RESTRUCTURING THE WORK IN THE OPERATING ROOM WITH THE COVID-19 PANDEMIC

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The coronavirus (Covid-19) pandemic was declared by the World Health Organization (WHO[1], and the government established measures of prevention and control of the disease, recommending the temporary cancellation of elective surgeries. Except for emergency and urgent surgeries, whose indications remained the same, a large number of surgeries was postponed all over the country.

The health systems (HS) around the world are being as challenged as they possibly can be. After the first wave of this pandemic, the volume of patients who require surgical treatment is critical, and hospitals and health professionals must be prepared to meet this demand[2]. Again, there will be a risk of collapse in the HS due the convergence of postponed treatments and new patients affected by Covid-19.

In global terms, the strict adherence to government health care protocols aims at promoting the return of surgical activities with a certain level of normality, especially aiming at reducing socioeconomic costs. The application and use of this set of actions should be adapted according to the determinations of the government, local resources and locoregional epidemiological data regarding the disease load and presence[3].

The revenues of private hospitals presented significant reduction in 2020, according to data from the National Association of Private Hospitals, which indicate that the reduction in the first four months of 2020, in comparison to the same period in 2019, was of 26%, related to the variable expenses and the maintenance of fixed expenses[4].

Due to the postponement of surgeries, the number of complications increased[5,6]. In April and May, 2020, some orientations were published for the gradual return of elective surgical procedures, based on safety protocols and exclusive and segregated flows in the health unit, named Covid Free flow.

The challenge was to guarantee that the patient would leave the isolation, come to the hospital for the surgery and return safely, without being contaminated. Some measures were taken, such as: exclusive and isolated beds for hospitalization and intensive care, exclusive elevators, reinforced hygiene in the rooms, testing of the patient using the nasal swab method (PCR SARS-CoV2) 48 to 72 hours before the procedure, application of a specific consent term, direct hospitalization (without passing by the reception), temperature check and questionnaire about symptoms in the last 24 hours for all collaborators, physicians and third parties that have access to the hospital; no visitors, use of a disposable surgical mask by the patient, use of a N95 mask by the staff involved in the surgery, use of filter in videolaparoscopic surgeries due to risk of dispersion of carbon dioxide from aerosols used in the pneumoperitoneum[7,8].

Other challenges came up, such as the high demand of laboratories to perform the PCR, causing delay in the results and postponement of procedures, increased absence of collaborators due to external contamination, regression in a phase of the State plan, with new restrictions and isolation measures, causing fear and insecurity in patients about going to the hospital.

The vaccine arrived and gave hope and expectations of returning to the normal activities.

Vaccines for the immunization against SARS-CoV-2 play an essential role towards a new moment, one of more security and progression of activities for the economic scenario. But despite this perspective, elective surgeries may gradually return to the normal numbers of the pre-pandemic reality.

Besides the predefined flows in the preoperative evaluation phase, such as RT-PCR tests, when the vaccination calendar began in the country, the evaluation about possible side effects after the application of the immunization should also be contemplated.

Considering the vaccines, it is essential to systematize the preoperative flows to verify the administration of doses corresponding to each vaccine, which is the period when it is possible to identify adverse effects, as well as the time of immunization after the administration of complementary doses.

Each individual presents specificities regarding reactions to the vaccine, depending on factors such as age and immune status. Generally, after the administration of the second dose, immunization begins in 14 days, since this is the time period our system requires to create neutralizing antibodies, which block the entrance of the virus in the cells[9].

The indicator of absenteeism in the nursing staff is a highly relevant data for any health organization, both for the analyses of causes and effects that impact health care. A study from 2019 showed that the average absence in Brazilian companies ranges from 3 to 4%, and these rates are acceptable in a work place.

In the country, considering the Covid-19 pandemic, the number of nursing professionals who are absent from work is still not possible to measure. Health services are challenged to work with shifts in order to meet the patients' needs, even with the increasing absence rates. Besides the contamination with Sars-CoV-2, there is also the impact from the burnout syndrome, the stress caused by governmental and institutional policies, as well as the conducts of society concerning preventive measures against the virus, the ethical dilemma to execute procedures, anxiety and depression disorders, increased self-medication, tiredness, insecurity and fear of contaminating relatives[10].

Finally, it is a major challenge for the organizations to be sustainable, to maintain their perpetuity, so that costs can be covered by the revenues, and still maintain a competitive model with qualified care and safety for patients and collaborators.

