

Article

# Safety Climate Assessment in Operating Room Nurses Through Safety Attitudes Questionnaire (SAQ)

Rubén J. Tejera-Quintana <sup>1,\*</sup>, Pilar Marqués-Sánchez <sup>2</sup>, C. Patricia Arencibia-Sánchez <sup>1</sup> and Elba Mauriz, PhD<sup>3</sup>

<sup>1</sup> Surgical area, Maternal and Children's University Hospital of the Canary Islands (HUMIC), Avda/ Marítima del Sur s/n, 35016, Las Palmas, Spain.

<sup>2</sup> SALBIS Research Group, Department of Nursing and Physiotherapy, University of Leon, Campus of Ponferrada, Avda/Astorga s/n, 24401, Ponferrada, Spain.

<sup>3</sup> Department of Nursing and Physiotherapy, University of Leon, Campus of Vegazana s/n, 24071, León, Spain.

\* Correspondence: rubentq27@hotmail.com; Tel.: +34-625-789-215

Received: 16/02/2018 ; Accepted: 31/05/2018; Published: 17/07/2018

**Abstract.** Introduction: Surgical safety is a global public health concern. The attitudes and perceptions of the surgical team regarding to the patient safety are associated to the safety climate and the prevalence of adverse events. Objective: To describe the safety climate according to sociodemographic characteristics and work professional conditions of operating room nurses from three Hospitals in Canary Islands, Spain. Method: This work presents a multicentre cross-sectional study. Data collection was obtained by means of The Safety Attitudes Questionnaire (SAQ), a self-completed questionnaire translated to the Spanish. A convenience sample with voluntary participation was selected. The safety climate was determined through six factors: *Teamwork climate, Safety climate, Job satisfaction, Perception of the Unit and Hospital Management, Working conditions* and *Stress recognition*. Results: The SAQ domains show variability in relation to sociodemographic characteristics and work professional conditions. Perception of the management and Working conditions are the domains lower valued in every sociodemographic characteristics studied. The size of the hospitals and Years of professional experience showed statistical differences in several domains. Conclusions: The age, years of profession, years of experience and type of hospital present strong relationship among patient safety perception.

**Keywords:** Patient Safety; Operating Room Nursing; Safety Management; Adverse Effects, Safety Climate.

---

## 1. Introduction

It is estimated that more than 234 million major surgical procedures are undertaken every year worldwide [1]. Approximately 10% of patients admitted in hospitals suffer unexpected accidents or adverse events (AE) derived from health care causing to undesirable effects on their health or even death. In 2005 there were more than 4 million major surgical procedures in Spanish hospitals [2]. Around 50% of the AE are considered avoidable [3]. These data suggest that surgical patient safety is a major global concern in public health [1].

Studies on epidemiology about healthcare risks report that the second most frequent cause of AE derive from surgical procedures[4]. Most of AE occurring in the operating room relies on either the nature and characteristics of major surgical procedures or the increased use of precise technologies. The complexity of the procedure increases or determine the probability of undesirable events [5].

Organizational culture refers to a set of beliefs, values, and prevailing attitudes that determine the functioning of an organization reflected in their daily actions [3]. Historically, the health institutions have addressed AE from the perspective of the blame and hiding culture by using a model of error centred on the person. A safety culture is needed in order to achieve a model of error centred in the system, where errors are not considered personal failures, but a result from the interplay of multiple factors and opportunities that improve the system while prevent damage [3, 6]. Safety culture is essential in the prevention of AE and could be defined as "the product of individual and group values, attitudes, perceptions, competencies and patterns

of behaviour that determine the commitment to and proficiency of an organization's health and safety management" [6].

Organization errors are responsible for the vast majority of AE. The human factor performs a very important role [7]. The analyze of cultural, professional and organizational factors improves the understanding and prevention of errors [8]. Healthcare provider attitudes about these factors are one component of safety culture [9].

When using questionnaires to study group-level perceptions, the most appropriate term to use is climate (e, g., safety climate, or teamwork climate). Climates are more readily measurable aspects of safety culture (perceptions are part of both definitions) but surveys are generally not capable of measuring all other aspects of culture like behavior, values, and competencies [9].

Few studies have been conducted on the assessment of safety culture in Spanish National Health System [10]. In addition, surgical safety climates studies have never been conducted in this country. On the other hand, the nurse in the operating room is responsible for multiple health care tasks related to patient safety and is also in charge, according to the institution, of the surgical checklist. The Surgical Checklist is the quintessential tool for patient safety in the operating room created by World Health Organization [11]. The safety climate in the operating room is associated with the correct use of the surgical checklist [12]. Undoubtedly, the attitudes of the safety culture in nurses is reflected in the AE [13, 14].

The objective of this study is to describe the safety climate according to sociodemographic characteristics and work professional condition of operating room nurses. Description of surgical safety climate is essential for the assessment of the surgical patient safety, minimize the AE and be able to carry out improvement actions according to National Quality Forum [9, 10].

The improvement of safety climate has important benefits for patients and is associated with the reduction of nurses injuries [14]. Likewise, promoting the safety culture in surgical areas may contribute to the sustainability of the health system and to reduce health care costs [15].

## 2. Materials and Methods

A multicentre cross-sectional study design was selected. To evaluate surgical nurses' safety climate the Safety Attitudes Questionnaire (SAQ) was translated into Spanish and self-completed using a convenience non-representative sample by voluntary participation.

The SAQ demonstrates good psychometric properties and has been adapted to use in intensive care units (ICU), operating rooms, general inpatient settings and outpatient (medical ward, surgical ward, etc.). It has been also validated into several languages but not into Spanish [16-18], and its use allows valid comparison between hospitals, patient care areas, and types of caregivers, and tracking of change over time [9].

The population under study were nurses from surgical areas of three third level main public hospitals of Gran Canaria Island (Las Palmas). Operating room nurses, in both elective and urgent surgeries, were included. Nurses not assigned in the operating room and with less than six months of experience in the surgical area were excluded from the study.

182 surgical nurses were the study population. The sample consists of 125 (68.68%) surgical nurses aged between 25 and 64 years old. The distribution by gender, hospital, age, years of experience and profession, represented a normal distribution. The sample was not probabilistic but it was well balanced in terms of nurses' proportion, in both, elective and urgent surgeries. The characteristics of the sample are described in Table 1.

