









## Professional experience and age as a contribution to the safety climate in the surgical center: a cross-sectional study

*Experiência profissional e idade como contributo do clima de segurança no centro cirúrgico: estudo transversal*

*Experiencia profesional y edad como aporte al clima de seguridad en el centro quirúrgico: estudio transversal*

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### ABSTRACT

**Objective:** to identify the association between length of professional experience and age with the safety climate domains of professionals in the surgical center. **Method:** this is a cross-sectional study conducted with 179 professionals from the multidisciplinary team of the university surgical center located in Rio de Janeiro, using the Safety Attitudes Questionnaire/Surgical Center. The association of variables was determined by the chi-squared test ( $p < 0.05$ ). **Results:** there is an association between length of experience and the safety climate domains of: "Perception of management" (p-value 0.039); "Perception of job performance" (p-value 0.014); and "Perception of stress" (p-value  $< 0.001$ ). An association for age is observed with "Perception of job performance" (p-value  $< 0.001$ ) and "Perception of stress" (p-value  $< 0.001$ ). **Conclusion:** it was observed that professional experience and age were associated with the safety climate, and so these variables can help surgical center managers to outline better strategies for allocating human resources in order to promote more effective and safe surgical care. **Descriptors:** Organizational Culture; Surgicenters; Patient Safety; Patient Care Team; Nursing.

### RESUMO

**Objetivo:** identificar a associação entre tempo de experiência profissional e idade com os domínios do clima de segurança dos profissionais do centro cirúrgico. **Método:** estudo transversal, realizado com 179 profissionais da equipe multiprofissional do centro cirúrgico universitário localizado no Rio de Janeiro, utilizando o Questionário de Atitudes de Segurança/Centro Cirúrgico. Associação das variáveis determinada pelo teste qui-quadrado ( $p < 0,05$ ). **Resultados:** evidencia-se associação do tempo de experiência com os domínios do clima de segurança "Percepção da gerência" (p-valor 0.039), "Percepção do desempenho profissional" (p-valor 0.014) e "Percepção do estresse" (p-valor  $< 0.001$ ). Para idade, observa-se associação com "Percepção do desempenho profissional" (p-valor  $< 0.001$ ) e "Percepção do estresse" (p-valor  $< 0.001$ ). **Conclusão:** observou-se que tempo de experiência profissional e idade obtiveram associação com o clima de segurança, assim essas variáveis podem auxiliar gestores do centro cirúrgico em traçarem melhores estratégias de alocação de recursos humanos, de modo a promover uma assistência cirúrgica mais efetiva e segura.

**Descritores:** Cultura Organizacional; Centros Cirúrgicos; Segurança do Paciente; Equipe de Assistência ao Paciente; Enfermagem.

### RESUMEN

**Objetivo:** identificar la asociación entre el tiempo de experiencia profesional y la edad con los dominios del clima de seguridad de los profesionales del centro quirúrgico. **Método:** estudio transversal realizado con 179 profesionales del equipo multiprofesional del centro quirúrgico universitario ubicado en Río de Janeiro, utilizando el Cuestionario de Actitudes de Seguridad/Centro Quirúrgico. La asociación de las variables se evaluó mediante la prueba de chi-cuadrado ( $p < 0,05$ ). **Resultados:** se evidenció asociación entre el tiempo de experiencia y los dominios del clima de seguridad: "Percepción de la gerencia" (p-valor 0,039), "Percepción del desempeño profesional" (p-valor 0,014) y "Percepción del estrés" (p-valor  $< 0,001$ ). Se observó una asociación de la edad con la "Percepción del desempeño profesional" (p-valor  $< 0,001$ ) y la "Percepción del estrés" (p-valor  $< 0,001$ ). **Conclusión:** tiempo de experiencia profesional y edad están asociados con clima de seguridad, sugiriendo que estas variables pueden ayudar a los gestores del centro quirúrgico a desarrollar estrategias más eficaces de asignación de recursos humanos, promoviendo una atención quirúrgica más efectiva y segura.

**Descriptores:** Cultura Organizacional; Centros Quirúrgicos; Seguridad del Paciente; Grupo de Atención al Paciente; Enfermería.

## INTRODUCTION

Patient safety is understood as a structure of organized activities that creates cultures, processes, and procedures that consistently and sustainably reduce risks, the likelihood of error, the occurrence of preventable harm, and/or its impact when it occurs<sup>1</sup>. In this sense, creating and promoting a strengthened patient safety

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climate is an important structural component of services which favors implementing safe practices and reducing adverse events.

The safety climate is assessed considering the professionals' perception of opinions, safety attitudes, and beliefs, constituting the measurable and integral part of the patient safety culture and an important tool for analyzing the organization's safety culture<sup>2</sup>. Therefore, this study uses the safety climate considering it to be the measurable factor of patient safety culture and capable of reproducing professionals' perceptions in their work scenario.

Thus, an assessment of the safety climate becomes essential because it favors recognizing strengths and weaknesses that will guide improvement actions. Furthermore, it is necessary to measure and analyze the safety climate based on the perception of health professionals, as this action can enable situational awareness, developing continuing education programs, implementing care protocols, monitoring adverse events and increased care quality, especially in specialized units, such as the surgical environment<sup>3</sup>.

