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NURSING WORK ENVIRONMENTS DURING COVID-19: CONTRIBUTIONS TO DEVELOP A TECHNOLOGICAL TOOL

AMBIENTES DE TRABALHO DE ENFERMAGEM DURANTE A COVID-19: CONTRIBUIÇÕES PARA DESENVOLVER UMA FERRAMENTA TECNOLÓGICA

AMBIENTES DE TRABAJO DE ENFERMERÍA DURANTE COVID-19: CONTRIBUCIONES PARA DESARROLLAR UNA HERRAMIENTA TECNOLÓGICA

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Objective: to evaluate the impact of COVID-19 on nursing work environments and to develop a technological tool to assess systematically the qualification of these contexts. Method: mixed method research conducted in six Portuguese hospitals, with the participation of 442 nurses. The questionnaire used contained sociodemographic and professional characterization, which was the Scale for the Environments Evaluation of Professional Nursing Practice and open questions. Results: COVID-19 had a negative impact on the components Structure ($p<0,001$), Process ($p<0,001$) and Result ($p=0,009$) of nursing work environments. The monitoring of the quality of the work environments was pointed out as an improvement strategy. The technological tool developed allows identifying the most fragile dimensions early and prioritizing improvements. Conclusion: COVID-19 had a negative impact on work environments. The technological tool built, which made the evaluation of work environments more dynamic, in addition to ensuring the involvement of nurses, is an important management tool.

Descriptors: Workplace. COVID-19. Nursing. Hospitals. Biomedical Technology.

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Objetivo: avaliar o impacto da COVID-19 nos ambientes de trabalho de enfermagem e desenvolver uma ferramenta tecnológica para avaliar sistematicamente a qualificação desses contextos. Método: pesquisa de método misto realizada em seis hospitais portugueses, com participação de 442 enfermeiros. Utilizou-se um questionário com caracterização sociodemográfica e profissional, a Scale for the Environments Evaluation of Professional Nursing Practice e questões abertas. Resultados: a COVID-19 teve impacto negativo nos componentes Estrutura (p<0,001), Processo (p<0,001) e Resultado (p=0,009) dos ambientes de trabalho de enfermagem. A monitorização da qualidade dos ambientes de trabalho foi apontada como uma estratégia de melhoria. A ferramenta tecnológica desenvolvida permite identificar precocemente as dimensões mais fragilizadas e priorizar melhorias. Conclusão: a COVID-19 repercutiu negativamente nos ambientes de trabalho. A ferramenta tecnológica construída, que tornou mais dinâmica a avaliação dos ambientes de trabalho, além de garantir o envolvimento dos enfermeiros, constitui uma importante ferramenta de gestão.

Descritores: Ambiente de Trabalho. COVID-19. Enfermagem. Hospitais. Tecnologia Biomédica.

Objetivo: evaluar el impacto de COVID-19 en los entornos de trabajo de enfermería y desarrollar una herramienta tecnológica para evaluar sistemáticamente la calificación de estos contextos. Método: investigación de método mixto realizada en seis hospitales portugueses, con participación de 442 enfermeros. Se utilizó un cuestionario con caracterización sociodemográfica y profesional, la Scale for the Environments Evaluation of Professional Nursing Practice y cuestiones abiertas. Resultados: La COVID-19 tuvo impacto negativo en los componentes Estructura (p<0,001), Proceso (p<0,001) y Resultado (p=0,009) de los ambientes de trabajo de enfermería. La monitorización de la calidad de los entornos de trabajo fue apuntada como una estrategia de mejora. La herramienta tecnológica desarrollada permite identificar precozmente las dimensiones más fragilizadas y priorizar mejoras. Conclusión: COVID-19 tuvo un impacto negativo en los entornos de trabajo. La herramienta tecnológica construida, que hizo más dinámica la evaluación de los ambientes de trabajo, además de garantizar la participación de los enfermeros, constituye una importante herramienta de gestión.

Descriptores: Lugar de Trabajo. COVID-19. Enfermería. Hospitales. Tecnología Biomédica.