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EVALUATION OF PSYCHOSOCIAL RISKS IN THE CENTRAL STERILE SUPPLY DEPARTMENT OF NORTHERN BRAZIL

Avaliação dos riscos psicossociais no centro de material e esterilização do norte do Brasil

Evaluación de riesgos psicosociales en el centro de material y esterilización del norte de Brasil

Valéria Moreira da Silva[1]*, Janne Cavalcante Monteiro[2], Priscilla Perez da Silva Pereira[3], Daniela Oliveira Pontes[4], Ana Laura Salomão Pereira Fernandes[5]

ABSTRACT: Objective: To analyze the level of psychosocial risks of workers at the Central Sterile Supply Department of a large hospital in Rondônia. **Method:** Cross-sectional study, including assistants, nursing technicians, and nurses, using the Copenhagen Psychosocial Questionnaire. Descriptive analyses were performed using the Stata® statistical package, version 11. **Results:** 35 workers took part in the study, most of them women, aged over 40 years old, and nursing technicians. Of the six dimensions assessed, four had a medium risk. The dimension of justice and respect presented a high psychosocial risk, and the dimension of work organization and content, low risk. **Conclusion:** The workers considered their work important and significant, but they experienced a high psychosocial risk with regard to the demand for attention and emotional demand of the activities carried out in the unit. Few were satisfied with the work, the environment, and the use of individual skills by the service. Information about psychosocial relationships is an important indicator for analyzing work situations, generating information that supports safe interventions in the work process.

Keywords: Psychosocial impact. Nursing, team. Sterilization.

RESUMO: Objetivo: Analisar o nível de riscos psicossociais dos trabalhadores do Centro de Material e Esterilização de um hospital de grande porte de Rondônia. **Método:** Estudo transversal, incluindo auxiliares, técnicos de enfermagem e enfermeiros, utilizando o questionário *Copenhagen Psychosocial Questionnaire*. As análises descritivas foram realizadas no pacote estatístico Stata® versão 11. **Resultados:** Participaram 35 trabalhadores, sendo a maioria mulheres, com idade acima de 40 anos e técnicas de enfermagem. Das seis dimensões avaliadas, quatro tiveram risco médio. A dimensão sobre justiça e respeito apresentou elevado risco psicossocial, e a dimensão organização do trabalho e conteúdo, baixo risco. **Conclusão:** Os trabalhadores consideravam seu trabalho importante e significante, porém vivenciavam alto risco psicossocial no que se refere à exigência de atenção e exigência emocional das atividades desenvolvidas na unidade. Poucos estavam satisfeitos com o trabalho, com o ambiente e com a utilização das habilidades individuais pelo serviço. As informações sobre as relações psicossociais constituem um importante indicador para análise das situações de trabalho, gerando informações que apoiam intervenções seguras sobre o processo de trabalho.

Palavras-chave: Impacto psicossocial. Equipe de enfermagem. Esterilização.

RESUMEN: Objetivo: Analizar el nivel de riesgo psicosocial de los trabajadores del Centro de Material y Esterilización de un gran hospital de Rondônia. **Método:** Estudio transversal, incluyendo auxiliares, técnicos de enfermería y enfermeras, utilizando el Cuestionario Psicosocial de Copenhague. Los análisis descriptivos se realizaron con el paquete estadístico Stata® versión 11. **Resultados:** participaron 35 trabajadores, en su mayoría mujeres, mayores de 40 años y técnicos de enfermería. De las seis dimensiones evaluadas, cuatro tenían un riesgo medio. La dimensión de justicia y respeto presentó un alto riesgo psicosocial y la dimensión de organización y contenido del trabajo fue de bajo riesgo. **Conclusión:** Los trabajadores consideraron su trabajo importante y significativo, pero experimentaron un alto riesgo psicosocial en cuanto a la demanda de atención y demanda emocional de las actividades desarrolladas en la unidad. Pocos estaban satisfechos con el trabajo, el entorno y el uso de habilidades individuales por parte del servicio. La información sobre las relaciones psicosociales es un indicador importante para analizar situaciones laborales, generando información que sustente intervenciones seguras en el proceso laboral.

Palabras clave: Impacto psicosocial. Grupo de enfermería. Esterilización.

