



## Research article

# Safety perception in the operating environment: The nurses' perspective versus that of the surgeons



Fátima Ruano-Ferrer<sup>a,\*</sup>, María Isabel Gutiérrez- Giner<sup>b</sup>

<sup>a</sup> Hospital Universitario Materno-Infantil (HUMIC). Universidad de Las Palmas de Gran Canaria, Avenida Marítima del Sur, S/n, 35016, Las Palmas de Gran Canaria, Las Palmas, Spain

<sup>b</sup> Complejo Hospitalario Universitario Insular-Materno Infantil, Universidad de Las Palmas de Gran Canaria, Avenida Marítima del Sur, S/n, 35016, Las Palmas de Gran Canaria, Las Palmas, Spain

## ABSTRACT

**Background:** Adverse effects due to surgery occur in 25% of patients, and the patient safety perception seems to differ between nurses and surgeons in the operating room (OR). This difference can be attributed to lack of communication. However, our hospital has not conducted any studies on patient safety climate (PSC) in the OR.

**Aims:** To determine if the perception of PSC of nurses and surgeons in the OR diverges and understand whether these differences could be explained by communication gap.

**Methods:** A total of 42 perioperative nurses and 44 surgeons in the OR of a tertiary hospital answered the Spanish version of the US Hospital Survey on PSC. This was an observational, cross-sectional study with descriptive statistics and a non-parametric test.

**Results:** Nurses had a worse perception of the dimensions of overall safety, leader expectations, teamwork within units, feedback, staffing, and hospital management ( $p < .05$ ). Although no differences were found concerning organizational learning/continuous improvement, communication openness, nonpunitive responses, and teamwork across hospital unit dimensions, the findings suggest that the nurses' perception was worse than that of the surgeons.

**Conclusions:** In general, OR nurses have worse PSC than surgeons, mainly in the areas where communication it's important. Our study has provided the data that will enable the hospital management team to make decisions to improve the PSC in the operating room area. We recommend a more active presence of nurses in directive teams.

## 1. Background

Medical errors are human errors [24] that increase the duration of hospital stay and healthcare expenses [46]. It is estimated that 10% of the patients admitted to hospitals in developed countries may suffer adverse effects during hospitalization [47] and that 50% of these events could be averted [12]. Consequently, the errors that occur in healthcare settings must be reported to assess the state of the patient safety climate (PSC) and determine priority areas for improvement [28]. Communication, leadership, mutual respect, teamwork, and other aspects are related to patient safety, and knowing the weaknesses will allow for improvement [24,29].

The term "safety climate" identifies and describes safety-related policies, procedures, and practices that can be measured through workers' perceptions [36]. It also indicates how safety is perceived at a given time or how it is perceived by different individuals or groups over time [33]. This implies that each of the hospital services and professional groups working at a hospital may put forth different aspects of PSC that need to be identified and strengthened [35,36].

**Abbreviations:** Patient Safety Climate, PSC; US Hospital Survey on Patient Safety Culture, HSOPSC; Operating Room, OR.

\* Corresponding author.

**E-mail addresses:** [fatima.ruano101@alu.ulpgc.es](mailto:fatima.ruano101@alu.ulpgc.es) (F. Ruano-Ferrer), [isabel.gutierrez@ulpgc.es](mailto:isabel.gutierrez@ulpgc.es) (M.I. Gutiérrez- Giner).

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The role of nursing staff in improving the PSC has been widely acknowledged. The nature of their work provides them opportunities to identify healthcare errors before they occur [20,22], as is reflected in the fact that most of the incidents reported are administered by nurses [27].

Surgery is an essential component of health care, and due to advances in technology, pathologies that were previously unamenable to surgical treatment are now routinely operated on [4]. This could explain why over half of all adverse events in a hospital (51%–62%) occur during surgical care [6,12,37], why surgical procedures cause complications in approximately 25% of patients, or why one million patients die annually during or immediately following surgery (*WHO guidelines for safe surgery, 2009*). Thus, the operating room (OR) has a high potential for patient harm [23], and thus, a weak PSC is associated with higher rates of surgical complications [9].

Once the patient has been anesthetized, the surgeons are responsible for carrying out the intervention while both the operating and circulating nurses, who handle the instrumentation or provide external assistance, are in an optimal position to detect and communicate surgical adverse events [22]. For this reason, it is necessary to know the PSC perceptions of both OR nurses and surgeons to strengthen the safety climate in the OR.

Some authors have suggested that the PSC perception of OR teams should be unitary and cohesive [13]; however, heterogeneous results have been reported. Although most of the studies include surgical staff, some do not specify whether there are differences between perioperative nurses and surgeons [2,26,39,42]. Further, some studies focus their interest on the perception that OR nurses have about PSC [5,7,40,44]. The few studies that analyzed differences between OR doctors and nurses found that communication needs to be improved [32]. They also indicated that safety climate perception varies between OR professional groups (doctors, nurses, and ancillary personnel) [8,21], and that the doctors assessed safety climate more positively than nurses [15]. In other words, each professional group has a different perception of patient safety quality [30,31]. Low perception of teamwork [43], negative perceptions of PSC [34], workload [14], and professional experience [3,10] have been identified as elements that require improvement. One of the most frequently used tools for measuring PSC is the US Hospital Survey on Patient Safety Culture (HSOPSC) designed by the Agency for Healthcare Research and Quality [38]. Communication is considered an essential element for improving PSC [16,17,25]. Nine of the 12 dimensions studied by the HSOPSC tool can be influenced by the level of communication between staff members. These are communication openness, feedback and communication about errors, frequency of events reported, handoffs and transitions, management support for patient safety, non-punitive response to errors, supervisor/manager expectations and actions promoting patient safety, teamwork across units, and teamwork within units. All of these are based on the exchange of communication among health professionals as well as between health professionals and management leaders. However, although communication is considered an essential element for achieving improvement in PSC, most studies based on the HSOPSC tool are limited to describing how each of the composites is perceived and proposing actions that could improve the PSC in the organization/unit studied.