**Table 1.**  
*Characteristics of the sample*

		n	%	
Gender	woman	92	73.6	
	man	33	26.4	
Studies	diploma/Bachelor	113	90.4	
	master	12	9.6	
	doctor	0	0.0	
Hospital	Materno-I		41	32.8
		elective surgery	19	46.3
		urgent surgery	22	53.7
	Insular		39	31.2
		elective surgery	16	41.0
		urgent surgery	23	59.0
	Dr. Negrín		45	36.0
		elective surgery	19	42.2
		urgent surgery	26	57.8
Time commitment	Full-time	111	88.8	
	Part-time	14	11.2	
Working relationship	eventually hired	44	35.2	
	interim	35	28.0	
	permanent	46	36.8	
		<b>Interval in years</b>		
Average age		35-39		
Average years of professional experience		15-19		
Average years of operating room working experience		5-9		

## 2.1 Measuring instrument

The SAQ was created and validated in 2006 by teamwork from The University of Texas. The SAQ is a self-administered questionnaire that allows obtaining a snapshot of the safety climate through surveys of frontline worker perceptions. It contains 41 items and is answered using a five-point Likert scale. The final score varies between 0 and 100, 100 represents the best perception, and a positive response value according to safety is considered when the score is equal or greater than 75 [9, 19].

Safety climate perception is evaluated through six factors or dimensions and is defined as follows:

- *Teamwork climate*: perceived quality of collaboration between personnel.
- *Safety climate*: perceptions of a strong and proactive organizational commitment to safety.
- *Job satisfaction*: positivity about the work experience.
- *Perception of management of the unit and the Hospital*: approval of managerial action.
- *Working conditions*: perceived quality of the work environment and logistical support (staffing, equipment, etc).
- *Stress recognition*: acknowledgement of how performance is influenced by stressors [9].

A SAQ short version was translated into Spanish, and the following working method was applied:

1. The translation was confronted with the questionnaire of Gutierrez's work [20] and the first draft of the questionnaire was written.
2. The questionnaire validity content was reviewed by three experts (two assistants experts and one academic expert).
3. A sample of volunteer surgical nurses (n = 5) was selected to apply the questionnaire. Nurses expressed their opinions and suggestions about the questionnaire. The results of the pilot questionnaire were analysed and the findings based on the expected data were explored. The final questionnaire was drafted after the correction of errors and addition of eight closed demographic questions.

## 2.2 Data collection

Staff meetings were attended to hand-deliver the questionnaires. Several visits to the unit were also done on different days and hours, to hand out the questionnaire to the nurses who could not attend at the meeting day and also from emergency teams.

## 2.3 Ethical aspects

Ethical aspects of the research were reviewed and approved by the Ethics and Research Committee of University Hospital of Gran Canaria Dr. Negrín and Insular Maternal and Child Hospital Complex of the Canary Islands. Each professional was asked for a writing consent together with a presenting letter of the questionnaire, ensuring their confidentiality, privacy and voluntary participation in the study. The anonymity questionnaire and the consent document were not coded to allow data union. In accordance with the principles set out in the Declaration of Helsinki, the data provided were treated with caution to protect the privacy of personal information, according to the code of ethics of Spanish Nursing and the Organic Law 15/1999 of 13 of December on Personal data Protection. Authorization for use was also obtained from the authors of the questionnaire.

## 2.4 Data analysis

The answers were placed in a database and each response was scored according to the indications of the SAQ author. Items numbers 2 and 11 are negatively worded and reverse scored. The not answered items, blank items, were not included in the statistical analysis. The items corresponding to each SAQ dimension were taken to calculate the average. The average SAQ dimension with each of the demographic variables was analyzed. Analysis of variance ANOVA, multiple mean's comparison with post-hoc tests and, non-parametric tests (Kruskal-Wallis test) were used for statistical and differences significant finding. The Pearson correlation coefficient was used for the relationship degree study of quantitative demographic variables of scale. Statistical analysis was performed using the SPSS 23.0 programme (SPSS Inc., Chicago, IL, USA).

## 3. Results

A total of 182 questionnaires were distributed and 134 were returned, 9 of them did not meet the inclusion criteria and were excluded. The overall participation was 73.63%. Tables 2 summarize the percentage of responses in each item of the questionnaire.