Perioperative safety is part of a global concern, including the need for investment in education, research, management, qualified human resources and organizational culture to ensure perioperative safety<sup>4</sup>. The surgical center environment is considered a complex scenario and susceptible to failures and errors, since it involves working under pressure, multidisciplinary teams, use of technologies and invasive procedures<sup>5</sup>.

Undesirable events in the surgical center environment were among the ten most reported sentinel events in 2023. However, surgical safety is recognized as a global problem and is on the priority agenda of the 'Global Patient Safety Action Plan 2021–2030: Towards eliminating avoidable harm in healthcare' by the World Health Organization, which aims to reduce avoidable harm resulting from unsafe healthcare as much as possible worldwide<sup>6,7</sup>. Therefore, promoting patient care safety is a top priority in the perioperative environment, and to this end, a favorable safety climate can contribute to reducing sentinel events, deaths, post-surgical complications and preventable adverse events<sup>8</sup>.

The aim is to promote a patient safety climate worldwide, with an emphasis on learning, organizational improvement, professional experience in the specialty, multidisciplinary communication, involvement of professionals and patients in incident prevention, focus on safe systems, and avoiding individual blame processes<sup>9</sup>.

Studies show an association between professional experience and age with positive perceptions of patient safety climate<sup>10-12</sup>. By relating professional experience and age as drivers of a strengthened safety climate, managers are provided with a better strategy for allocating human resources, professional title, skills and personality traits, so that they can alleviate some pressures through team cooperation and communication<sup>10</sup>. The relationship between professional maturity and safety climate has proven to be a promising strategy for preventing adverse events, since the experience and knowledge acquired by more experienced professionals contribute to creating a safer surgical environment.

It is imperative to seek to promote a safety climate with an emphasis on professional experience, age, learning and organizational improvement<sup>11</sup>. It has been observed that the expertise acquired over the years leads workers to a more in-depth knowledge of the care process, which can prevent the occurrence of undesirable events<sup>10</sup>. In turn, this study was justified by the importance of assessing the safety climate, especially in a critical environment such as the surgical center, which requires support for evidence-based, safe and quality practice.

In view of the above, the objective of this study was to identify whether there is an association between length of professional experience and age of surgical center professionals with the safety climate domains.

## THEORETICAL FRAMEWORK

Patricia Benner developed the Novice to Expert Theory, "*From Novice to Expert: Excellence and Power in Nursing Practice*", in 1982. It has been reported that it was translated into 12 languages, and in 1984 it was considered by the American Journal of Nursing as the book of the year<sup>13</sup>.

It is known that Benner's theory is based on the individual's experience and education. In this context, it is relevant to reflect on associating professional experience with the safety climate domains of professionals in the surgical center. The theory from beginner to expert establishes that acquiring skills consists of five levels of proficiency, namely: beginner, advanced beginner, competent, proficient and expert<sup>13</sup>.

The progression from a beginner professional to an advanced beginner level is marked by a process of skill development and maturation of clinical judgment. While the beginner professional relies on detailed instructions and faces challenges in decision-making, the advanced beginner professional, although following established standards, demonstrates an ability to recognize patterns and variations in clinical cases. Practical experience is essential for this transition, allowing the professional to develop the autonomy necessary to deal with the complexity of real situations, always with the support and guidance of more experienced professionals<sup>13</sup>.

Professionals who are at the competent level demonstrate a high degree of proactivity, planning their actions consciously and deliberately. The ability to identify relevant aspects and efficiently organize tasks are striking characteristics of this stage. With acquired knowledge and accumulated experience, these professionals demonstrate the ability to deal with unexpected events and make assertive clinical decisions. Although time management and task organization are still priorities, the professional is attentive to anticipating problems and resolving complex situations. This level is generally reached after 2 to 3 years of professional practice<sup>13</sup>.

Proficient professionals demonstrate a holistic understanding of situations using perception and intuition to guide their actions. Learning at this stage occurs more autonomously, through inductive methods and case studies, which enables developing more sophisticated clinical reasoning. Compared to the previous level, there is a qualitative leap in the ability to analyze complex situations and make strategic decisions. Reaching this level occurs after an average of 3 to 5 years of practice in the same field of activity<sup>13</sup>.

The last level is expert. Expertise characterizes a professional who demonstrates deep understanding of their field of activity and the ability to apply this knowledge autonomously. The expert professional does not rely on rules; they perceive the situation as a whole and directly provide their care to the necessary point. They can foresee the problem and anticipate actions with great assertiveness. Sharp perception and accumulated experience allow these professionals to identify patterns, foresee problems and make complex decisions based on highly developed clinical reasoning using intuition, something explained in terms of brain processes and not logical reasoning<sup>13</sup>.

Professional experience and age can have a positive impact on the safety climate in the surgical center and reduce undesirable events. Patricia Benner's nursing theory (From Novice to Expert) establishes a theoretical support in which professional practice grows through experimental learning and transmitting what is learned in practical environments. The applicability of Benner's theory to the surgical context is indisputable, since the professional adheres to protocols and conducts in their essence upon reaching the last level of clinical proficiency, understanding their role as a facilitator in actions aimed at perioperative patient safety<sup>13</sup>.