### 1.1. Aims

This study aimed to determine the differences in PSC perception between nurses and surgeons of the OR at a tertiary care hospital and provide the data to the hospital management for improving patient safety policies. Simultaneously, we theorized that the differences in perception between the groups are fundamentally due to communication defects, and in that case, we would recommend that this aspect be improved as a priority.

## 2. Methods

### 2.1. Methods and settings

This observational, cross-sectional study was carried out in a surgical unit of the Hospital Universitario Materno-Infantil de Canarias (HUMIC), Gran Canaria (Canary Islands, Spain), between June 2020 and March 2021.

The Spanish version of the HSOPSC was used to measure the PSC and data was treated according to its general indications. First, the five points of the Likert scale were restricted to three categories (“strongly disagree/disagree,” “neither”, and “agree/strongly agree”). Second, the negatively worded items were inversely coded, such that all responses classified as “agree/strongly agree” are positive responses and, conversely, all responses classified as “strongly disagree/disagree,” are negative responses. (We should keep in mind that disagreement with a negatively worded item indicates a positive response. And vice versa). In this way, percentages of the positive or negative responses rates to the HSOPSC were computed.

When the percentage of positive responses (agree/strongly agree) is greater than or equal to 75%, the item or dimension is a strength. When the percentage of negative responses (strongly disagree/disagree) is greater than or equal to 50%, the item or dimension is a weakness or an opportunity for improvement [26,38].

The questionnaire includes 42 questions that measure the 12 components of the PSC and two outcome variables: the number of reported events and patient safety grade. The time spent in the profession, time spent working at the hospital, time spent at the unit or service, and hours of work per week were also considered independent variables.

### 2.2. Sample

First, the cooperation of the heads of both nurses and surgical departments was requested. All registered nurses and surgeons working exclusively in the surgical unit of HUMIC were informed personally about the purpose of the study, and their voluntary participation was requested. Those who consented to participate received a copy of the questionnaire. To maintain total anonymity, no

personal information (age, sex, and name) was collected.

The final sample consisted of 86 participants: 42 registered nurses (48.8%) and 44 surgeons (51.2%). It must be borne in mind that, although the hospital basically treats the illnesses of children and women, including pregnancies and childbirth, some surgical specialties also provide their services to the population in their facilities, so they treat patients of any age or gender. Thus, 35 of the surgeons are Gynecologists - Obstetricians (79.54%) while 9 (20.46%) belong to other surgical specialties. The time that the staff has been in the profession, working in the hospital or working in the unit/service were recorded and segmented into five-year periods (Table 1).

### 2.3. Ethical considerations

Authorization was obtained from the Comité de Ética e Investigación del Servicio Canario de Salud for both the study protocol and measurement instrument (code number CEIm HUGCDN: 2020-286-1).

### 2.4. Data analysis

Data were exported to SPSS 27.0 (IBM Corporation, Armonk, NY, USA). The internal consistency (reliability analysis) of the HSOPSC was determined using Cronbach’s alpha test for each composite before data analysis. Values above 0.70 were considered acceptable [41]. For each dimension, percentages for each item for every response, individual group of participants (nurses and surgeons), and the entire group, were calculated.  $\chi^2$  test, Pearson correlation coefficients, and Mann-Whitney and Kruskal-Wallis non-parametric tests were used to determine the differences between nurses and surgeons and to establish the relationships between the study variables influencing the PSC. Statistical significance was set at  $p < .05$ .

## 3. Results

### 3.1. Sample characteristics and internal consistency

One hundred percent of participants had direct contact with patients. All nurses and 52.4% of the surgeons worked between 35 and 40 h per week, and 47.6% of the surgeons worked more than 41 h per week. Table 1 shows the characteristics of the study participants related to time in the profession, time in the hospital, and time in the unit/service.

The internal consistency of each of the composites of the questionnaire was good in this study, except for the non-punitive response to error dimension, which had a Cronbach alpha level of less than 0.6 (see Table 1).

### 3.2. Individual-level dimensions

The total events reported in the previous year was low (nurses = 3, surgeons = 10). The number of mistakes and positive responses provided by nurses and surgeons showed no significant differences (Tables 2 and 3).

Regarding the overall perception of the safety dimension, compared to surgeons, nurses believed that more errors occur than are reported ( $p = .04$ ), patient safety is sacrificed over doing more work ( $p = .01$ ), and that there are safety issues too ( $p = .01$ ) (Tables 2 and 3). However, although both groups agreed that established procedures prevent errors, significant differences were found when responses of the nurses and obstetricians were compared ( $p = .02$ ) (Tables 4 and 5).

**Table 1**

Frequency, percentages, and  $\chi^2$  values of the outcome variables Time in Profession, Time in the Hospital, and Time in the Operating Room Unit/Service.  $\chi^2$  values indicate global differences between nurses and surgeons.