**Table 2.**  
Response rate of items SAQ scale

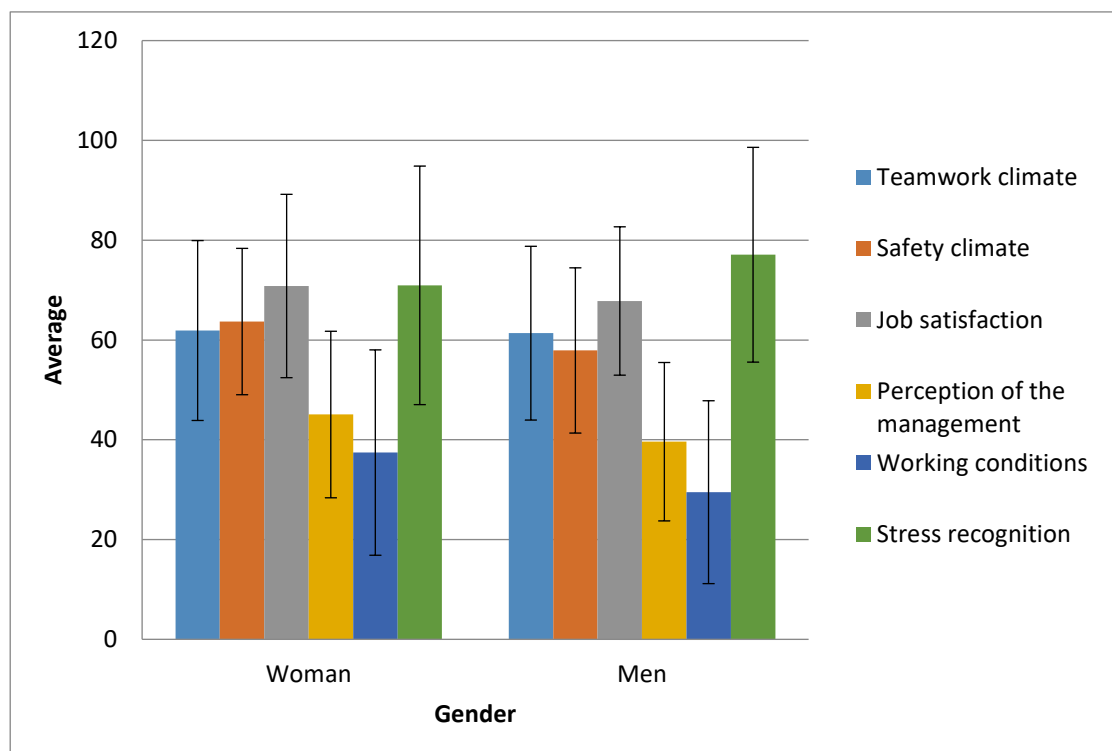
	--	-	-/+	+	++	NA
<b>Teamwork climate</b>						
Nurse input is well received in this clinical area.	2.4	22.4	23.2	40.8	9.6	1.6
In this clinical area, it is difficult to speak up if I perceive a problem with patient care.	20.8	23.2	23.2	28.0	4.8	0.0
Disagreements in this clinical area are resolved appropriately (i.e., not <i>who</i> is right, but <i>what</i> is best for the patient)	8.0	21.6	25.6	38.4	6.4	0.0
I have the support I need from other personnel to care for patients.	4.8	7.2	13.6	46.4	27.2	0.8
Is is easy for personnel here to ask questions when there is something that they do not understand.	1.6	11.2	8.0	40.8	38.4	0.0
The physicians and nurses here work together as a well-coordinated team.	3.2	25.6	25.6	38.4	7.2	0.0
<b>Safety climate</b>						
I would feel safe being treated here as a patient.	0.8	6.4	16.0	48.8	28.0	0.0
Medical errors are handled appropriately in this clinical area.	4.0	16.8	35.2	35.2	8.0	0.8
I know the proper channels to direct questions regarding patient safety in this clinical area.	5.6	5.6	18.4	37.6	32.8	0.0
I receive appropriate feedback about my performance.	10.4	16.8	31.2	30.4	11.2	0.0
In this clinical area, it is difficult to discuss errors.	11.2	26.4	26.4	27.2	8.0	0.8
Im a encouraged by my colleagues to report any patient safety concerns I may have.	1.6	12.8	26.4	38.4	20.8	0.0
The culture in this clinical area makes it easy to learn from the errors of others.	4.0	14.4	26.4	44.0	11.2	0.0
<b>Job satisfaction</b>						
I like my job.	3.2	2.4	4.0	16.8	73.6	0.0
Working here is like being part of a large family.	8.8	12.0	21.6	40.8	16.8	0.0
This is a good place to work.	0.8	8.8	19.2	40.8	30.4	0.0
I am proud to work in this clinical area.	0.8	7.2	14.4	35.2	42.4	0.0
Morale in this clinical area is high.	8.8	26.4	32.0	29.6	3.2	0.0
<b>Stress recognition</b>						
When my workload becomes excessive, my performance is impaired.	5.6	8.8	10.4	30.4	44.0	0.8
I am less effective at work when fatigued.	2.4	11.2	10.4	34.4	41.6	0.0
I am more likely to make errors in tense or hostile situations	3.2	9.6	12.0	35.2	40.0	0.0
Fatigue impairs my performance during emergency situations (e.g. emergency resuscitation, seizure)	6.4	16.8	12.8	34.4	29.6	0.0
<b>Perception of management</b>						
Unit Management supports my daily efforts.	23.2	24.0	25.6	16.0	10.4	0.8
Hospital Management supports my daily efforts.	43.2	31.2	20.8	4.8	0.0	0.0
Unit Management doesn't knowingly compromise pt safety.	9.6	13.6	31.2	26.4	17.6	1.6
Hospital Management doesn't knowingly compromise pt safety.	9.6	14.4	36.0	27.2	12.0	0.8
Unit Management is doing a good job.	9.6	22.4	30.4	26.4	11.2	0.0
Hospital Management is doing a good job.	20.0	28.8	37.6	16.6	0.0	0.0
Problem personnel are dealt with constructively by our Unit Management.	12.0	19.2	32.0	28.0	8.8	0.0
Problem personnel are dealt with constructively by our Hospital Management.	25.6	28.8	33.6	9.6	0.8	0.8
I get adequate, timely info about events that might affect my work, from Unit Management.	11.2	20.0	23.2	28.0	17.6	0.0
I get adequate, timely info about events that might affect my work, from Hospital Management.	20.0	32.0	30.4	16.8	0.8	0.0
<b>Working condition</b>						
The levels of staffing in this clinical area are sufficient to handle the number of patients.	40.0	28.0	12.8	16.0	2.4	0.8
This hospital does a good job of training new personnel.	48.8	24.87	11.2	12.0	2.4	0.8
All the necessary information for diagnostic and therapeutic decisions is routinely available to me.	12.0	30.4	33.6	18.4	4.8	0.8
Trainees in my discipline are adequately supervised	16.0	20.8	27.2	26.4	8.0	0.8

Note: (--) Disagree strongly, (-) Disagree slightly, (-/+) Neutral (+) Agree slightly, (++) Agree strongly, (NA) No answer, blank answers.

### 3.1 Sociodemographic characteristics

#### 3.1.1. Gender

All domains showed better ratings among women, with the exception of the *Stress recognition* domain that was higher values in men. Furthermore, the *Stress recognition* domain obtained values, greater than 75, according to patient safety (77.08). No significant differences were found. The lowest values for both genders were recorded for *Working conditions* followed by *Perception of the management*.



**Figure 1:** Distribution of SAQ factors according to gender.

#### 3.1.2. Age

There was a negative trend for the dimensions of the SAQ that increases with age, showing lower values between 40-44 years of age, with the exception of the *Stress recognition* domain, which increases its value in that range (80.59). There were no existing significant differences between the domains in the age range 40-44 years, showing in this age range greater distance from averages. All domains improve at the end of the working life then, excluding *Working conditions* (35.42) and the *Perception of the management* (51.25), falling in most of the nurses older than 59 years old. Over the time, the differences in these two last factors were statistically significant ( $p = 0.014$ ,  $p = 0.020$ ).