## METHOD

This is a cross-sectional, descriptive and analytical study with a quantitative approach. The 'Strengthening the Reporting of Observational Studies in Epidemiology' (STROBE®)<sup>14</sup> support tool was used to ensure methodological rigor in developing this study.

The study was conducted in the surgical center of a university hospital located in the state of Rio de Janeiro, with 20 operating rooms, 1 of which was intended for hybrid and robotic surgery and 1 post-anesthesia recovery room with capacity to treat 12 patients simultaneously. The participants were healthcare professionals from the surgical center, consisting of the medical team (surgeons, anesthesiologists, surgery residents, and anesthesia residents), nursing team (nurses, nursing residents, and nursing technicians), and support staff (pharmacy and X-ray technicians). The inclusion criteria were: working in the surgical center for at least 30 days, with a minimum workload of 20 hours per week.

Data collection took place from July 2021 to July 2022. The long collection period was due to the difficulty of the researcher's insertion in the study field due to access limitations instituted by the hospital management and the study scenario as a consequence of the COVID-19 pandemic. In a global panorama, three waves of COVID-19 are evident. However, the research scenario established access limitations following the epidemiological incidence of the state of Rio de Janeiro, which was hit by five critical periods of COVID-19: April and May 2020; November 2020 to January 2021; February 2021 to June 2021; August 2021; December 2021 to January 2022<sup>15</sup>. Given the above, this data collection period was necessary to achieve a representative sample.

The study population consisted of a total of 206 professionals from the multidisciplinary team, including surgeons, anesthesiologists, nurses, nursing technicians, surgery residents, anesthesiology residents, and nursing residents. The sample size was calculated based on the total population (N=206) using the EpiInfo v5.5.9 application, achieving a

confidence level of 99.9% and sample loss of 0.1%, resulting in a minimum sample size of  $n=173$ . The sample was random and non-probabilistic, and it is worth noting that this investigation exceeded the minimum sample size, with the participation of 179 professionals.

The professionals were individually invited by the researcher in person at appropriate times to participate in the study during the morning and afternoon shifts. The researcher introduced herself and informed them about the study, the form and time of participation. Upon showing interest in participating, they received the informed consent form (ICF). After the participation agreement, the data collection instrument was delivered in paper format, and instructions were given on how to fill it out correctly. The researcher remained close to the participant during the time it was being filled out to answer any questions. The average time to fill it out was 10 minutes.

The Safety Attitudes Questionnaire/Surgical Center (SAQ/SC) was used for data collection. This is a specific instrument that assesses the safety culture in the surgical center through the perception of professionals, adapted and validated for the Brazilian reality<sup>17</sup>. This instrument enables analyzing the safety climate in the surgical center through the perception of professionals. The SAQ/SC is divided into three parts, answered using a Likert-type scale in the first two parts. In the first, the degrees of the scale are arranged as: "Very Bad", "Bad", "Adequate", "Good", "Very Good", "Not Applicable". The questions in this stage address the quality of communication and collaboration between professionals working in the SC, reflecting the relationship of participants with each professional category.

The second part consists of 40 questions related to patient safety, among which there are assertions written negatively on purpose. The scale grades are defined as: "Totally Disagree", "Partially Disagree", "Neutral", "Partially Agree", "Totally Agree" and "Not Applicable"; and an assertion asking whether the survey had already been answered at another time. Six domains are explored: Safety climate (seven items), Perception of management (five items), Perception of stress (four items), Working conditions (six items), Communication in the surgical environment (four items) and Perception of job performance (four items).

Sociodemographic information such as position, work regime, work shift, length of professional and unit experience, length of service at the institution, age, gender, race/ethnicity, and country of birth make up the third part of the instrument. A space with open responses is made available to participants at the end of the SAQ/SC so that they can suggest possible recommendations to improve patient safety in the surgical center.

Negative statements were reversed for data analysis, so that the answers filled in with "I completely disagree" became "I completely agree", and so on for all items. The items were subsequently grouped into domains and the score for each of them was calculated by calculating the sum average. The SAQ/SC questionnaire follows the five-point Likert scale, with scores distributed as follows: "Totally disagree" and "Not applicable" – 0 points, "Partially disagree" – 25 points, "Neutral" – 50 points, "Partially agree" – 75 points and "Totally agree" – 100 points. Blank items and "not applicable" were disregarded from the analysis, as were items with the same answer for all questions. The final score ranges from 0 to 100 points, where zero corresponds to the worst perception of safety culture, and 100 as the best perception. Positive values are considered when the total score is  $\geq 75$ .

The data were manually entered into a spreadsheet on the Microsoft Excel platform and then transferred to the statistical R version 4.2.1 software package. They were analyzed using descriptive and inferential statistics. The association of the variables of interest was determined using the chi-squared test and a significance level of  $p < 0.05$ . Pearson's correlation coefficient, a measure of the intensity and direction of linear relationships, was calculated to quantify the strength of association between the experience time and age variables with the safety climate domains and presented using scatter plots with a regression line using the ggplot2 package of the statistical R version 4.2.1 package.