Introduction

In December 2019, an outbreak of pneumonia caused by a new coronavirus began in the city of Wuhan, China – SARS-CoV2. The rapid spread of the disease, which became known as COVID-19, led the World Health Organization (WHO) to designate, in March 2020, the state of pandemic[1]. In Portugal, the first case of COVID-19 was diagnosed on March 2, 2020. Until December 31, 2021, SARS-CoV2 infected 1,389,646 people and led to the death another 18.955[2].

The pandemic has subjected health institutions and professionals to a high workload and rapid adaptations[3], having intensified some problems that nurses already faced in the hospital context[4-5].

Even before the pandemic, research conducted focused on work environments and their impact on clients, institutions and nurses themselves[6]. Involvement in decision making, clear communication, opportunities for personal and professional growth, teamwork, interprofessional collaboration, as well as the authenticity and effectiveness of the leader were some of the qualities found in the literature in relation to work environments[4]. On the other hand, low remuneration, lack of support, lack of nurses, increased workload and ineffective responses by nurse managers had already been pointed out as the main negative factors[4,6] being the precariousness of work even better evidenced in the COVID-19 pandemic, influencing the mental health of nursing workers[7].

Thus, the existence of favorable working environments becomes even more emergent in the context of a pandemic, since, in addition to being responsible for most of the care provided to patients[8], nurses also have a fundamental role in in the construction of protocols, as well as in the development of strategies that guarantee patient safety[9].

The problem is that, both in the national and international context, throughout the pandemic nurses faced various adversities. The lack of nurses, the lack of clinical and non-clinical

consumables, the lack of training of teams to promote safe care[7,10] and the lack of opportunity for nurses to participate in the policies of institutions in relation to changes in workflows and contingency plans are among the most experienced difficulties[7-8,10-11]. Along with this, the conflict between the duty to care, the high risk of infection, the fear of becoming infected with COVID-19[12], the high workloads, the severity of the clinical condition and the death of many patients have triggered in nurses physical repercussions, but also mental, emotional and spiritual[7,12].

Moreover, nursing professionals do not always receive the support they need to minimize situations of anxiety, stress and depression, often related to physical and emotional exhaustion, professional insecurity and feelings of impotence[8]. In recent decades, burnout, dissatisfaction and disinterest in the nursing profession have become more evident, and COVID-19 has further amplified these problems. In this sense, strategies to improve work environments are a priority[4,13].

Tools that can assess the quality of work environments in the best way and as quickly as possible are urgent, as they allow early detection of situations that require investment. Thus, the objectives of this study were to evaluate the impact of COVID-19 on nursing work environments and to develop a technological tool to assess systematically the qualification of those contexts.

Method

This is a mixed method research of the incorporated type, focusing on the quantitative approach and incorporating qualitative data. In order to maintain methodological rigor, the Mixed Methods Appraisal Tool was used[14].

The study was conducted in six hospitals in Portugal, from different geographic regions. To define the sample, a non-probabilistic convenience sampling technique was used as inclusion criteria: to be a nurse or specialist nurse and to perform professional activity in services of the departments of medicine, surgery, intensive care and urgency and department of women and children. In the period of data collection, retired professionals were excluded. Thus, 442 nurses participated in the study.

As a data collection instrument, an online questionnaire was used, consisting of two parts. The first, with questions of sociodemographic and professional characterization, and the second part with the Scale for the Environments Evaluation of Professional Nursing Practice (SEE-Nursing Practice)[15], as well as an open question about the aspects that could improve working environments according to the nurses.

The SEE-Nursing Practice consists of three subscales: the SEE-Nursing Practice – Structure (with 43 items distributed in 6 dimensions), the SEE-Nursing Practice – Process (with 37 items distributed in 6 dimensions) and the SEE-Nursing Practice – Outcome (with 13 items distributed in two dimensions). The answer to each item is made on a Likert scale with five options, in which one corresponds to "never", two "rarely", three "sometimes", four "often" and five "always"[15].

Data collection was performed by completing the instrument online, by Google Forms. Regarding the items of the SEE-Nursing Practice[15], the response was requested for two distinct moments: pre-pandemic and current moment, which, in this study, occurred after the 4th critical period of the pandemic in Portugal. The critical period was considered when there was a higher number of patients hospitalized for COVID-19, with a subsequent decrease in the number of new cases and deaths[16]. Thus, data collection took place from August 15 to October 15, 2021.