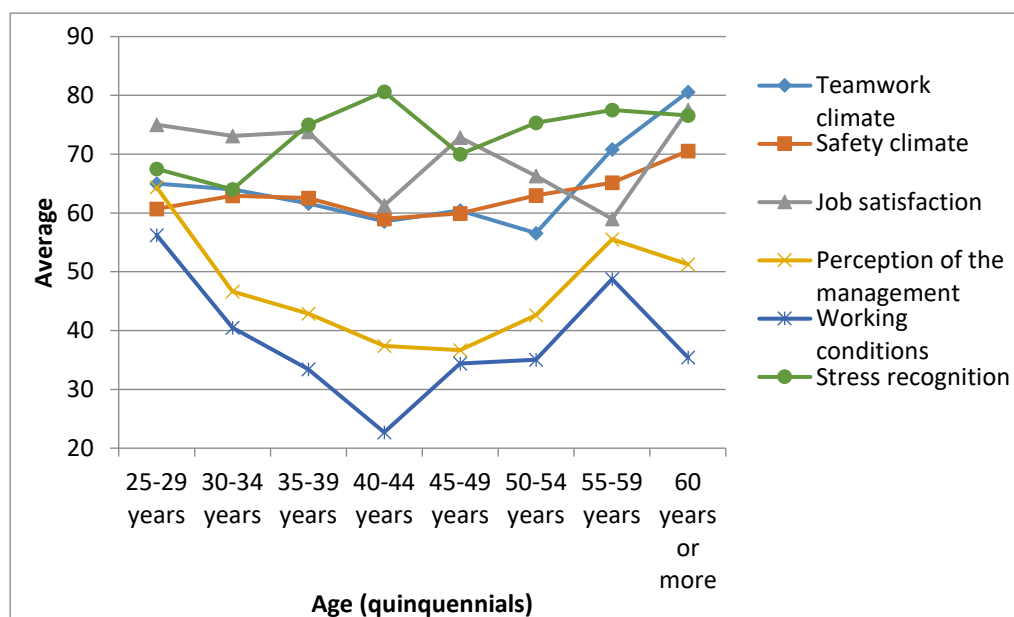


Figure 2: Distribution of SAQ factors according to age.

### 3.1.3. Educational level

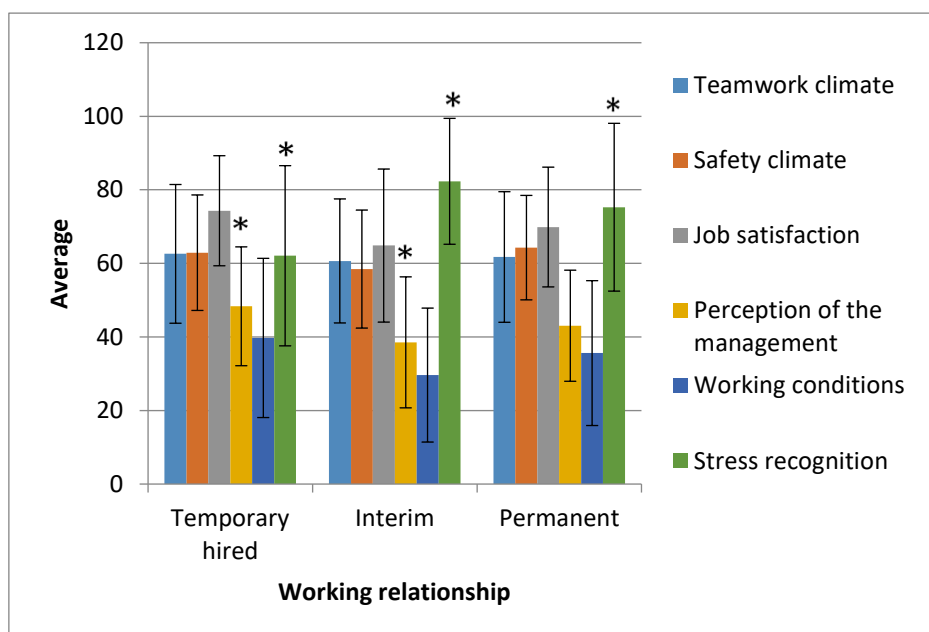
No statistical differences were found according to the educational level. It was observed that the higher the educational level, the lower the value of the domains. This result was observed for all the domains with the exception of *Stress recognition*, that showed values greater than 75 (78.13) in the master level.

## 3.2 Differentiation according to work-professional conditions

### 3.2.1. Working relationship

Temporary hired nurses showed an overall higher value on the domains, being the interim<sup>1</sup> contrast, the *Stress recognition* domain showed the highest values to interim nurses (82.32) and the lowest to temporary hired nurses (62.07). These differences were significant ( $p = 0.000$ ), as well as differences in the *Perception of the management* domain ( $p = 0.030$ ) between eventually hired and interim nurses. The *Job satisfaction* domain showed values of  $p$  close to 0.05 ( $p = 0.051$ ). Figure 3 shows significant differences (\*  $p < 0.05$ ).

<sup>1</sup>Note: Nurses working relationship in Spanish public hospitals consist in a range of nurses form by temporary hired nurse, interim nurse (*"enfermero interino"* in Spanish) and permanent nurse. Interim nurses have a working relationship indefinite in time and do not count with privileges of permanent nurses.



**Figure 3:** Distribution of SAQ factors according to working relationship.

### 3.2.2. Type of surgery

Differences in the score of the domains among nurses performing scheduled surgeries and urgent surgeries were not observed. The *Stress recognition* domain showed that nurses carrying out urgent surgeries had greater rating, according to patient safety (77.20), than those performing scheduled surgeries (69.01). The differences in *Stress recognition* among the types of surgery were not statistically significant, although values of  $p$  close to 0.05 were observed ( $p = 0.053$ ). When considering perception of the unit supervisor, nurses who perform surgeries scheduled showed best ratings (54.64) compared to those performing emergency surgeries (46.60), with significant differences ( $p = 0.048$ ).

### 3.2.3. Years of professional experience

Lower dimension values were observed for nurses with more years of experience. The 15-19 years of professional experience range showed the lowest values for all the domains. This finding was not observed for the *Stress recognition* (81.67) domain wherein values increased. The maximum value was registered in nurses with less than one professional year (100), although differences between domains were not statistically significant. All domains improved slightly during the rest of the working life, with the exception of the *Working conditions* (39.06) and the *Perception of the management* (50.50) domains, with lower perceptions values in nurses with more than 39 professional years. Differences during professional years were statistically significant for *Working conditions* ( $p = 0.003$ ) and *Perception of the management* ( $p = 0.001$ ), as well as for the overall value of SAQ ( $p = 0.004$ ).