This study is part of the research protocol "Safety culture in the university surgical center" by the researcher of the institution and has been approved by the Research Ethics Committee of the institution involved.

## RESULTS

The study included 179 health professionals from the surgical center with an average professional experience of 14 years, with a lower limit of less than one year and an upper limit of 44 years. The average age was 41 years, with a lower limit of 20 years and an upper limit of 71 years. The majority of participants were female ( $n=103$ ; 57.54%), and the predominant professional category was nursing, with a total of 105 professionals (58.66%), of which 20 were nurses (11.17%), 78 were nursing technicians (43.57%) and seven were nursing residents (3.91%). The nursing category was followed by the medical team with 58 professionals (32.40%), composed of 19 surgeons (10.61%), six anesthesiologists

(3.35%), 22 surgery residents (12.29%) and 11 anesthesiology residents (6.15%), in addition to 16 professionals who compose the support team (8.94%).

The results of the association analyses between the experience time and age variables with the safety climate domains in the surgical center are presented in Table 1.

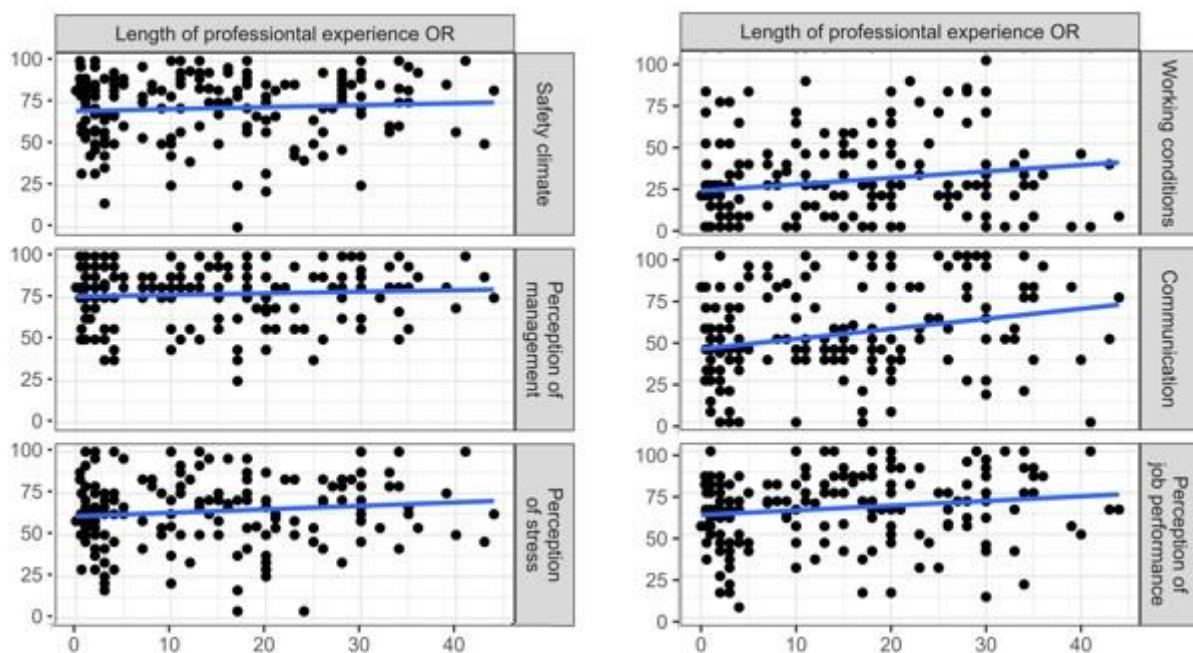
**Table 1:** Analysis of the association between the experience time and age variables with the safety climate domains in the surgical center. Rio de Janeiro, RJ, Brazil, 2022

Variables	Domains	CI* (95%)	X <sup>2</sup>	p-value
Experience time	Safety climate	-0.080 - 0.214	0.069	0.363
	Working conditions	-0.029 - 0.261	0.119	0.116
	Communication in the surgical environment	-0.085 - 0.209	0.064	0.401
	Perception of management	0.008 - 0.296	0.155	0.039
	Perception of job performance	0.037 - 0.322	0.184	0.014
	Perception of stress	0.118 - 0.393	0.261	<0.001
Age	Safety climate	-0.013 - 0.279	0.136	0.073
	Working conditions	-0.010 - 0.281	0.139	0.067
	Communication in the surgical environment	-0.164 - 0.132	-0.016	0.829
	Perception of management	-0.009 - 0.282	0.139	0.066
	Perception of job performance	0.108 - 0.387	0.253	<0.001
	Perception of stress	0.137 - 0.411	0.279	<0.001

**Note:** \*confidence interval

It is evident that there is an association between the length of experience in the specialization and the “Perception of management” ( $p=0.039$ ), “Perception of job performance” ( $p=0.014$ ) and “Perception of stress” ( $p<0.001$ ). In turn, the age variable was associated with the domains “Perception of job performance” ( $p<0.001$ ) and “Perception of stress” ( $p<0.001$ ) domains. Furthermore, these variables do not have a statistically significant relationship with the other domains.