Years	Outcome variables											
	Time in Profession $\chi^2$ .030				Time in Hospital $\chi^2$ .017				Time in Unit/Service $\chi^2$ .42			
	Nurses		Surgeons		Nurses		Surgeons		Nurses		Surgeons	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1-5	4	9.1	13	31.0	12	29.3	13	32.5	14	40.0	14	34.1
6-10	7	15.9	8	19.0	1	2.4	7	17.5	5	14.3	77	17.1
11-15	6	13.6	3	7.1	6	14.6	4	10.0	6	17.1	4	9.8
16-20	9	20.5	6	14.3	11	26.8	5	12.5	3	8.6	5	12.2
21-25	7	15.9	4	9.5	3	7.3	5	12.5	3	8.6	5	12.2
26-30	9	20.5	2	4.8	7	17.1	0	0	4	11.4	1	2.4
31-35	2	4.5	1	2.4	1	2.4	3	3	0	0	3	4.9
36-40	0	0.0	4	9.5	0	0	2	2	0	0	3	4.9
41-45	0	0.0	1	2.4	0	0	1	1	0	0	1	2.4

**Table 2**  
Mean, standard deviation, and positive responses of the nurses and surgeons participants.

Safety Climate Dimensions	Nurses (n = 42)		Surgeons (n = 44)		Total (n = 86)		p
	% Positive	Mean (SD)	% Positive	Mean (SD)	% Positive	Mean (SD)	
<i>Individual level</i>							
Frequency of events reported	37.2	3.18 (.83)	41.5	3.41 (.76)	39.3	3.29 (.79)	.20
Overall perception of safety	48.8	3.58 (.83)	83.3	4.25 (.59)	65.9	3.91 (.79)	.01
<i>Unit-level scales</i>							
Supervisor/manager expectations and promoting patient safety	34.9	3.26 (.82)	66.7	3.92 (.63)	50.6	3.59 (.80)	.01
Organizational learning/continuous improvement	37.2	3.24 (.78)	52.4	3.60 (.74)	44.7	3.42 (.77)	.04
Teamwork within units	52.8	3.84 (.69)	73.8	3.96 (.58)	68.2	3.89 (.63)	.10
Communication openness	23.3	2.90 (.90)	42.9	3.23 (.83)	32.9	3.96 (.88)	.07
Feedback and communications about error	25.6	2.67 (.89)	69.0	3.68 (.66)	47.1	3.17 (.94)	.01
Non-punitive response to error	30.2	3.14 (.70)	65.9	3.23 (.76)	34.1	3.19 (.70)	.06
Staffing	14.0	2.49 (.78)	26.2	3.18 (.70)	20	2.83 (.82)	.01
Hospital management support for patient safety	9.3	2.37(.90)	26.2	2.96 (.84)	17.6	2.66 (.92)	.01
<i>Hospital-level scales</i>							
Teamwork across hospital units	20.9	3.03 (.67)	45.2	3.32 (.73)	32.9	3.18 (.71)	.01
Hospital handoffs and transitions	30.2	3.24 (.72)	38.1	3.41 (.65)	34.1	3.33 (.69)	.10

SD: standard deviation; p: Mann-Whitney U test significance levels for comparison between nurses and surgeons. (Significant level,  $p \leq .05$ ).

### 3.3. Patient safety climate at the unit level-scale dimensions

#### 3.3.1. Supervisor/manager expectations and promoting patient safety (Leader' Expectations)

At the unit level, surgeons had a higher number of positive responses, indicating that they were praised for a job performed well and that their suggestions to improve patient safety were considered (Tables 2 and 3). However, both groups reported feeling no pressure and that the leaders did not overlook patient safety issues (Table 3). Significant differences did exist in the responses between the nurses' and obstetricians' (Table 5).

#### 3.3.2. Organizational learning/continuous improvement

Although no differences were found when each of the items of this composite was analyzed (Table 3), the percentage of positive responses by surgeons was higher ( $p = .04$ ) (Table 2).

#### 3.3.3. Teamwork within units

Both groups agreed about a good teamwork climate within the OR (Tables 2, 3, and 5). However, the surgeons more strongly believed that they work together as a team to get the work done. ( $p = .03$ ).

#### 3.3.4. Communication openness

In this case too, no significant differences were found between the groups (Tables 2 and 3, and 4). Both nurses and surgeons could express and ask questions about issues that may negatively affect patient safety. However, they did not feel free to question the decisions of those with more authority (nurses, 54.5%, surgeons 42.9%).

#### 3.3.5. Feedback and communications about errors

This dimension showed total disagreement between the two groups. The nurses' positive responses (25.6%) were lower than those of the surgeons (69.0%) ( $p = .01$ ) (Table 2). The nurses indicated that they were not informed about the actions implemented based on reported mistakes (56.8%) or about errors that occurred in their unit (54.5%). In contrast, the surgeons indicated that they received good feedback (57.1%) and information on reported errors (64.3%) ( $p = .01$ ,  $p = .01$ , respectively). Furthermore, while 90.5% of the surgeons could discuss ways to prevent errors, nurses could do only in 34.1% of the cases ( $p = .01$ ) (Table 3). This difference was evident when nurses were compared to obstetricians ( $p = .01$ ), but not in other surgical specialties (Table 5). The best ratings in this composite were provided by those working more hours per week ( $p = .01$ ) (Tables 4 and 5).

#### 3.3.6. Nonpunitive response to error

No significant differences were found between the groups in this composite. Most of the participants (nurses 65.9%, surgeons 47.6%) mentioned that they felt that their mistakes were used against them, and that when an incident was reported, they felt like the person, not the issue, was being reported (nurses 43.2%, surgeons 57.1%).

However, they did not believe that the errors were saved in their files (Tables 2 and 3).