Perceptions of the SAQ domains improve with years of experience in the surgical area, showing higher scores for nurses with more than 30 years of experience in the surgical area. All the domains showed similar values before 30 years of experience in the surgical area, with the exception of the *Working conditions* and *Stress recognition* domains which lower values between 10 and 19 years of experience. The differences were not significant regardless of the domain examined.



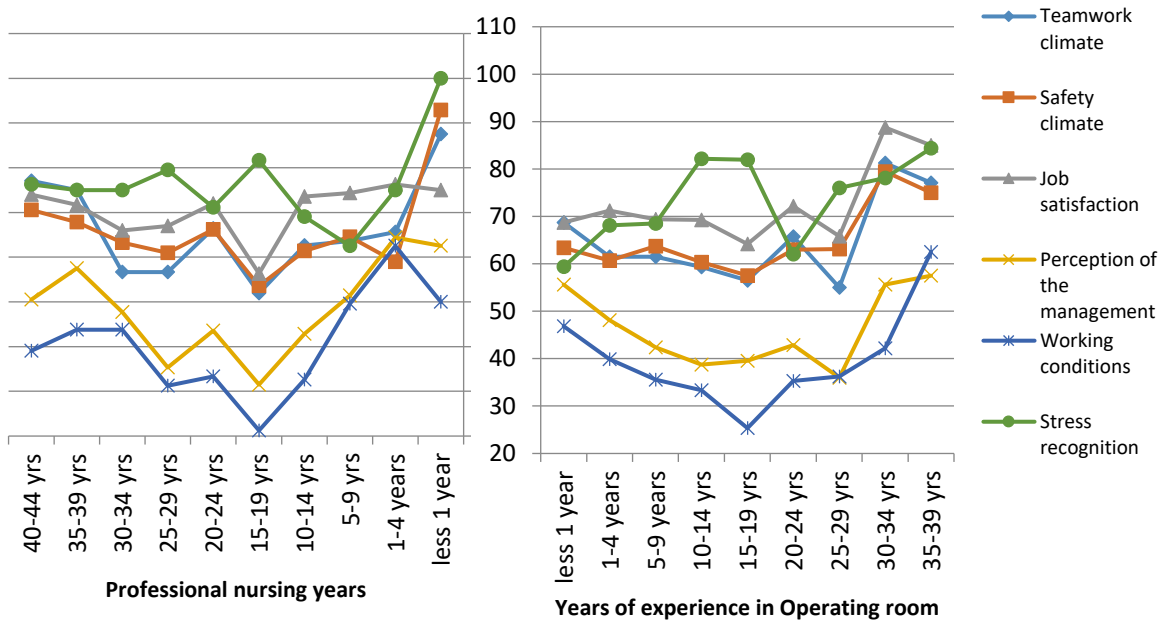


Figure 4: Distribution of SAQ factors according to years of professional nursing and years of experience

3.2.4. Differentiation according the hospital to study

Higher scores were obtained for the smaller hospitals while the larger hospital with a greater number of staffing surgical nurses showed lower scores. These differences were significant when examining the overall SAQ value ( $p = 0.027$ ) and in three domains: *Safety climate* ( $p = 0.002$ ), *Job satisfaction* ( $p = 0.042$ ) and *Teamwork climate* ( $p = 0.000$ ). Figure 5 presents the significant differences ( $*p < 0.05$ ).

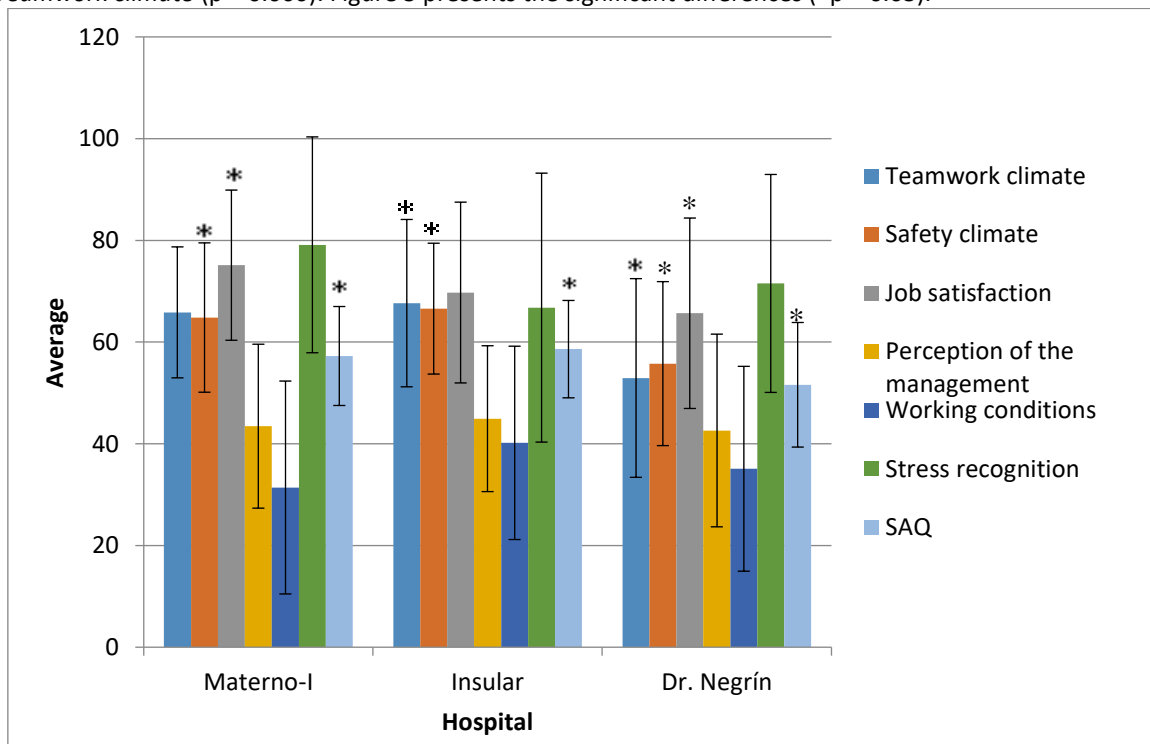


Figure 5: Distribution of SAQ factors by hospital.

