)	59.2 ± 20.9 (0-100)	***Z = -2.752; P = .006***

Z, Mann Whitney U.

Table 3
Correlation Matrix for LOTICS and PSC Scale of OR Nurses

	1	2	3	4	5	6	7
Teamwork and Awareness	1						
Resource Management and Planning	0.275*	1					
Employee Resources and Supervision	0.570*	0.061	1				
Teamwork Instructions and Preparations	0.620*	0.339*	0.466*	1			
Education and Access to Knowledge	0.702*	0.269*	0.600*	0.649*	1		
LOTICS Scale	0.878*	0.481*	0.689*	0.759*	0.860*	1	
PSC Scale	0.231†	0.365*	0.135	0.160	0.237†	0.344*	1

* Correlation is significant at the 0.01 level (two-tailed).
† Correlation is significant at the 0.05 level (two-tailed).

Table 4
Correlation Matrix for LOTICS and PSC Scale of ICU Nurses

	1	2	3	4	5	6	7
Teamwork and Awareness	1						
Resource Management and Planning	0.393*	1					
Employee Resources and Supervision	0.441*	0.174†	1				
Teamwork Instructions and Preparations	0.664*	0.392*	0.445*	1			
Education and Access to Knowledge	0.634*	0.360*	0.575*	0.538*	1		
LOTICS Scale	0.869*	0.631*	0.618*	0.749*	0.818*	1	
PSC Scale	0.459*	0.399*	0.318*	0.381*	0.427*	0.528*	1

* Correlation is significant at the 0.01 level (two-tailed).
† Correlation is significant at the 0.05 level (two-tailed).

A positive, weak and significant correlation was found between teamwork and awareness (r = 0.459), resource management and planning (r = 0.399), employee resources and supervision (r = 0.318), teamwork instructions and preparations (r = 0.381), education and access to knowledge (r = 0.427). A positive, moderate and significant correlation (r = 0.528) was found between the total score of the LOTICS scale and the PSC scale of ICU nurses (Table 4).

Discussion

In this study, a significant difference was found between teamwork and awareness and teamwork instructions and preparation scores of the LOTICS scale between OR and ICU nurses ($P < .05$). It is suggested that OR nurses' influential latent system risk factors compared to ICU nurses concerning both teamwork and awareness *(OR:30.6* vs *ICU:31.9)* and teamwork instructions and preparation *(OR:13.1* vs *ICU:13.6)*. Van Beuzekom et al[30] found that the difference between groups in which teamwork instructions and preparations were more problematic in ICUs than in ORs was not statistically significant, and ICU had a lower patient safety perception score than OR. Another study stated that the essential latent system risk factors in OR were education, material, and personnel resources.[18] In a study conducted by Van Beuzekom et al,[9] it was found that teamwork instructions and preparations were more problematic for OR nurses and, in contrast, material resources were more problematic for ICU nurses; however, the difference between these groups was not statistically significant. Our study concluded that OR nurses perceived teamwork and awareness, teamwork instructions, and material resources as problematic and emphasized that these are necessary to be addressed as areas that require development. After the safety program, which they implemented by focusing on the field of training, material, and personnel resources, Van Beuzekom et al,[18] it was

noted that they received a more positive score from the beginning in terms of material resources than before training ($P < .001$). Thus, material sources and information deficiencies are seen as preventable factors. Additionally, defective equipment reveals the need for high employee performance in the working environment.[9] Again, in terms of teamwork and negative perception in the sub-dimension of awareness experienced by OR nurses, support should be provided on issues that can strengthen working relationships, including conflict management, communication skills, stress management, and information should be provided according to needs analysis.

Patient safety climate perceptions of OR and ICU nurses participating in the study were negative; ICU nurses had a higher safety climate perception than OR nurses. In previous studies, nurses,[37] and OR nurses[38] reported a more adverse safety climate than other health care providers. There are also studies in which nurses and OR nurses reported positive safety climate perceptions.[39,40] Tawfik et al.[41] study found that infection rates were lower in ICUs with employees having stronger patient safety climate perception. It is believed that the perception of a positive patient safety climate of nurses may be related to the unit in which they work, and from this point of view, it is necessary to strengthen employees specific to the patient safety climate in the areas in which they work.

In this study, a positive, weak and significant correlation was found between patient safety and patient safety climate perceptions in OR nurses, and a positive, moderate and significant correlation was found in ICU nurses. We observed that as PSC scores of OR and ICU nurses increase, patient safety perceptions increase as well. One study suggested that the patient safety climate may be considered as a distant factor affecting safety outcomes.[24] In our study, the weak level of relationship also supports these studies. Latzke et al[23] found a positive, weak ($r = 0.25$) significant ($P < .01$) correlation between the patient safety climate and patient safety during patient transport. Patient safety climate refers to health professionals' perceptions of patient safety within the institution.

For this reason, although there is single management in institutions from the nurses' point of view, it can be assumed that the presence of different administrations between units such as OR and ICU and the presence of a dynamic within each unit also differ in the perception of latent system risk factors involved in patient safety. Thus, promoting positive patient safety perception contributes to the creation of a patient safety climate in units. Additionally, the patient safety climate assessment provides an opportunity to improve culture, lead, set goals for improvement, and, if necessary, redirect resources.[42] Identifying latent system risk factors with patient safety perception will significantly improve the patient safety climate and patient safety within the scope of addressing existing problems. However, in this study, the study of the relationship between nurses' perceptions of patient safety and the patient safety climate suggests that issues related to patient safety are more easily expressed as latent system risk factors.

Limitations

There were some limitations in this study. This research reveals the perception of OR and ICU nurses involved in the research. Research results represent the sample in which the research was conducted, so it cannot be generalized to the whole population. Conducting surveys online limits the accuracy of data obtained from participants. It is believed that in the future, the studies carried out in a single-center can produce more effective results from a corporate point of view. Another limitation was that this study was conducted using a descriptive research design. The use of focus groups and in-depth interviews in studies and direct observation of the functioning of OR and ICU may be more descriptive approaches in determining latent system risk factors in terms of the relationship between the perceptions of patient safety and patient safety climate.

Conclusion

Our study determined that ICU nurses had a higher perception of patient safety and patient safety climate than OR nurses and that patient safety perceptions also increased as much as nurses' PSC scores increase. In comparison to ICU nurses, OR nurses stated that teamwork and awareness, which is one of the problematic latent system factors in patient safety, was weak and they do not feel themselves like a part of the team, and that teamwork was incompatible. Referring to teamwork instructions and preparation, they stated that there was no prior information about the operation and, that they could not get enough information during the operation and that sufficient material was not ready in case of need in the OR, and that the worn materials were not replaced and repaired in time. Conclusively, a positive, weak and significant correlation was found between the perceptions of patient safety and patient safety climate in OR nurses, and a positive, moderate and significant relationship was found in ICU nurses.

To increase the perception of patient safety and patient safety climate of OR nurses, it is possible to work with nurses in different ORs. In addition, patient safety and patient safety climate perceptions can be compared between nurses and other health care professionals. To increase awareness on the subject, in-service training should be given to nurses to increase the perception of patient safety both in the occupational training process and in the unit they work. Developing strategies that prevent team conflicts, providing preliminary information about the surgery, and eliminating material deficiencies can increase nurses' perception of patient safety climate. Dissemination of non–judgmental reporting of adverse events and analysis of their causes will also contribute to patient safety.

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