#### 3.3.7. Staffing

Numerous differences were observed in this dimension. Although nurses did not have a clear opinion on whether there was enough staff to cope with the workload, surgeons believed the staffing levels were adequate ( $p = .01$ ). Conversely, nurses felt pressured to do more work quickly (75%), while the responses of the surgeons were split similarly between the different options ( $p = .01$ ). Although over 50% nurses (52.3%) and 40.5% of surgeons understood that intense workdays can affect patient safety, it is striking that 42.9% of

**Table 3**

Number and percentages of the responses to each of the items of the US Hospital Survey on Patient Safety Culture questionnaire by nurses and surgeons. Weaknesses and strengths of each of the groups for each item.

Dimension	Item	Group	Strongly disagree/Disagree n (%)	Neither n (%)	Strongly agree/Agree n (%)	p
Frequency of events reports	When a mistake is made, but is caught and corrected before it affects the patient, how often is this reported? (Q40)	Nurses	7 (15.9)	11 (25.0)	26 (59.1)	.65
		Surgeons	10 (23.8)	9 (21.4)	23 (54.8)	
Overall perception of safety	When a mistake is made, but has no potential to harm the patient, how often is this reported? (Q41)	Nurses	16 (36.4)	12 (27.3)	16 (36.4)	.20
		Surgeons	8 (19.0)	26 (30.2)	36 (41.9)	
	When a mistake is made that could harm the patient, but does not, how often is this reported? (Q42)	Nurses	11 (25.0)	14 (31.8)	19 (43.2)	.44
		Surgeons	6 (14.6)	27 (31.8)	41 (48.2)	
	It is just by chance that more serious mistakes do not happen around here (I) (Q10)	Nurses	13 (29.5)	9 (20.5)	22 (50.0)	.04
		Surgeons	18 (42.9)	14 (33.3)	10 (23.8)	
Patient safety is never sacrificed to get more work done (Q15)	Nurses	29 (65.9) <sup>†</sup>	7 (15.9)	8 (18.2)	.01	
	Surgeons	13 (31.0)	10 (23.8)	19 (45.2)		
We have patient safety problems in this unit (I) (Q17)	Nurses	15 (34.1)	10 (22.7)	19 (43.2)	.01	
	Surgeons	33 (78.6) <sup>†</sup>	5 (11.9)	4 (9.5)		
Our procedures and systems are effective in preventing errors (Q18)	Nurses	11 (25.0)	7 (15.9)	26 (59.1)	.02	
	Surgeons	3 (7.1)	3 (7.1)	36 (85.7) <sup>‡</sup>		
Supervisor/manager expectations and promoting patient safety	My supervisor/manager says a good word when a job is done according to established patient safety procedures (19)	Nurses	15 (34.1)	15 (34.1)	14 (31.8)	.01
		Surgeons	3 (7.1)	13 (31.0)	26 (61.9)	
My supervisor/manager seriously considers staff suggestions for improving patient safety (20)	Nurses	13 (29.5)	12 (27.3)	19 (43.2)	.01	
	Surgeons	3 (7.1)	6 (14.3)	33 (78.6) <sup>‡</sup>		
Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts (I) (Q21)	Nurses	25 (56.8) <sup>†</sup>	14 (31.8)	5 (11.4)	.25	
	Surgeons	30 (71.4) <sup>†</sup>	7 (16.7)	5 (11.9)		
My supervisor/manager overlooks patient safety problems that happen over and over (I) (Q22)	Nurses	29 (65.9) <sup>†</sup>	9 (20.5)	6 (13.6)	.02	
	Surgeons	38 (90.5) <sup>†</sup>	3 (7.1)	1 (2.4)		
We are actively doing things to improve patient safety (Q6)	Nurses	14 (31.8)	9 (20.5)	21 (47.7)	.14	
	Surgeons	6 (14.3)	9 (21.4)	27 (64.3)		
Mistakes have led to positive changes here (Q9)	Nurses	5 (11.4)	14 (31.8)	25 (56.8)	.26	
	Surgeons	6 (14.3)	7 (16.7)	29 (69.0)		
After we make changes to improve patient safety, we evaluate their effectiveness (Q13)	Nurses	17 (38.6)	17 (38.6)	10 (22.7)	.11	
	Surgeons	10 (23.8)	14 (33.3)	18 (42.9)		