#### 4. Discussion

Age, professional experience and operating room working experience variables showed direct correlation and similar trends. Nurses under the age of 30 (with less professional experience and less operating room working experience) and over 55 years old showed better perceptions. This phenomenon might be due to factors such as trust, inexperience, awareness of the risks and motivation that might be modified over their working life. The differences between nurses with different working relationship suggest the same phenomenon, since this is related to the professional years in the public health service. On the other hand, perceptions were greater among nurses in all domains, with the exception of the *Stress Recognition*. This result suggests some sensitivity of nurses about perceptions related to certain aspects of their work. Job satisfaction [21, 22] and estimations in burnout dimensions [23, 24] have also shown differences. All these data must be taken into account to set up more balanced and secure work. Based on the above assumptions, an analysis of safety climate of the surgical team must be done in a cautious way. Nurses are one of the largest groups of health professionals and it is possible to extrapolate some of their ratings. Nurses and doctors use the same psychometrics to evaluate *Job satisfaction* factor [25]. Instead, the same thing does not happen with other domains [26].

*Stress Recognition* items differ from those in other SAQ scales in where self-behavior is assessed. It does not measure frontline healthcare workers' understanding in a highly stressful environment could put them in adverse conditions that might result in harm to their patients, as the SAQ authors intended. *Stress Recognition* subscale does not fit into the overall safety climate construct measure by the SAQ and, therefore it is not reflective of safety climate. The *Stress Recognition* score must be assessed separately from the other SAQ domains. The workers fatigue and burnout are related with *Stress Recognition* score [27]. *Stress Recognition* values should be interpreted with caution in this study. Some values are described according to the patient's safety, which could indicate the opposite situation.

Working conditions and proper staffing were the dimensions worse evaluated in two studies about safety culture in Spain [10, 20]. Comparing the values obtained in the present study with the results described in the previous Spanish research, even lower results were shown. In addition, nurses perceived that staffing is insufficient in the present study (68%). Based on these considerations, Saturn warns of the risk of trivialising this fact in the year 2009, and the trend in Gutierrez article is confirmed [20]. Finally, a worsening in the results of the present study is observed.

Regarding to the *Perception of the management* domain, a poor evaluation among professionals was found. The results were in agreement with several hospitals in other countries, being the worst rating factor attributed to the lack of safety [9, 10, 16, 28]. The present study shows identical values in nurses that Gutierrez article in ICUs [20] and the Saturn study showed weaknesses in the support of the management of hospitals with respect to patient safety [10]. It has been described that managers show best estimations of safety climate in hospitals than their own employees [29], this could be due to the lack of communication and management strategies without taking into account the participation of the workers. Effective measures, like a better and fluid communication between workers and management has been associated with an improvement of the outcomes of patient safety in nurses [30]. Likewise, the management influence is striking about patient safety. The answers on the dimension "Support of the management of the hospital about patient safety" show high correlations and influence on the overall rating in the study of Saturn [10] in accordance with the results herein reported. Significant differences were found between one of the two hospitals of the same hospital complex, where management department is shared, and the largest hospital with different management.

Another relevant aspect in the *Perception of the Management* factor is the best assessment of unit supervisors towards nurses performing scheduled surgeries ( $p = 0.048$ ). This could be due to the coincidence of their schedules working hours, showing weak perceptions between the emergency teams who do not always share working hours with the supervisors. Supervisors of the surgical areas must take these perceptions into consideration, showing a closer relationship to nurses from emergency teams.

The variability of *Teamwork Climate* among hospitals was also found in another operating room safety climate study [31]. Perceptions of *Teamwork Climate* did not exceed values in relation with the patient safety of the hospitals studied. It has been associated institutions with low stages of *Teamwork climate* and safety climate with a higher rate of AE and work-related accidents in nurses [14]. Correlation exists between the increase of teamwork and a lower frequency of errors in surgery or to its elimination and correction [12]. It is obvious that the human factor and the teamwork climate have a great contribution to patient safety and also to the quality of the service. Managers cannot keep track of the *Teamwork climate* that is generated in their institutions, because they put at risk the sustainability of these. In this framework, programs that encourage an open communication in the organization, as well as organizational strategies that involve knowing networks and social structures at work are needed [32]. The completion rate depends on the institution [11], showing the large hospital the lowest values [33]. Strategies related to the use of the checklist, communication and teamwork, form a triad that improves surgical safety: teamwork improves the efficient use of the checklist, and this one improves the communication of the team, leading to the improvement of safety culture [11]. Further research is needed to assess these events and variables, since the association is even weaker due to the scarcity of studies.

In general, the results obtained by applying the SAQ were not in agreement with a safety climate in the surgical area. The average global scores in surgical clinical areas of the three public hospitals suggest deficiencies in aspects referring to patient safety and significant potential for improvement. The average grade of safety culture in Spanish hospitals, in the Saturn study, was 7, showing scores below 6 in 25% of cases [10]. According to these data, Canary hospitals, and therefore their surgical clinical areas, could be among the fourth part of the national health system hospitals with worse rating and at a greater risk.

The largest hospital obtained the worst values, similar findings were found in other studies done in mainland Spain about safety culture in hospitals [10] and a subsequent study about safety climate in ICUs, not existing anymore recent study. Teamwork is easier in smaller hospitals, managers and supervisors feel closed and it is perceived that the staff number is sufficient [20].

However, the smaller monograph maternity and children hospital showed the best value on the *Job satisfaction* domain (75.12), existing statistical significant differences in relation with the largest hospital ( $p = .042$ ). The characteristics of patients and processes differ in maternity and children hospitals and can be extrapolated to the valuations of the SAQ dimensions [21].

The most important limitation lies in the adaptation to the Spanish language of the SAQ questionnaire. Although a method for the translation of the questionnaire was used, this is quite simple according to the recommendations for a correct validation [34]. On the other hand, the sample is small in comparison with other studies with the SAQ tool [31].