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INTRODUCTION

The Central Sterile Supply Department (CSSD) is the sector whose main activity is to provide safe health products (HP) for direct assistance to the user in the Surgical Center, in inpatient units, outpatient clinics, diagnostic sectors, in addition to emergency units[1-3].

It is considered a critical area, as it receives HP contaminated with organic secretions from the procedures performed by the health team. The environment and work organization in this sector exposes workers to various occupational risks: biological, chemical (vapors and liquids), physical (noise, high temperature, and inadequate lighting), ergonomic (physical efforts and uncomfortable positions), and psychosocial (stress, dissatisfaction, and mental overload)[4].

The work process at CSSD requires specific skills and competences from workers at a very fast production pace and with physical and mental demands. In addition to the environment and work process, other factors can potentialize psychosocial problems among workers, such as management support and relationships between colleagues and with the technician responsible for the sector[5].

A systematic review on exposure to psychosocial risk factors in work contexts analyzed 22 articles that used the *Copenhagen Psychosocial Questionnaire* (COPSOQ) to measure psychosocial factors. The findings showed an influence between individual, work-related, and psychosocial risk factors regardless of the risk exposed. All workers included in the studies showed losses in relation to their mental health and physical well-being[6].

A study conducted at the CSSD of a university hospital in Rio de Janeiro, with 34 professionals, pointed out that the physical environment, the process, and the organization of work in the sector were directly related to the physical and emotional exhaustion of the professionals[7]. Respondents reported being subjected to work conditions that caused stress and decreased concentration and attention, resulting in migraine, high blood pressure or gastric ulcer[7]. Another study carried out in a public hospital in the state of São Paulo, with 63 professionals, showed that the main psychosocial factors that trigger stress and illness in the CSSD are: high demand for work, relationship between team members, management support, low recognition, and a stigmatized view of the sector for not working directly on patient care[5].

In the previous literature review, there were no studies on the subject in the Amazon region. The Brazilian Amazon consists of nine states, which occupy 61% of the country's territory, housing 12% of the population, which faces several public health, social, and economic problems[8]. The health institution where the study was conducted has the challenge of processing HP with the same quality standard as any other institution, but with structural and work process problems peculiar to a region far from the major technological and professional training centers.

OBJECTIVE

To analyze the level of psychosocial risks of health workers who work at the CSSD of a public general hospital in Rondônia.

METHODS

This is a cross-sectional study, carried out at the CSSD of a public tertiary-level hospital, large and state reference in the provision of public health care in Rondônia — however, it receives users from Amazonas, Acre, and Bolivia[8]. It serves the specialties of neurosurgery, oncology, orthopedic surgery, corneal, and kidney transplantation, general surgery, and bariatric surgery. It is the only public hemodynamic service in the state as well as the only public health care establishment that provides care in the Neonatal Intensive Care Unit[9].

The studied CSSD is classified as Class II, according to the Resolution of the Collegiate Board of the National Health Surveillance Agency No. 15 of 2012[3]. The processed HP are used in the different units of the hospital. This CSSD is a reference in the stage of HP sterilization of other local institutions when they present operational difficulties in the stage of sterilization.

The dimensioning of personnel was observed by the scales of monthly services, with the average of eight mid-level nursing professionals and one higher-level nursing professional, exclusive to the sector, in a 12-hour day. 41 workers directly in the processing of HP were identified,

including nurses, technicians, and nursing assistants, and all were invited to participate in the study. Those who were present in the sector during the collection period were included and those on sick leave, vacation or premium leave were excluded.

Of the total number of CSSD workers, 35 took part in the study, 29 of which were nursing assistants and technicians and 6 nurses. Six were excluded because they were on sick leave or vacation during the period of data collection, carried out between March 2016 and April 2017.

Two questionnaires were used: the first addressing sociodemographic, occupational and lifestyle aspects of the participants, with 19 open and closed questions, based on the instrument proposed by Santos[10]; the second was the COPSOQ questionnaire, translated and adapted by Silva et al.[11], containing 26 items, with six dimensions:

- labor requirements;
- social relations and leadership;
- organization of work and content;
- work-individual interface;
- justice and respect;
- general physical health.

Each item contained five response alternatives, with a maximum score of five and a minimum of one point, with the final risk obtained by averaging the item's responses (Chart 1).