For the treatment of quantitative data, using the Statistical Package for the Social Sciences (SPSS), version 27.0, descriptive and inferential statistics were used. In the analysis of the results related to nursing work environments, the following criteria were established: mean score <1.75 – component of the practice environment not favorable to the quality of care; between 1.75 and 2.75 – component of the practice environment moderately favorable to the quality of care; >2.75 to 3.75 – component of the

practice environment favorable to the quality of care; and >3.75 – component of the practice environment very favorable to the quality of care. At the beginning of the statistical analysis, using the Shapiro-Wilk and Lilliefors tests, normality for all dimensions and subscales was rejected. Consequently, for the variable "nursing work environments", the comparisons between the pre-pandemic moment and after the 4th critical period of COVID-19 were based on the Student's t-test for two paired samples. The significance level adopted was 0.05.

The qualitative data collected in the second part of the instrument were analyzed through thematic analysis[17], based on the Donabedian reference[18].

For the development of the technological tool, which includes the SEE-Nursing Practice, a website was created and the WordPress system was used, which is an easy to use interface, allowing constant updating of the contents. Before being used, the tool underwent a formal usability test by a group of 20 nurses (10 general care nurses and 10 specialist nurses), who assessed its relevance and ease of use.

The broader research project, implemented in several hospital institutions, was approved by the Research Ethics Committee of a Hospital Center in the North of Portugal with Opinion n. 104/21. Subsequently, in each hospital, the study was approved by the Research Ethics Committees and the respective Boards of Directors. The Informed Consent Form (ICF) was presented online, accompanied by a clarification page on the study. The completion of the questionnaire was only possible after the agreement of the nurse to participate in the research. Confidentiality and anonymity were guaranteed in the use and disclosure of the data obtained. All responses were coded using the initial letter of the word participant (P), followed by numerical order from 1 to 442.

Results

Regarding age, the participants' mean age was 41.3 years (standard deviation 9.5). They had professional exercise time in areas of assistance to patients with COVID-19, mean 9.2 months and standard deviation 5.5; professional exercise time, mean 18.4 years and standard deviation 9.8; professional exercise time in the current service, mean 9.9 years and standard deviation 8.2.

The study included 442 nurses, whose sociodemographic and professional characteristics are explained in Table 1.

Table 1 – Sociodemographic and professional characterization of the participants. Porto, Portugal, 2021. (N=442)

(continued)

Variable	n (%)
Sex	
Female	374 (84.6)
Male	68 (15.4)
Marital Status	
Single	109 (24.7)
Married or Stable Union	305 (69.0)
Divorced	26 (5.9)
Widow(ed)	2 (0.5)
Education	
Baccalaureate	4 (0.9)
Licentiate	345 (78.1)
MSc	92 (20.8)
PhD	1 (0.2)
Work context	
Medical Department	173 (39.1)
Surgical Department	96 (21.7)
Intensive Medical and Urgency Department	112 (25.3)
Women and Children Department	61 (13.8)

Table 1 – Sociodemographic and professional characterization of the participants. Porto, Portugal, 2021. (N=442)

(continued)

Variable	n (%)
Areas of assistance to COVID-19 patients	308 (69.7)
Condition of exercise of profession	
Nurse	258 (58.4)
Specialist Nurse	184 (41.6)

Source: Created by the authors.

Regarding work environments, the results are shown in Table 2.

Table 2 – Mean scores of components and dimensions of nursing work environments in the pre-COVID-19 moment and after the 4th critical period of COVID-19. Porto, Portugal, 2021. (N=442)