The three hospitals are public Canarian Hospitals (Servicio Canario de Salud) and they are in the same area (Gran Canaria), therefore it is difficult to extrapolate the results when there is the same administrative unit for the three institutions under the organisational and functional unit of the hospital. The existence of a maternity and children hospital in the hospitals studied could also distort the comparisons of results with other general hospitals. Moreover, the study population was only formed by surgical nurses, offering a partial result of the surgical team safety climate.

## 5. Conclusions

Surgical nurses present different perceptions about patient safety according to sociodemographic characteristics and working conditions. Some characteristics present a strong relationship in the perceptions of certain SAQ domains. The age, years of profession and experience show variability in the Working conditions and Perception of the management domains. On the other hand, the characteristics of the hospital also have relation with nurses' safety perceptions. The type of hospital suggests greater influence in the Job satisfaction, Teamwork climate and Safety climate domains. The gender, educational level and type of surgery show trends in patient safety perceptions, but these are weak.

Nurses' perceptions of patient safety have multifactorial influences, which require further study. The study of these relationships will involve the creation of more efficient and safer work teams. In addition, the use of effective and validated tools for the analysis and evaluation of safety climate in the surgical area is required. The SAQ is shown as an effective tool for operating theatre and presents appropriate psychometric properties, the SAQ validation to the Spanish could meet these needs.

**Conflicts of Interest:** The authors declare that they have no competing interests.

## Abbreviations

SAQ: Safety Attitudes Questionnaire.

AE: accident or adverse events.

Yrs: years

## Appendix A

Safety Attitudes Questionnaire in Spanish version was used in this study:

1. Las aportaciones de los enfermeros son bien recibidas en el área quirúrgica.
2. En el área quirúrgica es difícil decir lo que pienso cuando detecto un problema en el cuidado del paciente.
3. Los desacuerdos en el área quirúrgica son resueltos de manera correcta (es decir, lo importante no es quien tiene razón, sino qué es lo mejor para el paciente).
4. El resto del personal me proporciona el apoyo que necesito para cuidar a los pacientes.
5. Es fácil para el personal realizar preguntas cuando hay dudas.
6. En el área quirúrgica los médicos y enfermeras trabajan juntos como un equipo bien coordinado.
7. Me sentiría seguro si fuese paciente en esta área quirúrgica.
8. Los errores médicos se manejan adecuadamente en el área quirúrgica.
9. Conozco los canales de comunicación adecuados para tratar cuestiones relacionadas con la seguridad del paciente en el área quirúrgica.
10. Recibo los comentarios adecuados sobre mi trabajo en el servicio.
11. Resulta difícil hablar los errores en este servicio.
12. Mis compañeros me animan a informar sobre cualquier preocupación que tenga sobre la seguridad del paciente.
13. La manera de trabajar en el área quirúrgica me permite aprender de los errores de los demás.
14. Si comunicase mis sugerencias sobre seguridad a la dirección serían puestas en práctica.
15. Me gusta mi trabajo.
16. Trabajar aquí es como formar parte de una gran familia.
17. Este es un buen lugar para trabajar.
18. Me siento orgulloso de trabajar en esta área quirúrgica.
19. El estado de ánimos del personal en el área quirúrgica es alto.
20. Cuando la carga de trabajo es excesiva afecta a la calidad de mis intervenciones.
21. El cansancio afecta a mi efectividad en el trabajo.
22. Es más probable que cometa errores en situaciones tensas o adversas.
23. El cansancio afecta mi rendimiento durante situaciones de emergencia (por ejemplo: RCP, convulsiones,...).
24. La dirección del servicio apoya mis esfuerzos diarios.
25. La gerencia del hospital apoya mis esfuerzos diarios.
26. La dirección del servicio no compromete deliberadamente la seguridad del paciente.
27. La gerencia del hospital no compromete deliberadamente la seguridad del paciente.
28. La dirección del servicio está haciendo un buen trabajo.
29. La gerencia del hospital está haciendo un buen trabajo.
30. Los problemas personales son tratados adecuadamente por la dirección del servicio.
31. Los problemas personales son tratados adecuadamente por la gerencia del hospital.
32. La dirección del servicio me informa adecuada y oportunamente sobre acontecimientos que podrían afectar a mi trabajo.
33. La gerencia del hospital me informa adecuada y oportunamente sobre acontecimientos que podrían afectar a mi trabajo.
34. La dotación de personal es suficiente en relación con el número de pacientes.
35. El hospital entrena el personal de nueva incorporación de manera eficiente.

36. Puedo acceder con facilidad y de forma sistemática a la información sobre decisiones diagnósticas y terapéuticas.
37. Los estudiantes de enfermería están correctamente supervisados.
38. Percibo que la colaboración con las enfermeras es buena en el área quirúrgica.
39. Percibo que la colaboración con los médicos es buena en el área quirúrgica.
40. Percibo que la colaboración con el servicio de farmacia es buena en el área quirúrgica.
41. Son frecuentes los problemas de comunicación que provocan retrasos en la prestación de cuidados.