Figure 1 shows the relationship between the length of experience, represented by the horizontal axis, and the perception of the safety domains, represented by the vertical axis.



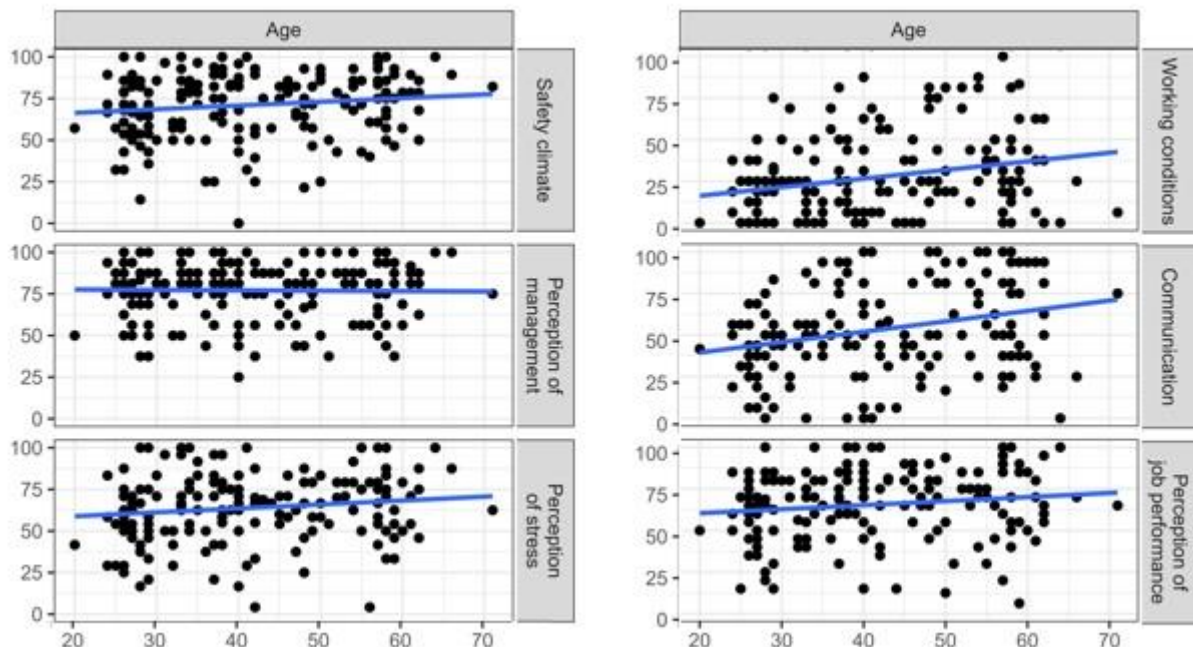
**Note:** Scatter plot with regression line using the ggplot2 package (R statistical package version 4.2.1)).

**Figure 1:** Relationship between time of experience and safety domains. Rio de Janeiro, RJ, Brazil, 2022.



It can be seen that the longer the experience, the more positive the perception of the domains.

Figure 2 shows the relationship between age, represented by the horizontal axis, and the perception of the safety domains, represented by the vertical axis.



**Legend:** Scatter plot with regression line using the ggplot2 package (R statistical package version 4.2.1).

**Figure 2:** Relationship between age and safety domains. Rio de Janeiro, RJ, Brazil, 2022.

It is observed that the perception of the domains becomes more positive as age increases, except in the domain 'Perception of management', where the perception remained stable, demonstrating that age does not interfere in this specific domain.

## DISCUSSION

The healthcare team with the highest prevalence was the nursing team (58.66%). It is evident that the nursing team is an active component and driver of improvements in perioperative patient safety<sup>17</sup>. The nursing professional is recognized as the main articulator and responsible for all phases of the perioperative period in the surgical environment<sup>18</sup>. Nursing is a professional category of extreme importance in healthcare, as it is seen as the profession which performs the most actions to improve patient safety in the surgical environment, in addition to being one of those responsible for managing care in the surgical environment<sup>19</sup>.

This study observed that as the length of professional experience in the specialization and age increases, there is a more positive perception for some of the safety climate domains. Thus, this study is in agreement with previous investigations in which greater work experience and advanced age were associated with safety attitudes in the surgical center<sup>10,20</sup>.

Perioperative safety is essential in providing care in the operating room, and therefore organizations need a more positive and proactive safety culture to avoid harm to the patient. A Canadian study shows that using experienced professionals is crucial to maintain specialized knowledge in emergency and critical care environments to ensure safe patient care<sup>21</sup>. Thus, the manager can keep more experienced professionals in the operating rooms as an active management action for positive maturation of the safety climate to better develop patient safety in the surgical environment<sup>10</sup>.

There was an association between the professionals' experience and age with the "Perception of stress" and "Perception of job performance" domains in the present study, indicating that the greater the professional experience and age, the more positive their perception. These domains assess the professionals' recognition of how much external factors affect their work, which involves the professional's ability to recognize and understand that fatigue and work overload have an impact on their work activities, and consequently on the safety of surgical patients<sup>22</sup>.