Components/ Dimensions of workplace	Pre-COVID-19	After 4th critical period of COVID-19	
	Mean (standard deviation0	Mean (standard deviation0	*p* values(1)
Structure Component			
Dimension 1 - People management and service leadership	3.5 (0.8)	3.4 (0.8)	<0.001
Dimension 2 - Physical environment and conditions for the operation of the service	3.3 (0.6)	3.1 (0.6)	<0.001
Dimension 3 - Participation and involvement of nurses in the policies, strategies and functioning of the institution	3.2 (0.7)	3.1 (0.7)	0.001
Dimension 4 - Institutional policy for professional qualification	2.9 (0.8)	2.8 (0.9)	0.021
Dimension 5 - Organization and orientation of nursing practice	3.5 (0.8)	3.4 (0.8)	0.113
Dimension 6 - Quality and safety of nursing care	3.8 (0.9)	3.6 (0.8)	0.003
Structure subscale	3.4 (0.6)	3.2 (0.7)	<0.001
Process Component			
Dimension 1 - Collaboration and teamwork	3.4 (0.6)	3.6 (0.6)	<0.001
Dimension 2 - Strategies for quality assurance in professional practice	3.4 (0.8)	3.3 (0.8)	<0.001
Dimension 3 - Autonomous practices in professional practice	3.8 (0.6)	3.7 (0.6)	<0.001
Dimension 4 - Planning, evaluation and continuity of care	3.8 (0.6)	3.7 (0.6)	<0.001
Dimension 5 - Theoretical and legal support of professional practice	3.9 (0.7)	3.8 (0.7)	<0.001
Dimension 6 - Interdependent practices in professional practice	3.2 (0.7)	3.4 (0.7)	<0.001
Process Subscale	3.6 (0.5)	3.5 (0.5)	<0.001
Outcome Component			
Dimension 1 - Systematic assessment of nursing care and indicators	3.2 (0.8)	3.1 (0.9)	0.004
Dimension 2 - Systematic evaluation of nurses' performance and supervision	2.5 (0.8)	2.6 (0.8)	0.141
Subscale Result	2.9 (0.8)	2.8 (0.8)	0.009

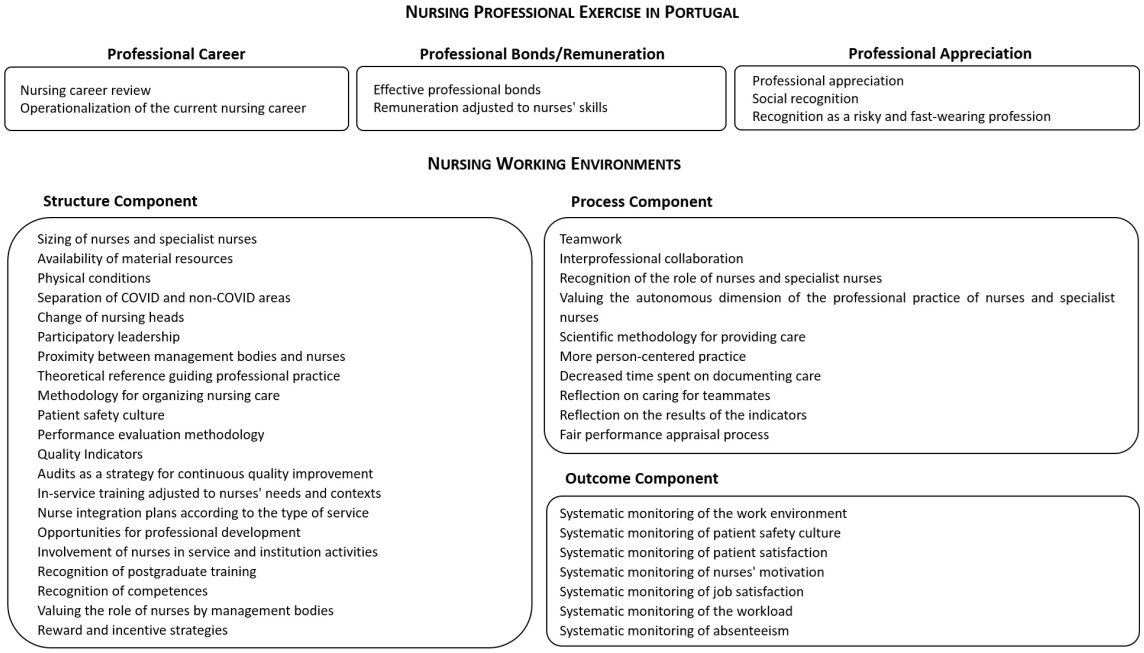
Source: Created by the authors.

(1) *Student's t Test* for two paired samples.

Concerning the Structure component, the impact was negative in all dimensions, and in both moments, the dimension with the lowest average was the "institutional policy for professional qualification". Regarding the Process, despite the positive impact on the dimensions "collaboration and teamwork" and "interdependent practices in the professional exercise", in all other dimensions, the average was lower after the 4th critical period of COVID-19. Finally, in the Outcome component, analyzing the overall score, the impact was also negative.