## References

1. Weiser, Thomas G., et al. "An estimation of the global volume of surgery: a modelling strategy based on available data." *The Lancet* 372.9633 (2008): 139-144.
2. Colomer J, Arias J, Barturen F, García J, Gómez-Arnau J, González A, et al. *Bloque quirúrgico. Estándares y recomendaciones*. Madrid: Ministerio de Sanidad y Política Social; 2009.
3. Reyes Revuelta, J., and J. Bermúdez Mingorance. "Conceptos básicos sobre seguridad clínica. Definición e importancia del problema. *Rev. Enfer del Trabajo [en línea]* Nov 2011 1: 221-228.
4. Fernández, Rodrigo Gutiérrez, and Juan Fernández Martín. "La seguridad quirúrgica en el marco del Sistema Nacional de Salud de España." *Revista CONAMED* 15.4 (2016)
5. Vázquez-Frías, José Antonio, et al. "El error en la práctica médica.¿ Qué sabemos al respecto?." *Anales Médicos*. Vol. 56. No. 1. 2011.
6. Sorra J, Gray L, Stregale S, Famolaro T, Yount N, Behm J. *AHRQ Hospital Survey on Patient Safety Culture: User's Guide*. EEUU.: Agency for Healthcare Research and Quality; 2016.
7. Combalia A, Titus F. *Seguridad quirúrgica*. *Jano*. 2011:63-9.
8. Sexton JB, Thomas EJ, Helmreich RL. Error, stress, and teamwork in medicine and aviation: cross sectional surveys. *Bmj*. 2000;320(7237):745-9.
9. Sexton JB, Helmreich RL, Neilands TB, Rowan K, Vella K, Boyden J, et al. The Safety Attitudes Questionnaire: psychometric properties, benchmarking data, and emerging research. *BMC health services research*. 2006;6(1):44.
10. Saturno P, Terol E, Da Silva Z, De Oliveira S, De Souza A, Fonseca Y, et al. *Análisis de la Cultura sobre Seguridad del Paciente en el ámbito hospitalario del Sistema Nacional Español*. Madrid: Ministerio de Sanidad y Política Social; 2009.
11. OMS. *Manual de aplicación de la Lista OMS de verificación de la Seguridad de la Cirugía 2009*. La cirugía segura salva vidas. 2009.
12. Cabral R, Eggenberger T, Keller K, Gallison B, Newman D. Use of a surgical safety checklist to improve team communication. *AORN journal*. 2016;104(3):206-16.
13. Abualrub R, Gharaibeh H, Bashayreh A, editors. *The relationships between safety climate, teamwork, and intent to stay at work among Jordanian hospital nurses*. *Nursing forum*; 2012: Wiley Online Library.
14. Taylor JA, Dominici F, Agnew J, Gerwin D, Morlock L, Miller MR. Do nurse and patient injuries share common antecedents? An analysis of associations with safety climate and working conditions. *BMJ Qual Saf*. 2012;21(2):101-11.
15. Ministerio de Sanidad SSeI. *Revisión Sistemática de Eventos Adversos y Costes de la No Seguridad*. *Las Infecciones Asociadas a la Atención Sanitaria*. In: *Informes Eel*, editor. Madrid2015.
16. Carvalho R, Arruda L, Nascimento N, Sampaio R, Cavalcante M, Costa A. Assessment of the culture of safety in public hospitals in Brazil. *Revista latino-americana de enfermagem*. 2017;25:28-49.
17. Haerikens M, van Leeuwen W, Sexton JB, Pickkers P, van der Hoeven JG. Validation of the Dutch language version of the Safety Attitudes Questionnaire (SAQ-NL). *Bmc Health Services Research*. 2016;16:8.
18. Klemenc-Ketiš Z, Maletic M, Stropnik V, Deilkas ET, Hofoss D, Bondevik GT. The safety attitudes questionnaire - ambulatory version: psychometric properties of the Slovenian version for the out-of-hours primary care setting. *Bmc Health Services Research*. 2017;17:7.

19. Center for Healthcare Quality and Safety. Safety attitudes and safety climate questionnaire Texas (EEUU): The University of Texas at Austin; 2006 [Available from: <https://med.uth.edu/chqs/surveys/safety-attitudes-and-safety-climate-questionnaire/>].
20. Gutiérrez-Cía I, de Cos PM, Juan AY, Obón-Azuara B, Alonso-Ovies Á, Martín-Delgado MC, et al. Percepción de la cultura de seguridad en los servicios de medicina intensiva españoles. *Medicina Clínica*. 2010;135:37-44.
21. Pablos-González M, Cubo-Delgado S. Satisfacción laboral de las enfermeras de los Hospitales Públicos de Badajoz. *Medicina y Seguridad del Trabajo*. 2015;61(239):195-206.
22. Carrillo-García C, Martínez-Roche M-E, Gómez-García C-I, Meseguer-de-Pedro M. Satisfacción laboral de los profesionales sanitarios de un hospital universitario: análisis general y categorías laborales. *anales de psicología*. 2015;31(2):645-50.
23. Albendín L, Gómez J, Cañadas G, Cañadas G, San Luis C, Aguayo R. Prevalencia bayesiana y niveles de burnout en enfermería de urgencias. Una revisión sistemática. *Revista Latinoamericana de Psicología*. 2016;48(2):137-45.
24. Sánchez S. Prevalencia del síndrome de burnout en profesionales de enfermería de las unidades de cuidados críticos y urgencias del hospital médico-quirúrgico de Jéan. *Enfermería del Trabajo*. 2015;4(4):115-25.
25. Etchegaray JM, Sexton JB, Helmreich RL, Thomas EJ. Job satisfaction ratings: measurement equivalence across nurses and physicians. *Western journal of nursing research*. 2010;32(4):530-9.
26. Thomas EJ, Sexton JB, Helmreich RL. Discrepant attitudes about teamwork among critical care nurses and physicians. *Critical care medicine*. 2003;31(3):956-9.
27. Taylor JA, Pandian R. A dissonant scale: stress recognition in the SAQ. *BMC research notes*. 2013;6(1):302.
28. Schwendimann R, Zimmermann N, Küng K, Ausserhofer D, Sexton B. Variation in safety culture dimensions within and between US and Swiss Hospital Units: an exploratory study. *BMJ quality & safety*. 2012;bmjqs-2011-000446.
29. Singer SJ, Gaba D, Geppert J, Sinaiko A, Howard SKs, Park K. The culture of safety: results of an organization-wide survey in 15 California hospitals. *Quality and safety in health care*. 2003;12(2):112-8.
30. Thomas EJ, Sexton JB, Neilands TB, Frankel A, Helmreich RL. The effect of executive walk rounds on nurse safety climate attitudes: a randomized trial of clinical units. *BMC health services research*. 2005;5(1):28.
31. Sexton JB, Makary MA, Tersigni AR, Pryor D, Hendrich A, Thomas EJ, et al. Teamwork in the Operating Room. Frontline Perspectives among Hospitals and Operating Room Personnel. *The Journal of the American Society of Anesthesiologists*. 2006;105(5):877-84.
32. Marqués P, González ME, Agra Y, Vega J, Pinto A, Quiroga E. El análisis de las redes sociales: Un método para la mejora de la seguridad en las organizaciones sanitarias. *Revista Española de Salud Pública*. 2013;87(3):209-19.
33. Rodríguez F. Complimentación Checklist Quirúrgico. Las Palmas de Gran Canaria: Servicio de Calidad. Hospital Universitario de Gran Canaria Doctor Negrín; 2016.
34. Carvajal A, Centeno C, Watson R, Martínez M, Sanz Rubiales A, editors. ¿Cómo validar un instrumento de medida de la salud? *Anales del sistema sanitario de Navarra*; 2011: SciELO España.