Quantitative analysis was performed using the Stata® software, version 11. Data were entered and stored in Microsoft Excel®, and absolute and relative frequencies and measures of central tendency (mean and standard deviation [SD]) were calculated.

This study was approved by the Research Ethics Committee of *Universidade Federal de Rondônia*, under approval opinion 1.849.750.

RESULTS

Among the 35 study participants, a mean age of 48 years was obtained (SD = 9.43). Most participants had the following characteristics: female gender (77.1%); belonging to the auxiliary and technical nursing categories (82.9%); family income of up to four minimum wages (60.0%); training time over ten years (74.3%); length of service in the sector for more than five years (40.0%); on-call regime adding up to 40 hours a week (94.9%); only one job (60.0%); execution of only the function to which they were assigned in the CSSD (85.7%). Approximately half the professionals work in the areas of preparation and sterilization of HP (48.6%), and 20.0% of them frequently work overtime (Table 1).

For most workers, the break time in the workday is less than 30 minutes (62.9%), and the distribution of the period was variable according to the shift period. Just over half of the participants do not exercise (54.3%), 22.9% are former smokers, and 5.7% still smoke. As for the Body Mass Index, the majority presented the categories overweight or obesity (Table 2).

Regarding psychosocial risks, in general, the analysis made through COPSOQ showed that most dimensions were classified as medium risk. The justice and respect dimension was considered to be of high risk, and the organization of work and content, of low psychosocial risk for the participants (Table 3).

In this analysis, high risks were found in the following categories:

- Work, self-emotional (mean=3.94; SD=1.21), and cognitive demands, with regard to the need for constant attention in the execution of the work (mean=4.82; SD=0.71);
- Social relationships and leadership, with regard to the fact that colleagues are not open to hearing about work problems (mean=3.71; SD=0.99);

Chart 1. Alternative responses, scores, and categories of the level of psychosocial risk.

Answer alternatives	Score Questions 1 to 8 and 22	Score Questions 9 to 25, except 22	Categories/mean
Always	5	1	High risk: greater than 3.67 Medium risk: 2.35 to 3.66 Low risk: less than 2.34
Often	4	2	
Sometimes	3	3	
Rarely	2	4	
Never	1	5	

Source: adapted from Silva et al.[11].

Table 1. Sociodemographic and occupational profile of the professionals participating in the research, who work at the Central Sterile Supply Department (n=35).

Characteristic	N	%
Gender		
Female	27	77.1
Male	08	22.9
Professional category		
Nursing assistant/technician	29	82.9
Nurse	06	17.1
Age range (years)		
26 to 30	02	5.7
31 to 35	02	5.7
36 to 40 years	05	14.3
41 to 45	06	17.2
46 to 50	02	5.7
over 50	18	51.4
Family income * (minimum wage)		
0–4	21	60.0
5–10	09	25.7
>10	05	14.3
Time of profession (years)		
0–4	03	8.6
5–9	06	17.1
≥10	26	74.3
Time at the Central Sterile Supply Department (years)		
0–4	10	28.6
5–9	14	40.0
≥10	11	31.4

Characteristic	N	%
Occupation area		
Reception and cleaning area	10	28.6
Preparation and sterilization area	17	48.6
Storage area	08	22.8
Other functions at the Central Sterile Supply Department		
No	30	85.7
Yes	05	14.3
Working hours		
On duty	29	82.9
Daily regimen	06	17.1
Hourly load in the sector (hours)		
≤40	33	94.9
>40	02	5.1
More than one job		
No	21	60.0
Yes	14	40.0
Often works overtime		
No	28	80.0
Yes	07	20.0
Break period		
Morning	12	34.3
Afternoon	09	25.7
Night	14	40.0
Break duration (minutes)		
≤30	22	62.9
>30	13	37.1

*Minimum wage in Brazil in 2017=R$ 937.00, according to the Inter-Union Department of Statistics and Socioeconomic Studies[12].

Table 2. Lifestyle of the professionals participating in the research, who work at the Central Sterile Supply Department (n=35).

Characteristic	N	%
Physical exercise		
No	19	54.3
Yes	16	45.7
Smoking		
No, never smoked	25	71.4
No, former smoker	08	22.9
Yes	02	5.7
Body Mass Index		
Low weight	-	-
Eutrophic	10	28.6
Overweight	15	42.9
Obesity I	08	22.9
Obesity II	-	-
Obesity III	02	5.6

- Justice and respect, regarding the feeling of belonging to a community (mean=4.00; SD=1.37).