Following the analysis of the answers to the open question, two thematic areas emerged, "nursing professional practice in Portugal" and "nursing work environments" and three categories in each of them (Figure 1).

Figure 1 – Categories and subcategories in relation to aspects that would improve nursing work environments. Porto, Portugal, 2021



Source: Created by the authors.

In relation to the professional practice of nursing, aspects related to the need to review the professional career or at least operationalize the currently existing one emerged.

> *It's urgent a decent nursing career… or, at least, put the one existent into practice.* (P3).

The participants stressed the importance of the professional relationship and remuneration, as well as the necessary professional recognition.

> *More than ever, nurses deserve effective employment contracts* […] *not to mention the remuneration, which, given the nurses' skills, is far from fair.* (P59).

> *It's crucial to value nurses by top management* […] *and within the scope of the service, by the nurse manager, by peers and other professionals* […]. (P130).

> *Socially, only in situations like this, of a pandemic, are we recognized professionals.* (P7).

> *The pandemic has shown that our work is at risk* […] *it's time for them to take on the profession as one of rapid wear and tear.* (P16).

Regarding nursing work environments, in the category "structure component" aspects related to human and material resources and to the physical conditions themselves emerged.

> *It's emerging to increase the number of nurses and specialist nurses. The number of patients assigned to each nurse is very high.* (P76).

> *The material available isn't always enough to satisfy all needs.* (P81).

> *It was essential to create spaces for team meetings* […] *spaces for socializing/meals and rest for professionals. In addition, the physical space of the wards does not suit the needs and the excessive number of patients.* (P128).

> *We have been talking about the need to more rigorously separate the COVID area from the non-COVID area.* (P11).

From the participants' perspective, the solution to many of the structural problems lies in management.

> *The solution lies in changing the head nurse of the service*. (P302).
>
> *In the current context, at the very least, what is required is participatory leadership*. (P49).
>
> *Greater proximity between management bodies and nurses would greatly facilitate*. (P101).

Along with the existence of theoretical references guiding the professional practice, the methodology of care organization and safety culture are fundamental.

> *With one or more theoretical references guiding the practice, we would have the same common thread*. (P165).
>
> *It's important to rethink the working method used. Although theoretically it's the individual, in practice it seems more the task*. (P268).
>
> *Have a clearly defined patient safety culture*. (P81).

As strategies to improve the performance of professionals and, consequently, the care provided, it was mentioned the need for a methodology of performance evaluation, indicators, audits, in-service training and integration plans.

> *There is an urgent need for a fair performance assessment methodology that reveals the real performance of nurses and not based on criteria that no one understands*. (P110).
>
> *Have quality indicators* […] *and audits, as a quality improvement strategy*. (P151).
>
> *Training should be planned according to the context and needs of nurses* […] *the same training in all contexts and for all nurses, it makes no sense …* (P244).
>
> *With two weeks of integration, especially in the case of recent graduates, who do not have experience in the Intensive Care Unit* […] *the probability of making a mistake is high. The process of integrating new nurses should be more rigorous*. (P157).

Still within the "structure component", the findings reinforce the need to create conditions for professional development, as well as to value the training and skills of nurses.

> *The absence of opportunities for professional development causes demotivation*. (P21).
>
> *Involvement of nurses in service decisions and institution policies*. (P178).
>
> *Postgraduate training for nurses is an asset, but it is rarely valued*. (P91).
>
> *There is enormous difficulty in recognizing nurses' competences* […] (P78).
>
> *Usually, management bodies do not value the role of nurses*. (P121).
>
> *Reward and incentive strategies would promote greater engagement*. (P201).

In the "process component", aspects that would improve work environments included teamwork, interprofessional collaboration, as well as the recognition and appreciation of the role of nurses and their autonomy in professional practice.

> *The teamwork developed was one of the most positive aspects of the pandemic*. (P96).
>
> *The best would be to improve the collaboration within the multiprofissional team*. (P319).
>
> *If there were recognition of the role of nurses and specialist nurses, the care provided to patients would effectively be more adjusted to their condition*. (P301).
>
> *In some contexts, there is great concern with the interventions prescribed by other professionals* […] *during the pandemic, the autonomous area of professional practice was limited*. (P85).