This result is in line with the scientific literature, which indicates that older professionals reported a lower level of stress compared to younger individuals<sup>10,23,24</sup>. In addition, years of career experience can promote greater resilience to deal with stress, which may be related to more positive professional performance<sup>25</sup>.

This study was conducted during the COVID-19 pandemic, in which professionals were subjected to a variety of stressors which can influence health and professional satisfaction<sup>23</sup>. Thus, the impact of stress is relevant, as the illness of health professionals can lead to a reduction in human resources, in addition to compromising the quality and resolution of the services offered<sup>20,25</sup>.

A Polish study found different results, in which less experienced professionals demonstrated a negative impact of stress on patient safety<sup>5</sup>. In fact, professional stress is an imperative element that negatively influences safety and efficiency at work. The surgical environment is characterized by high pressure and workload, which can be a factor that negatively impacts professionals, which in turn can negatively impact some outcomes such as increased infection or mortality rates among surgical patients<sup>2,26</sup>.

Therefore, the ability of professionals to recognize the factors that affect their actions favors quality in patient safety<sup>8,10</sup>. It can be inferred from the study that because more experienced professionals are more familiar with the standards and routines of the sector with emergencies in the surgical center, and have greater interpersonal interaction, they have a clearer perception of the factors that affect professional performance.

This result can contribute to practice and be used as a management tool, having experienced and inexperienced professionals interact with each other. Studies show the importance of integrating more experienced professionals with recent graduates, specifically highlighting nursing professionals, considering that they compose the professional team with the greatest representation in the surgical environment<sup>10,19</sup>.

A well-functioning multidisciplinary team is reported to be vital for the successful exchange of experiences, safety, comfort, work-life balance, support and guidance during the activities of less experienced professionals. These attitudes favor the perception of job performance and a positive perception of patient safety domains in the surgical center<sup>8,10</sup>. These results constitute indicators for the surgical center manager and can be used as a guide for planning and implementing actions with the objective of providing a safer work environment<sup>22</sup>.

The "Perception of management" domain only showed a correlation with the length of experience in the specialization. This domain is related to management actions in favor of safety and reflects the perception that professionals have of hospital and local administration, appropriate feedback on professional performance and satisfaction in working.

This data is similar to a study conducted in Japan which correlated nurses' perceptions of the safety climate with the quality of healthcare provided, suggesting that professionals with more experience have a greater perception of the quality of the services offered<sup>27</sup>. A study that compared the perception of nurses in a district surgical center and a university surgical center found that the most experienced professionals working in the unit had a more positive perception of management and job satisfaction<sup>10</sup>.

Higher job satisfaction levels were reported by nurses who had worked longer in a specific unit, which favors cohesion in teamwork, being a factor that has been valued as an important component of management perception because it has been associated with shorter surgical times, fewer surgical errors and interruptions, fewer communication failures, and fewer patient readmissions<sup>24,28</sup>.

The surgical center is one of the most complex sectors of a hospital organization, and managing it requires proactive leadership, quick thinking, prior knowledge, trust and ethics, visibility, communication and persuasive power, flexibility and resilience<sup>13,18</sup>. In addition, it is important that leaders are empathetic through their practices and provide support to team members according to their needs<sup>13</sup>.

Furthermore, it is worth highlighting that knowledge of safety climate perception in the surgical center is an important strategy for managing health services, since it is possible to seek improvements in care quality and in implementation of safety protocols for perioperative patients through this measurement<sup>9</sup>.

Developing the safety climate in hospital institutions should be understood as a subsidy and not as an obstacle, being used as a management tool for acquiring new habits and understanding safety attitudes, especially in highly specialized and complex sectors such as the surgical center<sup>23</sup>. Therefore, organizations must become responsible for making the safety climate part of the missions and core values of health services, being aware that a positive safety climate is essential to reduce harm to patients and ensure a safe work environment for health professionals, patients and family members<sup>29,30</sup>.

This study contributes to teaching, research and professional practice by providing evidence that can support human resource management strategies, and in turn stimulate reflection and identify factors which can influence safe, quality surgical care; this is especially true for the nursing team, which has greater representation in health and deals directly with care planning and implementation using their expertise acquired in risk assessment. Furthermore, identifying the most common failures and errors based on Patricia Benner's theory from Novice to Expert demonstrates that professional practice grows through experimental learning and transmission of what is learned in practical environments.

### Study limitations

Despite the importance of its findings, the study's limitations include the prolonged data collection period, which occurred due to the researcher's difficulty in entering the field of study due to the consequences of COVID-19. Thus, professionals' perceptions may be influenced by subsequent events and experiences. Therefore, the risk of recall bias must be considered. In addition, the study was restricted to only one surgical center, and it is not possible to extrapolate and generalize its results to other health institutions due to the regional heterogeneity of Brazil.

The southeast region, particularly the specific location of the study, has a work reality that is different from other regions, with unique characteristics which may directly influence professionals' perceptions of the safety climate in surgical centers. This regional diversity suggests the need for further research to understand how the safety climate in the surgical environment varies in different Brazilian contexts.