Items considered as low risk were:

- Social relations and leadership, in terms of help and support from co-workers (mean= 2.25; SD=0.95);
- Organization of work and content, with regard to the meaning of work for oneself (mean=1.86; SD=0.49) and the feeling that work is important (mean=1.82; SD=0.45).

The participants' perception of their general health was classified as good (mean=3.00; SD=1.03), but one participant considered his health to be excellent, and three as deficient.

Table 3. Level of psychosocial risks of the professionals participating in the research, who work at the Central Sterile Supply Department (n=35).

Characteristic	Always		Often		Sometimes		Rarely		Never		Mean (SD) / Level of risk
	N	%	N	%	N	%	N	%	N	%	
Work demands											**3.23 (0.83) medium**
Quantitative											
1. Poorly distributed workload	02	5.71	07	20.00	10	28.57	07	20.00	09	25.71	2.60 (1.24) medium
2. Not enough time to complete all tasks	08	14.29	01	2.86	07	20.00	14	40.00	08	22.86	2.46 (1.29) medium
3. Need to work overtime	07	20.00	08	22.86	11	31.43	02	5.71	07	20.00	3.17 (1.38) medium
Work pace											
4. Need to work very quickly	04	11.43	05	14.29	09	25.71	07	20.00	10	28.57	2.60 (1.35) medium
Emotional											
5. Self-emotional demand	16	45.71	08	22.86	05	14.29	05	14.29	01	2.86	3.94 (1.21) high
Cognitive											
6. Requires constant attention	32	91.43	02	5.71	-	-	-	-	01	2.86	4.82 (0.71) high
7. Work requires one to be good at proposing new ideas	10	28.57	12	34.29	05	14.29	06	17.14	02	5.71	3.63 (1.24) medium
8. Work requires one to make difficult decisions	03	8.57	05	14.29	11	31.43	10	28.57	06	17.14	2.68 (1.18) medium
Social relations and leadership											**3.08 (0.58) medium**
Social support from colleagues											
9. Has help and support from co-workers	09	25.71	11	31.43	12	34.29	03	22.86	09	25.71	2.25 (0.95) low
10. Colleagues hear about their work problems	05	14.29	05	14.29	11	31.43	09	25.71	05	14.29	3.71 (0.99) high
11. Colleagues talk about their work performance	-	-	04	11.43	11	31.43	11	31.43	09	25.71	
Social support from superiors											
12. Immediate superior talks about one's work	05	14.29	03	8.57	8	22.86	12	34.29	07	20.00	3.37 (1.31) medium
13. Has help and support from one's immediate superior	10	28.57	07	20.00	9	25.71	08	22.86	01	2.86	2.51 (1.22) medium
14. Immediate superior talks about one's job performance	04	11.43	03	8.57	5	14.29	17	48.57	06	17.14	3.51 (1.22) medium
Work organization and content											**2.17 (0.58) low**
Meaning of work											
15. One's work is meaningful	07	20.00	26	74.29	02	5.71	-	-	-	-	1.86 (0.49) low
16. One feels their work is important	07	20.00	27	77.14	01	2.86	-	-	-	-	1.82 (0.45) low
17. Feeling motivated and involved with work	01	2.86	12	34.29	13	37.14	09	25.71	-	-	2.85 (0.84) medium
Work-individual interface											**2.73 (0.33) medium**
Job satisfaction											
18. Satisfied with job prospects	01	2.86	18	51.43	13	37.14	03	51.43	-	-	2.51 (0.70) medium
19. Satisfied with work in a global way	02	5.71	07	20.00	15	42.86	11	31.43	-	-	3.00 (0.87) medium
20. Satisfied with the physical conditions of the place	02	5.71	15	42.86	17	48.57	01	2.86	-	-	2.48 (0.66) medium
21. Satisfied with the way one's skills are used	-	-	06	17.14	17	48.57	12	34.29	-	-	3.17 (0.71) medium
Job insecurity											
22. Being worried about becoming unemployed	13	37.14	07	20.00	02	5.71	10	28.57	03	8.57	2.51 (1.46) medium

Continue...

Table 3. Continuation.