The adoption of a scientific methodology in the provision of care, in addition to contributing to prioritize the person and not the disease, will promote the systematization of care and the necessary reduction of time for documentation.

> *The tendency not to comply with the phases of the nursing process needs to be rethought*. (P13).
>
> *Nurses should prioritize the person and not the person's illness*. (P74).
>
> *The time needed to document all care is too long* […] *the pandemic has demonstrated, once again, that this time has to be shorter*. (P168).

Reflection with colleagues on the care and results of indicators and performance evaluation emerged as other aspects to be considered in a perspective to improve work environments.

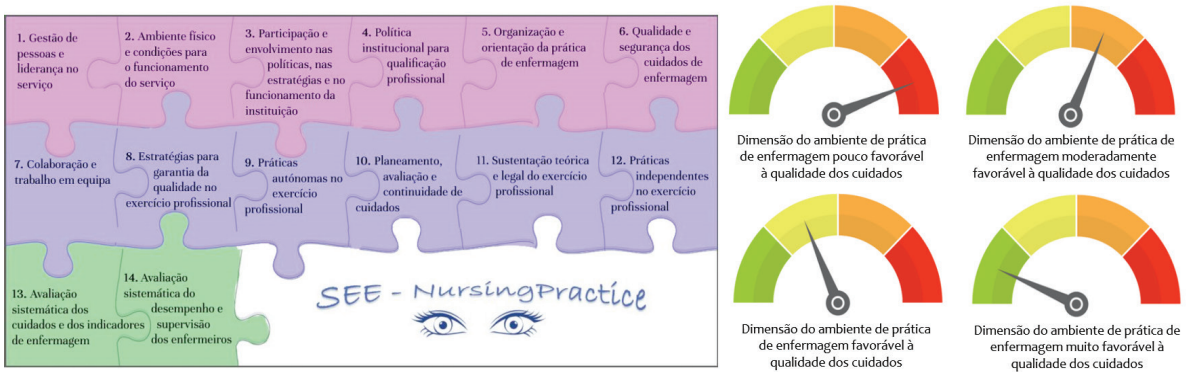
> *Doubts during the provision of care to patients with COVID-19 made reflection with colleagues more relevant*. (P401).
>
> *It's not enough to have indicators, it is necessary to reflect on their results*. (P415).
>
> *Performance appraisal must be a rigorous process*. (P77).

Finally, in the "outcome component" emerged seven subcategories, translators of indicators in relation to environments, patients and professionals.

> *Periodic assessment of the quality of work environments is crucial.* (P11).
>
> *Evolution is only perceived if there is monitoring of the patient safety culture.* (P32).
>
> *Patient satisfaction with the care provided is an excellent indicator of quality.* (P55).
>
> *Assessing nurses' motivation is crucial to adopt strategies that enhance it.* (P223).
>
> *Periodically, job satisfaction should be monitored. (P191).*
>
> *There is an idea that the workload is high, but the truth is that it is not monitored.* (P288).
>
> *Absenteeism has worsened in the pandemic... and there is no systematic monitoring of it.* (P111).

Based on the quantitative and qualitative results and considering relevant the adoption of strategies that allow evaluating and intervening in nursing work environments, a website was developed, registered in the Portuguese Software Association (ASSOFT) with number 2708/D/21. A WordPress system was used, a tool that allows responding to all items of SEE-Nursing Practice or only to items of SEE-Nursing Practice – Structure, SEE-Nursing Practice – Process and/or SEE-Nursing Practice – Outcome. In addition, the nurse can respond separately to the items of each of the 14 dimensions. After responding to the items of the dimensions and/or components, the nurse receives feedback regarding the level of qualification of their work environment online and free of charge. Figure 2 shows the graphic image of the tool created.

Figure 2 – Website "*Positive Professional Environments for Nursing*"



Source: Created by the authors.

Discussion

According to the professional association that regulates the nursing profession in Portugal - *Ordem dos Enfermeiros* –, in December 2020, 82.3% of the nurses who worked in the country were women and 17.7%, men[19], which is consistent with the characterization of the participants in this study. The predominance of licentiate degrees and specializations in medical-surgical nursing and rehabilitation nursing also reflects national data[19].