### CONCLUSION

It is concluded that the experience time in the specialization is associated with the safety climate domains "Perception of management", "Perception of job performance" and "Perception of stress" in the surgical center, while age is associated with the domains "Perception of job performance" and "Perception of stress".

Health professionals can benefit from the findings herein, and can use them to rethink their practices. This understanding, elucidated with Benner's nursing theory, provides managers with an assertive view to meet the needs of the surgical center that requires knowledge and skills in constant development. Therefore, professional experience becomes a consubstantial element for forming and maturing the safety climate in the surgical center.

### REFERENCES

1. Cabral JVB, Chaves JSC. Cuidado de enfermagem no pós-operatório de cirurgia cardíaca pediátrica: revisão integrativa. *Rev. Enf. Cont.* 2020 [cited 2024 Jan 12]; 9(1):118-26. DOI: <https://doi.org/10.17267/2317-3378rec.v9i1.2597>.
2. Zamora-Carmona F, Sianes-Gallén M, Costa-Ventura H, Del-Pino-Zurita C, Agudo-Arcos C, Augé-Ruiz A. Impact of the Pre-Surgical Nurse Visit on the Well-Being of the Patient Before a Surgical Process. *Clin Case Rep Int.* 2023 [cited 2024 Nov 15]; 7:1485. Available from: <https://www.clinicalcasereportsint.com/open-access/impact-of-the-pre-surgical-nurse-visit-on-the-well-being-of-9681.pdf>.
3. Precce ML, Moraes JMMM, Pacheco STA, Silva LF, Conceição DS, Rodrigues EC. Educational demands of family members of children with special health care needs in the transition from hospital to home. *Rev. Bras. Enf.* 2020 [cited 2024 Jan 13]; 73(Suppl. 4):e20190156. DOI: <https://doi.org/10.1590/0034-7167-2019-0156>.
4. Moreira LR, Souza JC, Oliveira MM, Melo NS, Cerqueira TF. Autocuidado com estomias: compreensão de pacientes hospitalizados acerca das orientações recebidas pela equipe. *Enf. Rev.* 2017 [cited 2024 Jan 18]; 20(2):116-34. Available from: <https://periodicos.pucminas.br/index.php/enfermagemrevista/article/view/16329>.
5. Lima MADS, Magalhaes AMM, Oelke ND, Marques GQ, Lorenzini E, Weber LAF, et al. Estratégias de transição de cuidados nos países latino-americanos: uma revisão integrativa. *Rev. Gaucha Enf.* 2018 [cited 2024 Jan 18]; 39:e20180119. DOI: <https://doi.org/10.1590/1983-1447.2018.20180119>.
6. Gentil LLS, Silva RM, Benavente SBT, Costa ALS. Educational manual for the care of patients in the post-operative period of myocardial revascularization: a tool for patients and families. *Rev. Eletr. Enf.* 2017 [cited 2024 Feb 10]; 19:a38. DOI: <https://doi.org/10.5216/ree.v19.43068>.
7. Elmore JG, Jekel JF, Katz DL. *Epidemiologia, Bioestatística e Medicina Preventiva*. 2. ed. Porto Alegre: Editora Artmed; 2005.
8. Donoso MTV, Aguiar FHS, Calhau GS, Sousa DPB, Casto e Silva RRC, Padovani FF. Pacientes em pós-operatório imediato: recepção na unidade clínico-cirúrgica. *Rev. enferm. UFPI.* 2023 [cited 2024 Feb 10]; 12:e3622. DOI: <https://doi.org/10.26694/reufpi.v12i1.3622>.
9. Santos Júnior CJ, Santos IV, Silva JVS, Gomes VM, Ribeiro MC. Perfil de pacientes atendidos por tentativa de suicídio em um Hospital Geral de Emergências do estado de Alagoas, Brasil. *Medicina (Ribeirão Preto)* 2019 [cited 2024 Feb 12]; 52(3):223-30. DOI: <https://doi.org/10.11606/issn.2176-7262.v52i3p223-230>.