Dimension	Item	Group	Strongly disagree/Disagree n (%)	Neither n (%)	Strongly agree/Agree n (%)	p
Teamwork within units	People support one another in terms of work in this unit (Q1)	Nurses	1 (2.3)	6 (13.6)	37 (84.1) <sup>‡</sup>	.37
		Surgeons	0 (0.0)	3 (7.1)	39 (92.9) <sup>‡</sup>	
	When a lot of work needs to be done quickly, we work together as a team to get the work done (Q3)	Nurses	9 (20.5)	5 (11.4)	30 (68.2)	.03
		Surgeons	2 (4.8)	12 (28.6)	28 (66.7)	
In this unit, people treat each other with respect (Q4)	Nurses	4 (9.1)	11 (25.0)	29 (65.9)	.40	
	Surgeons	3 (7.1)	6 (14.3)	33 (78.6) <sup>‡</sup>		
When one area in this unit gets really busy, others help out (Q11)	Nurses	5 (11.4)	7 (15.9)	32 (72.7)	.48	
	Surgeons	3 (7.1)	11 (26.2)	28 (66.7)		
Communication openness	Staff will freely speak up if they see something that may negatively affect patient care (Q35)	Nurses	16 (36.4)	7 (15.9)	21 (47.7)	.20
		Surgeons	8 (19.0)	8 (19.0)	26 (61.9)	
Staff feel free to question the decisions or actions of those with more authority (Q37)	Nurses	24 (54.5) <sup>†</sup>	10 (22.7)	10 (22.7)	.30	
	Surgeons	18 (42.9)	8 (19.0)	16 (38.1)		
Staff are afraid to ask questions when something does not feel right (I) (Q39)	Nurses	12 (27.3)	14 (31.8)	18 (49.9)	.70	
	Surgeons	10 (23.8)	11 (26.2)	21 (50.0)		
Feedback and communications about error	We are given feedback about changes put into place based on event reports (Q34)	Nurses	25 (56.8) <sup>†</sup>	6 (13.6)	13 (29.5)	.01
		Surgeons	8 (19.0)	10 (23.8)	24 (57.1)	
We are informed about errors that happen in this unit (Q36)	Nurses	24 (54.5) <sup>†</sup>	9 (20.5)	11 (25.0)	.01	
	Surgeons	8 (19.0)	7 (16.7)	27 (64.3)		
In this unit, we discuss ways to prevent errors from happening again (Q38)	Nurses	15 (34.1)	14 (31.8)	15 (34.1)	.01	
	Surgeons	2 (4.8)	2 (4.8)	38 (90.5) <sup>‡</sup>		
Non-punitive response to error	Staff feel like their mistakes are held against them (I) (Q8)	Nurses	29 (65.9) <sup>†</sup>	11 (25.0)	4 (9.1)	.06
		Surgeons	20 (47.6)	10 (23.8)	12 (28.6)	
When an event is reported, it feels like the person is being reported, not problem (I) (Q12)	Nurses	19 (43.2)	11 (25.0)	14 (31.8)	.34	
	Surgeons	24 (57.1) <sup>†</sup>	6 (14.3)	12 (28.6)		
Staff worry that mistakes are kept in their file (I) (Q16)	Nurses	9 (20.5)	19 (43.2)	16 (36.4)	.41	
	Surgeons	13 (31.0)	13 (31.0)	16 (38.1)		

Dimension	Item	Group	Strongly disagree/Disagree n (%)	Neither n (%)	Strongly agree/Agree n (%)	p
Staffing	We have enough staff to handle the workload (Q2)	Nurses	17 (38.6)	10 (22.7)	17 (38.6)	.01

(continued on next page)

**Table 3** (continued)

Dimension	Item	Group	Strongly disagree/ Disagree n (%)	Neither n (%)	Strongly agree/ Agree n (%)	p	
Hospital management support for patient safety	Staff in this unit work long hours which might affect patient care (I) (Q5)	Surgeons	3 (7.1)	11 (26.2)	28 (66.7)	.52	
		Nurses	16 (36.4)	5 (11.4)	23 (52.3)		
	We use more agency/temporary staff than is best for patient care (I) (Q7)	Surgeons	18 (42.9)	7 (16.7)	17 (40.5)	.01	
		Nurses	6 (13.6)	8 (12.2)	30 (68.2)		
	When working in 'crisis mode' trying to do too much, too quickly (I) (Q14)	Surgeons	17 (40.5)	3 (7.1)	22 (52.4)	.01	
		Nurses	6 (13.6)	5 (11.4)	33 (75.0) <sup>‡</sup>		
	Hospital management provides a work climate that promotes patient safety (Q23)	Hospital management shows that patient safety is a top priority (Q30)	Surgeons	14 (33.3)	12 (28.6)	16 (38.1)	.01
			Nurses	31 (70.5) <sup>†</sup>	8 (18.2)	5 (11.4)	
		Hospital management is interested in patient safety only after an adverse event happens (Q31)	Surgeons	14 (33.3)	16 (38.1)	12 (28.6)	.03
			Nurses	24 (54.5) <sup>†</sup>	8 (18.2)	12 (27.3)	
Teamwork across hospital units	Hospital units do not coordinate well with each other (I) (Q24)	Surgeons	12 (28.6)	17 (40.5)	13 (31.0)	.22	
		Nurses	24 (54.5) <sup>†</sup>	13 (29.5)	7 (15.9)		
	There is good cooperation among hospital units that need to work together (Q26)	Surgeons	10 (23.8)	16 (38.1)	16 (38.1)	.78	
		Nurses	7 (15.9)	13 (29.5)	24 (54.5)		
	It is often not easy to work with staff from other hospital units (I) (Q28)	Surgeons	13 (31.0)	12 (28.6)	17 (40.5)	.31	
		Nurses	10 (22.7)	18 (40.9)	16 (36.4)		
Hospital handoffs and transitions	Hospital units work well together to provide the best care for patients (Q32)	Surgeons	8 (19.0)	9 (21.4)	25 (59.5)	.07	
		Nurses	21 (47.7)	16 (36.4)	7 (15.9)		
	Things 'fall between the cracks' when transferring patients to another unit (I) (Q25)	Surgeons	4 (9.5)	11 (26.2)	27 (64.3)	.67	
		Nurses	17 (38.6)	11 (25.0)	16 (36.4)		
	Important patient care information is often lost during shift changes (I) (27)	Surgeons	20 (47.6)	10 (23.8)	12 (28.6)	.16	
		Nurses	21 (47.7)	9 (20.5)	14 (31.8)		
	Problems often occur in the exchange of information across hospital units (I) (29)	Surgeons	25 (59.5) <sup>†</sup>	11 (26.2)	6 (14.3)	.24	
		Nurses	21 (47.7)	18 (40.9)	5 (11.4)		
Shift changes are problematic for patients in this hospital (I) (Q33)	Surgeons	26 (61.9) <sup>†</sup>	10 (23.8)	6 (14.3)	.93		
	Nurses	23 (52.3) <sup>†</sup>	13 (29.5)	8 (18.2)			
		Surgeons	21 (50.0) <sup>†</sup>	12 (28.6)	9 (21.4)		

N = number of responses; % = percentage; p =  $\chi^2$  values; (significant level,  $p \leq .05$ ). <sup>†</sup> Weakness. <sup>‡</sup> Strength.

surgeons did not. On the other hand, while 68.2% of nurses and 52.4% of surgeons believed that patient safety is at risk because of the number of temporary staff, 13.6% of nurses and 40.5% of surgeons disagreed with this concept ( $p = .003$ ) (Table 3). Overall, surgeons (specifically obstetricians) provided a higher percentage of positive responses than nurses ( $p = .001$ ) (Tables 2 and 5).