Regarding nursing work environments, the three components remain favorable to the quality of care. After the 4th critical period of COVID-19, in the Structure component, the "physical environment and conditions for the functioning of the service", the "participation and involvement of nurses in the policies, strategies and functioning of the institution" and the "institutional policy for professional qualification" are the dimensions with lower average. These results are consistent with the qualitative findings, among which nurses reiterate that the better dimensioning of nurses and specialist

nurses, the availability of material resources, the involvement of nurses in the activities of the service and the institution, as well as in-service training adjusted to the needs of nurses and contexts, constitute strategies that could improve work environments. In a pandemic context, the need for rigor in the separation of COVID and non-COVID areas, pointed out by nurses, was also mentioned by other authors[9,20].

In studies conducted during COVID-19[7-8], nurses also indicated little participation in discussions and in the definition of strategies to be adopted by the institution in coping with the pandemic. Although in the first months of COVID-19 the requirement to respond quickly to challenges could have contributed to the centralization of decision-making[8], the involvement of nurses in the activities of the service and the institution is crucial[13]. Authors confirmed that commitment to the organization was a central indicator of intention to remain in nursing[21], reinforcing the importance of creating opportunities and investing in the involvement of nurses with the organization. This is even more relevant in a pandemic context, when institutions have problems with nurse retention[21].

The qualification of professionals is another aspect that requires investment, because training for the care of patients with COVID-19, in addition to enhancing the training to care, helps nurses to deal with the fear of COVID-19, which can improve work results, with greater job satisfaction, decreased stress and less intention to leave the organization and the profession[12]. Despite the commitment of professionals in the acquisition of knowledge, in the face of national guidelines and daily international guidelines, as well as physical and emotional wear, it is not always easy to keep up with the new scientific evidence[11]. This study reinforces the need for the management bodies of the institutions to be attentive to the training and training needs of professionals, providing rapid responses to these demands[13].

The adoption of a methodology for the organization of nursing care and the definition of an effective safety culture were other aspects punctuated by nurses as promoters of positive work environments. Working in complex and stressful environments can increase the occurrence of failures and errors, hence the safety of patients and professionals, especially in a pandemic context, should be a priority of institutions[22].

Also in the Structure component, the recognition and appreciation of postgraduate training and nursing skills and the existence of reward and incentive strategies were other possibilities for improvement mentioned by the participants.

An aspect that in the qualitative findings acquired special focus refers to the need to change the nursing leadership. The difficulty of leaders in valuing and dealing with the feelings of the nursing professionals of the team often leads to their failure[23], which is why they must find ways to encourage, recognize, reward and support the team. Discovering the interests and expectations of nursing professionals under their supervision helps the nurse manager to identify strengths and find ways to maximize them[4].

Although nurse managers cannot radically change the work context, based on magnetic values[13], they play a key role in creating safe and healthy environments in which all nursing professionals can give their best, be productive and prosper[4].

Along with strong leadership and shared decision-making[13], nurse managers can help staff nursing professionals gain control over work, ensuring proper integration and guidance, continuous training and promoting an environment in which questions, requests for help and reports of critical events can be encouraged[4].

The need to have integration plans for new nurses, according to the type of service, was pointed out by the participants of this study, especially by those who worked in the department of intensive care and urgency, which, in Portugal, are the contexts that needed more recruitment of nurses since the beginning of the pandemic. This reinforces the contribution of the nurse manager, not only in ensuring the material and human resources necessary for

the organization of services and the provision of care[9], but also in supporting professionals, who, in the context of a pandemic, experience unprecedented situations of overload, with potential repercussions on their health and well-being, as well as on their performance[3,7,12-13].

In the Process component, in the dimensions of "collaboration and teamwork" and "interdependent practices in the professional exercise", the average score was higher after the 4th critical period of COVID-19. In studies conducted during the pandemic, teamwork and collaborative practice among professionals were also positively evaluated by nurses[8].