Characteristic	Always		Often		Sometimes		Rarely		Never		Mean (SD) / Level of risk
	N	%	N	%	N	%	N	%	N	%	
Justice and respect											**3.69 (0.27) high**
Social community at work											
23. There is a good working environment between one and their colleagues	-	-	05	14.29	13	37.14	09	25.71	08	22.86	3.57 (1.00) medium
24. There is good cooperation between co-workers	-	-	04	11.43	15	42.86	10	28.57	06	17.14	3.51 (0.92) medium
25. Feeling of belonging to a community when in the workplace	02	5.71	06	17.14	2	5.71	05	14.29	20	57.14	4.00 (1.37) high

Overall health											3.00 (1.03) medium
	Excellent	%	Very good	%	Good	%	Mild	%	Poor	%	
26. Overall health	01	2.86	12	34.29	11	31.43	08	22.86	03	8.57	**3.00 (1.03) medium**

SD: standard deviation.

DISCUSSION

The results of the study showed that psychosocial risks influence the work process in the CSSD and, consequently, predispose workers to conditions of illness. In the literature review of the theme, there is a lack of studies carried out in the Amazon on the psychosocial factor, given the peculiarity of the work process at the CSSD, focused on the HP production system with a work organization based on a fragmented socio-technical division.

The socio-demographic and professional profile of the participants was female, aged over 50 years old and with medium-level positions (Table 1). These data corroborate the profile of a worker commonly assigned to the CSSD, that is, professionals about to retire, who are more likely to feel unmotivated, have physical and emotional stress[4,5,13]. In addition, the female gender seems to be a precursor to higher levels of stress and old age is a risk factor for heavier tasks, with regard to resistance and resilience[6].

Most had family income of up to four minimum wages, worked on duty regimen, 40.0% had more than one job, and 20.0% worked overtime frequently (Table 1). More than one job or extra jobs can bring financial compensation, but many hours of work can lead to overload and strenuous hours, interfering in work processes and contributing to the illness of workers[13,14]. The break period during the activities was conditioned to the number of workers scheduled for the day and the demand for receiving HP for processing. A study on ergonomic risks in the CSSD, carried out in a public hospital in Piauí, showed that staying in the same body posture without pauses for a long time causes, in addition to musculoskeletal disorders, psychological disorders[15].

Other psychosocial risks related to long working hours are: decreased attention span, concentration, perception and decision-making; development of stress; anxiety, depression, and apathy; substance abuse, such as alcohol, tobacco, and other drugs[6,7]. Exposure to these risks raises the stress level of workers and, as a consequence, can lead to the use of substances such as alcohol and tobacco. It also triggers physiological aspects, such as neuroendocrine and immunological reactions, which can be associated with weight gain and less willingness to practice physical exercises[6]. These three factors are risks for cardiovascular disease and interfere with general health.

In addition to life habits, stressful daily work helps workers to consume a more caloric diet than the body needs, which is generally low in fiber and nutrients, which can be related to overweight or obesity. In Rondônia, most workers were overweight (Table 2); less than half practiced physical exercises; 22.9% had been smokers; 5.7% reported smoking.

In the dimension of work demands, the highest mean for psychosocial risk was found in the item demand for constant attention during work and, in this same dimension, high risk in the item self-emotional demand (Table 3). This high demand for attention is mainly due to sophistication, the new conformations of the HP and technological advances in sterilization methods and surgical approaches16.

Social relationships and leadership had a medium risk for psychosocial problems (Table 3). Low risk was found for the

help of colleagues and high risk for the item colleagues heard about their work problems, and 57.14% of the participants indicated that they rarely or never had a dialogue about their work performance. This absence of dialogue on work performance by management may be related to the devaluation of the work performed in the sector compared to those who provide direct assistance to the patient. However, the final product of the activities carried out at the CSSD contributes to the continuity of health care throughout the care chain[4].

In Rondônia, a low psychosocial risk was found for the dimension of work organization and content. Work was rated as significant and important for most workers, and most participants indicated that they had help from their colleagues (Table 3).

The work-individual interface dimension had a medium psychosocial risk. More than half of the professionals expressed concern about their permanence in the job, which can be explained by the temporary employment contract of some. Less than half of the workers were generally satisfied with their work and with the conditions of the environment, and only 17.1% were satisfied with the way their capacities were used in the sector. A study conducted in ten public hospitals in São Paulo and a private hospital in Belo Horizonte (Minas Gerais), with 463 participants, found that the meaning of work for those professionals was the possibility of professional valorization and socioeconomic improvement, and the professionals of the private hospital showed greater emotional commitment to their work, due to the instability of the employment relationship[17].