### 3.3.8. Hospital management support for patient safety

The percentage of positive responses was very low for this dimension (nurses = 9.3%; surgeons = 26.2%) ( $p = .01$ ) (Table 2). However, while surgeons' perceptions were not clearly defined, nurses' perceptions were negative. Thus, 70.5% thought that hospital management does not facilitate the optimal environment to promote patient safety, and 54.5% thought that patient safety is not a priority and that attention is given to the safety of the patient only when mistakes occur (Table 3).

## 3.4. Patient safety climate at the hospital level dimensions

### 3.4.1. Teamwork across hospital units

Although the number of positive responses differed between the groups ( $p = .01$ ) (Table 2), there were no significant differences between the responses given to the different questions under this dimension (Table 3). Most participants thought that the hospital units did not coordinate well, except when the objective was patient safety.

Similarly, they believed that working with staff from other units or services was easy.

### 3.4.2. Hospital handoffs and transitions

In general, both nurses and surgeons felt that patient safety was not affected when patients were transferred to other units and that information was adequately communicated (Tables 2, 3 and 5).

## 3.5. Weaknesses and strengths

Table 3 summarizes the weaknesses and strengths of each group. The nurses pointed out weaknesses in 11 of the 42 items that make up the questionnaire and were included in the following dimensions: overall perception of safety, supervisor/manager expectations and promoting patient safety, communication openness, feedback and communication about error, nonpunitive response to error, hospital management support for patient safety, and hospital handoffs and transitions.

Similarly, the surgeons indicated seven weaknesses that belong to the following dimensions: overall perception of safety,

**Table 4**  
Kruskal Wallis and Mann-Whitney *U* test scores by outcome variables.

DIMENSION	PERCEPTION OF SECURITY		TIME OF PROFESSION		TIME IN HOSPITAL		TIME IN UNIT/ SERVICE		HOURS OF WORK/WEEK		NUMBER OF EVENTS REPORTED		UNIT/SERVICE		PROFESSION	
	KW	p	KW	p	KW	p	KW	p	KW	p	KW	p	KW	p	U M-W	p
Frequency of events reports	11.587	0.12	10.745	0.22	14.291	0.07	10.714	0.22	9.475	.01 <sup>†</sup>	3.359	0.50	3.015	0.22	1039.500	0.31
Overall perception of safety	31.158	.01	1.804	0.99	8.042	0.43	7.611	0.47	2.529	0.28	5.807	0.21	15.079	.00 <sup>†</sup>	1328.00	.01
Supervisor/manager expectations and promoting patient safety	22.597	.01	4.883	0.77	11.574	0.17	11.017	0.20	4.973	0.08	6.453	0.17	14.504	.01 <sup>†</sup>	1323.00	.01
Organizational learning/continuous improvement	29.643	.01	5.831	0.67	11.455	0.18	4.237	0.84	2.543	0.28	3.865	0.43	4.605	0.10	1131.00	.03
Teamwork within units	27.500	.01	7.013	0.54	10.427	0.24	13.542	0.10	2.506	0.29	2.150	0.71	1.191	0.55	993.00	0.42
Communication openness	11.649	0.11	8.463	0.39	6.852	0.55	8.018	0.43	2.869	0.24	2.292	0.68	3.123	0.21	1094.00	0.09
Feedback and communications about error	22.628	.01	13.839	0.09	12.033	0.15	5.321	0.72	18.042	.01 <sup>†</sup>	5.816	0.21	26.912	.01 <sup>†</sup>	1474.00	.01
Non-punitive response to error	8.593	0.28	17.897	.02 <sup>†</sup>	10.900	0.21	13.755	0.09	3.417	0.18	2.079	0.72	.829	0.66	963.00	0.60
Staffing	20.178	.01	4.790	0.78	7.099	0.53	4.529	0.81	3.952	0.14	7.462	0.11	15.827	.01 <sup>†</sup>	1348.50	.01
Hospital management support for patient safety	18.594	.01	10.081	0.26	13.050	0.11	7.088	0.53	5.852	0.054	3.919	0.42	9.796	.01 <sup>†</sup>	1255.00	.01
Teamwork across hospital units	14.694	.04	6.067	0.64	5.108	0.75	9.237	0.32	1.288	0.53	5.471	0.24	4.727	0.09	1130.50	.04
Hospital handoffs and transitions	10.981	0.14	3.849	0.87	6.175	0.63	5.361	0.72	1.310	0.52	6.523	0.16	4.845	0.09	1036.00	0.24

KW = Kruskal Wallis value; U M – W = Mann Whitney *U* Test value; significant level  $p \leq .05$ . <sup>†</sup> Indicate that differences between subgroups exist. See Table 5.

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**Table 5**  
Results of both Kruskal-Wallis and U-Mann-Whitney for each of the subgroups of the outcome variables. See Table 5.