During the pandemic crisis, given the high workload and worsening of the clinical condition of many patients, nurses felt the need to prioritize the implementation of interdependent interventions, which often contributed to the stabilization of the clinical condition of patients. However, in the context of the qualitative findings, the participants recognized the need to value the autonomous dimension of professional practice, to adopt the scientific methodology for the provision of care and a more person-centered practice. In a study[24] conducted in the hospital context before the pandemic, Portuguese nursing, although with different between hospitals, lived a transition phase between a practice still quite inspired by the biomedical model and a practice in which it was notorious the integration of the theoretical references of the nursing discipline, in a clear appreciation for the autonomous dimension of the profession. The problem is that the worsening demands, the severity of the clinical condition and the death of many patients, as well as the significant increase in the workload have prevented nursing professionals to respond to all patients' needs.

Given the many difficulties they face, reflection on care and the results of indicators are aspects that can also improve working environments, which has already been mentioned by authors as paramount for quality and safety in health institutions[13].

Regarding the Result component, in the dimension "systematic evaluation of nurses' performance and supervision" a lower mean score was confirmed. Previously, in the Structure and Process components, the performance evaluation had emerged as a concern of nurses. The truth is that these professionals, in addition to not seeing recognized and valued their performance, are faced with the existence of criteria little or nothing clear. A study conducted in 2021 confirmed that the most relevant aspects for professional satisfaction are related to personal achievement and the perception of having provided quality assistance[25], which makes even more significant the appreciation of the real performance of nurses.

Still in the Outcome component, the need to monitor the results in relation to patients, nurses and institution was one of the main because the aspects highlighted by the participants are strong indicators of the success of the strategies implemented in response to the challenges imposed by the pandemic[13].

Along with the findings regarding work environments, nurses stated as other improvement strategies aspects related to career, remuneration and recognition of the profession. Although, in Portugal, these aspects do not depend directly on institutions, but rather on political and regulatory decisions, the fact that they are problems that have dragged on for several years, acquires a special overloads and unprecedented challenges. In addition to the negative implications, the pandemic has shown the world what nurses do, giving evidence to governments, and in this particular case, to the Portuguese government, that their claims in recent years, strongly related to low wages and under sizing, were and are more than fair[5].

Given the speed of events and changes required by the pandemic[3], the existence of a technological tool available to professionals will allow quickly determining the perception of nurses about the work environments, decision-making in relation to improvement strategies. In these contexts, the early implementation of strategies, in addition to improving work environments, can minimize the emotional or cognitive-behavioral repercussions on nurses,

fundamental in the continuity of the response to the pandemic. In addition, technology can represent an ally for maintaining continuity and greater ownership of the work environment evaluation process.

The findings indicate aspects of the Structure, Process and Outcome components that were affected by the pandemic and contribute to giving light to problems present in the work environment of Portuguese hospital nurses and, potentially, other countries and scenarios. It brings intervening results of the quality of services, with interfaces in the safety of users and professionals. It also culminated in the development of a tool that allows immediate feedback to nursing professionals and managers on the dimensions and/ or components of the work environments, allowing a faster and more effective resolution of the most fragile aspects.

Despite the relevance of the results, this study has some limitations. First, the fact that the sampling technique was non-probabilistic for convenience. Secondly, data collection through online questionnaire completion, since this was the only possibility, in a pandemic context, to have the participation of nurses from different regions of the country. However, this data collection strategy hindered for more nurses to adhere. Nevertheless, it is important to bear in mind that, despite these limitations, the results of this study contribute to research and, essentially, to the improvement of nurses' working conditions.

Conclusion

This research evidenced that the COVID-19 pandemic had a negative impact on nursing work environments. The dimensions that received the lowest scores were: the physical environment and the conditions for the functioning of the service; the participation and involvement of nurses in the policies, strategies and functioning of the institution; institutional policy for professional qualification; the systematic evaluation of indicators and performance; and the supervision of nurses. Thus, the data warn of the need for institutional measures to start in those aspects.

The identified gaps will allow the managers of the institutions to develop policies that, in addition to improving work environments, promote the improvement of the quality of care, as well as facilitate the planning and management of the pandemic.

The combination of quantitative and qualitative data revealed convergence in the findings and allowed deepening the evaluation of nursing work environments, as well as to nourish the urgent development of a technology for this purpose. The technological tool built, besides being an innovative strategy, is an important management tool.

Collaborations:

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2 – analysis and interpretation of data: Olga Maria Pimenta Lopes Ribeiro, Letícia de Lima Trindade, Clemente Neves Sousa and Ana da Conceição Alves Faria;

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