10. Instituto Brasileiro de Geografia e Estatística (Br). Censo 2022. Panorama. 2023 [cited 2024 Feb 12]. Available from: [https://censo2022.ibge.gov.br/panorama/?utm\\_source=ibge&utm\\_medium=home&utm\\_campaign=portal](https://censo2022.ibge.gov.br/panorama/?utm_source=ibge&utm_medium=home&utm_campaign=portal).
11. Palmenira NC, Moro JP, Getulio FA, Vieira YP, Soares Junior AO, Saes MO. Analysis of access to health services in Brazil according to sociodemographic profile: National Health Survey, 2019. *Epidemiol. Serv Saude*. 2022 [cited 2024 Feb 23]; 31(3):e2022966. DOI: <https://doi.org/10.1590/S2237-96222022000300013>.
12. Souza MBCA, Lussi IAO. Juventude, trabalho informal e saúde mental. *Pol. Trab*. 2020 [cited 2024 Feb 23]; (51):126-44. DOI: <https://doi.org/10.22478/ufpb.1517-5901.0v51n0.48293>.
13. Cavalcante EGF, Galvão MTG, Lima ICV, Almeida PC. Strategies for notifying sexual partners of people with sexually transmitted infections: a randomized clinical trial. *Rev. Esc. Enferm. USP*. 2020 [cited 2024 Feb 23]; 54:e03648. DOI: <https://doi.org/10.1590/S1980-220X2019010103648>.
14. Eloia SM. Efeitos da prece sobre pacientes com doença renal crônica em hemodiálise: ensaio clínico randomizado [Dissertação de Mestrado]. Fortaleza: Universidade Federal do Ceará; 2019 [cited 2024 Feb 25]. Available from: <https://repositorio.ufc.br/handle/riufc/50053>.
15. Cousin E, Dumith SC. Epidemiologia das cirurgias traumato-ortopédicas em dois hospitais do extremo sul do Brasil. *Rev Baiana Saude Publica*. 2020 [cited 2024 Mar 02]; 44(4):240-54. DOI: <https://doi.org/10.22278/2318-2660.2020.v44.n4.a3060>.
16. Pereima ML, Feijó R, Camacho JG, Tramontin MP. Análise das cirurgias realizadas no hospital infantil Joana de Gusmão, antes e após a pandemia do novo Coronavírus. *Arq. Catarin. Med*. 2021 [cited 2024 Mar 02]; 50(1):68-80. Available from: <https://revista.acm.org.br/index.php/arquivos/article/view/934>.
17. Paz VP, Mantovani MD, Silva ÂT, Paes RG, Costa MC. Conhecimento e letramento em saúde no pós-operatório tardio de revascularização do miocárdio. *New Trends Qual. Res*. 2022 [cited 2024 Mar 02]; 13:e666. DOI: <https://doi.org/10.36367/ntqr.13.2022.e666>.
18. Mata LRF, Azevedo C, Bernardes MFVG, Chianca TCM, Pereira MG, Carvalho EC. Effectiveness of a home care teaching program for prostatectomized patients: a randomized controlled clinical trial. *Rev. Esc. Enferm. USP*. 2019 [cited 2024 Mar 10]; 53:e03421. DOI: <http://dx.doi.org/10.1590/S1980-220X2018012503421>.
19. Dalmolin A, Dallabrida GS, Gomes ES, Santos EB, Rossato GC, Girardon-Perlini NMO. Implementação de tecnologia educativa para alta hospitalar de paciente com estoma: relato de experiência. *Rev. Bras. Exten. Univ*. 2020 [cited 2024 Mar 10]; 11(3):389-96. DOI: <https://doi.org/10.36661/2358-0399.2020v11i3.11394>.
20. Sabino LMM, Ferreira AMV, Mendes ERR, Melo ESJ, Penha JC, Lima KF, et al. Educational interventions using a primer and motivational interviewing: randomized clinical trial. *Eur. J. Public Health*. 2021[cited 2024 Mar 10]; 31(5):985-90. DOI: <https://doi.org/10.1093/eurpub/ckab021>.
21. Oliveira SC, Vasconcelos EMR, Ximenes LB, Leal LP, Cavalcanti AMTS, Lopes MVO. Effect of an educational intervention on pregnancy: a cluster-randomized clinical trial. *Acta Paul. Enferm*. 2018 [cited 2024 Mar 15]; 31:291-8. DOI: <https://doi.org/10.1590/1982-0194201800041>.
22. Lima ACMACC, Pinho SME, Lima SAFCC, Chaves AFL, Vasconcelos CMT, Oriá MOB. Booklet for knowledge and prevention of HIV mother-to-child transmission: a pilot study of a randomized clinical trial. *Rev. Esc. Enferm. USP*. 2022 [cited 2024 Mar 15]; 56:e20210560. DOI: <https://doi.org/10.1590/1980-220X-REEUSP-2021-0560en>.
23. Freitas PS, Coradassi CE. Estratégia no monitoramento de pacientes suspeitos de Covid-19 em um município do sul do Brasil. *R. Saude Pub. Parana*. 2020 [cited 2024 Mar 15]; 3:(Suppl. 1):30-8. Available from: <https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1150857>.

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Conceptualization, C.S.F., R.A.F. and N.H.V.; methodology, C.S.F., R.A.F. and N.H.V.; formal analysis, C.S.F., O.M.P.L.R. and S.C.A.P.; investigation, R.A.F. and N.H.V.; resources, C.S.F., R.A.F. and N.H.V.; data curation, A.P.S.S.A. and S.C.A.P.; manuscript writing, C.S.F., R.A.F. and N.H.V.; writing – review and editing, C.S.F., R.A.F., A.P.S.S.A. and O.M.P.L.R.; visualization, C.S.F., R.A.F., N.H.V., A.P.S.S.A., O.M.P.L.R., S.C.A.P., F.G.C. and D.M.H.; supervision, C.S.F., F.G.C. and D.M.H.; project administration, C.S.F., R.A.F. and N.H.V.; acquisition of financing, C.S.F. All authors read and agreed with the published version of the manuscript.