YEARS	1-5 y	6-10 y	11-15 y	16-20 y	21-25 y	26-30 y	31-35 y	36-40 y	≥41 y
<b>PROFESSION</b>									
Non-Punitive	50 ± 16.14 <sup>†</sup>	45 ± 12.91 <sup>‡</sup>	49.07 ± 20.60	50 ± 19.16 <sup>‡</sup>	66.6 ± 16.67 <sup>†‡§</sup>	65.15 ± 11.10 <sup>†‡§</sup>	58.33 ± 22.05	68.75 ± 20.83	75
<b>HOURS/WEEK</b>	≤34	35-40	≥40						
Events report	25.00 ± 0.00 <sup>†‡</sup>	54.48 ± 19.82 <sup>†</sup>	2.63 ± .496 <sup>‡</sup>						
Feed-back	66.67 ± 0.00	48.72 ± 23.02 <sup>†</sup>	72.08 ± 14.12 <sup>†</sup>						
<b>UNIT/SERVICE *</b>	NURSE	SURGERY	OBSTETRICIANS						
Perception	63.78 ± 20.56 <sup>†</sup>	78.57 ± 23.89	83.57 ± 15.24 <sup>†</sup>						
Expectation	56.96 ± 20.45 <sup>†</sup>	66.96 ± 16.42	73.93 ± 15.57 <sup>†</sup>						
Feed-back	42.42 ± 22.65 <sup>†</sup>	60.71 ± 12.47	68.10 ± 17.21 <sup>†</sup>						
Staffing	37.50 ± 20.44 <sup>†</sup>	50.00 ± 16.14	55.36 ± 17.95 <sup>†</sup>						
Hospital support	34.47 ± 22.42 <sup>†</sup>	51.19 ± 26.53	48.33 ± 20.19 <sup>†</sup>						
<b>NURSES vs SURGEONS</b>	NURSES	SURGEONS							
Perception	63.75 ± 20.56 <sup>†</sup>	82.74 ± 16.73 <sup>†</sup>							
Expectation	56.96 ± 20.45 <sup>†</sup>	72.77 ± 15.73 <sup>†</sup>							
Learning	53.79 ± 18.80 <sup>†</sup>	64.28 ± 18.43 <sup>†</sup>							
Feed-back	41.86 ± 22.12 <sup>†</sup>	66.87 ± 16.61 <sup>†</sup>							
Staffing	37.50 ± 20.44 <sup>†</sup>	54.46 ± 17.59 <sup>†</sup>							
Hospital support	34.46 ± 22.42 <sup>†</sup>	48.81 ± 21.03 <sup>†</sup>							
Teamwork Hospital	50.71 ± 16.52 <sup>†</sup>	58.33 ± 17.55 <sup>†</sup>							

† ‡ § indicate where significant differences exist between subgroups. \* In this case, obstetricians form one subgroup and the rest of the surgeons another. y = years.

supervisor/manager expectations and promotion of patient safety, nonpunitive response to error, and hospital handoffs and transitions.

The nurses only indicated two items as strengths, included in the dimensions of teamwork within units and staffing. Conversely, the surgeons perceived five items as strengths, related to the dimensions: overall perception of safety, supervisor/manager expectations and promoting patient safety, teamwork within units, and feedback and communication about errors.

#### 4. Discussion

The findings of our work are consistent with earlier reports which documented that each of the professional groups integrated into any teamwork or functional unit may suggest different aspects of PSC that need to be strengthened [31,35,36]. Consequently, proposing initiatives aimed at improving the global perception of the group will subsequently improve the safety culture [45].

Our work showed that 48.8% of nurses and 83.3% of surgeons provided positive responses about the overall perception of safety. This is similar to a previous study that reported that doctors assess safety climate more positively than nurses [15]. However, the value being lower than 50%, we cannot agree with those reporting that OR nurses have a positive perception of the PSC [19,26]. This difference was significant when comparing the results of the nurses with those of the obstetricians.

Conversely, 65.9% of the nurses believed that patient safety was sacrificed to get more work done, and 50% believed that more errors did not occur by chance. Nevertheless, the event frequency reported was low (13), and related to the hours worked during the week and the time worked in the hospital. In other words, the more experienced professionals reported a higher number of events, which is consistent with a previous report [2].



The results of our work indicate that nurses' perceptions regarding the actions promoted by their leaders to improve patient safety are lower than those expressed by the surgeons, which is similar to the findings documented in previous studies [18,21]. However, these results differ from those of a Spanish study [26] which found that the scores of surgeons are lower than nurses. Our study shows that unlike surgeons, nurses do not receive appreciation words for their work and perceive that their suggestions toward improving patient safety are not considered. According to some authors, these differences are due to a stronger relationship and influence physicians have on hospital organization and management [18], with which we agree. However, we believe this is also a consequence of a lack of communication since 70.5% of the nurses alleged that the hospital management staff did not provide an adequate work environment to promote patient safety, and 54.4% believed patient safety was not a priority for hospital management. On the other hand, the surgeons' opinions are not so polarized, which we believe is due to the best communication channels they have with the hospital management. While each surgical specialty has a leader who intercedes with the hospital management, the nursing staff is included in just one large group with a single leader. This reduces their ability to influence hospital managers' decisions and may explain their negative perceptions in this area. Some authors have pointed out that supportive management practices focused on improving patient safety are effective to increase positive interactions between staff and management [45]. We too recommend this path to improve the perception of the nursing staff.

In our hospital, surgeons are grouped into small or medium-sized functional units based on their specialty, each of which has a department head. However, all perioperative nurses are integrated into a single large group, with a single head. The smaller the size of the group, the easier it is to communicate [11], and this could explain the differences in feedback and communication about error and communication openness dimensions. In the first case, while surgeons pointed out as a strength that they receive adequate feedback and that the errors are discussed within the unit, nurses perceive as a weakness that they do not receive information on errors or are not aware of the measures implemented to avoid them. In the second case, although nurses and surgeons felt free to communicate situations that may be detrimental to patient safety, 54.5% of nurses and 42.9% of surgeons refuse to do when the leaders had already taken some initiative. These findings are similar to a recent report that showed that nurses in Croatia, Hungary, and Spain believe that open communication was absent in their work environment [19].

It is worthwhile to state that what we state here is not new. Sorra and colleagues [38] highlighted the importance of open communication when patient safety is concerned. Likewise, Gillespie and others reported that a communication gap amongst surgical healthcare team members could be detrimental to patients [17], and Makary et al. discussed the effectiveness of the briefing and debriefing strategies in reducing errors within the surgical team [25]. They implemented strategies aimed at improving communication among all members of the surgical team. Further, the progressive and constant complexity of hospital activity implies that the actions of the hospital management must also be more complex, enabling the teams to act much closer with health professionals to understand their needs and proposals for patient safety [18,45]. In other words, creating an atmosphere of mutual respect between physicians and nurses as well as sharing information can enhance the quality of healthcare services, consequently improving the patient outcomes [16].

The high percentage of positive responses by nurses and surgeons in the items that analyze the teamwork within units dimension (between 66% and 93%) is striking (Table 3). If everyone considered that they are part of a single team, we believe that there would not be many differences between both professional groups, and the percentages of positive responses of both groups would be closer to each other as reported earlier [13]. Therefore, although the dimension does not show significant differences between the professional groups, it would be necessary to study this aspect deeply and creation of a climate of respect and communication between all members of the OR, as earlier proposed [1,16], should be insisted.

In this study, the responses of the nurses and surgeons showed a clear difference when asked about staffing. Thus, while 66.7% of the surgeons thought there was enough staff, only 38.6% of the nurses estimated the same. While 75% of the nurses believed that they are asked to work hard and rapidly in situations of stress (weakness), only 38.1% of the surgeons had the same opinion. On the other hand, although significant differences between the two groups remain, nurses and surgeons estimate that patient safety can be affected by both the high number of working hours and the number of temporary personnel existing in the workforce. This last aspect was pointed out by both groups as a weakness of the system. Other authors have also recognized the negative relationship between nurse staffing and work under stress, pointing out that the main causes of greater interest in hospital management in increasing productivity are ignoring to accompany this objective with staff according to the workload [17,19,44]. These authors also pointed out that surgeons perceive that the discontinuity of nursing staff decreases knowledge of the surgical procedures and makes communication within the group difficult. In our study, 40% of the nurses had been in the OR between 1 and 5 years, which implies a high turnover. Most surgeons associated with the hospital for same duration were undergoing specialized training.

Although the members of the studied sample are not concerned that the errors are known or recorded in their files, it is interesting to point out that they perceive that the knowledge of the errors points to the person. Currently, these fears only seem to be maintained in countries that, until recently, have been subject to a tight hierarchical structure [19], and efforts are needed to eliminate this approach.

Finally, nurses and surgeons perceive that teamwork across hospital units and handoff and transition dimensions do not negatively interfere with PSC.

## 5. Limitations

Our study has some limitations. First, it analyzed the existing PSC differences between nurses and surgeons who worked exclusively in the OR of a specific health center and did not include members of the anesthesia team. This is because HUMIC is included in a larger hospital complex in which two ORs exist, and the anesthesia team works in both ORs. Simultaneously, each hospital has a management

team that decides its patient safety policy. Therefore, the working conditions of both centers may differ, and the perceptions of the anesthesia team may not be adjusted to those specific to the center where the study was conducted. Second, the HSOPSC questionnaire does not specifically analyze the composites influenced by communication.

## 6. Conclusion

Our results confirm that nurses and surgeons of the OR of our hospital have different perceptions of many of their dimensions, which concurs with the general opinion. The main differences exist in the overall perception of safety, supervisor/manager expectations and promoting patient safety, teamwork within units, communication openness, hospital management support, feedback and communication about errors and staffing dimensions. We believe these differences are due to a lack of communication between the three groups involved: nurses, surgeons, and the management team. Perhaps, initially, efforts must be made in this area by attempting to implement actions that allow cohesion of the OR team before, during, and after any surgical procedure. Briefing and debriefing programs seem to be good choices, but these must be accompanied by better-adapted staffing.

More studies are necessary to better understand the opinion that surgical teams have PSC and to study whether actions aimed at improving communication between their members can improve it.

### 6.1. Implications to practice

Our study has two implications for routine practice. On one hand, we offer the management team of the HUMIC the first objective results on which they can develop policies to improve the safety and safety of their patients in the OR area. Our analysis revealed that most differences may be due to a lack of communication between nurses, surgeons, nurses, and hospital management. Although these professionals work in the same unit, they are unable to communicate efficiently as a team. Although doctors exchange opinions among themselves in an appropriate way, this does not happen between nursing staff. Therefore, it is necessary to reinforce three fundamental aspects: first, to promote specific meetings of the OR nurses in which opinions are exchanged, and information related to patient safety is transmitted; second, to reinforce the feeling of being a surgical team, nurses, and surgeons, facilitating communication between them; and, finally, to strengthen the presence and influence of the nursing staff in the governing bodies of the hospital to achieve improvements in the quality of patient care in aspects pertaining to the nursing profession.

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#### Authorship and Authors contribution

Both authors have participated in the conceptualization, methodology, formal analysis, writing, and review of the article.

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