In the social community of work dimension, almost half of the workers indicated that the work environment is rarely or never good, and, in terms of cooperation between colleagues, slightly less than half indicated that there is rarely or never good cooperation (Table 3). This shows a probability of relational conflicts in the work environment, which can cause stress and psychological wear and tear on workers. Corroborating this finding, a study carried out in a university hospital in the state of São Paulo, with 63 participants, concluded that the main psychosocial factors in the CSSD studied are the high demand for work, aggravated by absenteeism from colleagues, by working in a closed environment and without communication with other sectors, and the devaluation of work by other hospital professionals[5].

In general, there was a medium psychosocial risk (Table 3), but high risk in the dimension of justice and respect, in the feeling part of the community item. In other words, the study workers did not feel part of a group, which is essential for collaborative work and is opposed to the activities proposed in the CSSD.

In addition, in the domain of social relations and leadership, there was a high risk in the item that assessed how receptive colleagues are to hearing the individual's problems at work. Teamwork is vital in this activity, since the processes are sequential and summative, and the repercussion in the case of failures can generate serious damages.

As a limitation of the study, the failure to assess the implications of psychosocial relationships and possible outcomes in the health-disease process of CSSD workers is considered.

FINAL CONSIDERATIONS

In this study, workers considered their work important and significant, but they experienced a high psychosocial risk with regard to the demand for attention and the emotional demand of the activities developed at the CSSD. Few of them were satisfied with the work, the environment, and the use of individual skills by the service.

Information about psychosocial relationships is an important indicator for understanding the work process in the CSSD. The way this group is looked at needs to be rethought by health care managers and organizations, as understanding the work processes in the CME dynamics contributes to an organization that is not only focused on the product, but that considers workers to be determining subjects for the best quality of HP processing.

Psychosocial risks presented and reflected unwanted conditions for the present and for the future of a practice focused on patient safety and the prevention of infections related to health care and free from adverse events.

It is considered relevant to carry out awareness-raising actions for workers' health care and to develop strategies for Permanent Education in Health, with intersectoral actions with the Center for Permanent Education and the Center for Surveillance of Worker's Health Diseases.

It is also noteworthy that the study's CSSD is a reference scenario for the teaching practices of nursing students at higher and technical levels, contributing to teaching and research related to workers' health in health institutions.

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CRITICAL ANALYSIS OF TECHNICAL SPECIFICATIONS IN BIDDING PROCESSES FOR THE ACQUISITION OF AUTOCLAVES

Análise crítica das especificações técnicas em processos de licitação para aquisição de autoclaves

Análisis crítico de especificaciones técnicas en procesos de licitación para adquisición de autoclaves

Sandoval Barbosa Rodrigues[1], Rafael Queiroz de Souza[2]*, Luciano Lemos Doro[3], Kazuko Uchikawa Graziano[4], Gilmar Sidnei Erzinger[5]

ABSTRACT: Objective: To analyze technical specifications in bidding processes for the acquisition of autoclaves with more than 90 L, based on the related standards. **Method**: Descriptive, documentary research, with a quantitative approach, based on bidding processes available online. **Results**: 112 bidding processes were analyzed, of which 106 (94.6%) came from Brazil and six (5.4%) from Mexico, Honduras, El Salvador, Panama and Paraguay. The documents were assessed according to construction aspects, sterilization cycles, optional items, safety items and management tools. **Conclusion**: Most of the technical specifications are outdated, in some cases compromising safety in the sterilization process.

Keywords: Steam. Sterilization. Equipment and supplies. Competitive bidding.

RESUMO: Objetivo: Analisar as especificações técnicas em processos de licitação para aquisição de autoclaves com mais de 90 L, com base na normatização relacionada. **Método:** Pesquisa descritiva, documental, com abordagem quantitativa, baseada em processos de licitação disponíveis *online*. **Resultados:** Foram analisados 112 processos, dos quais 106 (94,6%) foram provenientes do Brasil e seis (5,4%) do México, Honduras, El Salvador, Panamá e Paraguai. Os documentos foram analisados de acordo com aspectos construtivos, ciclos de esterilização, itens opcionais, itens de segurança e ferramentas de gestão. **Conclusão:** As especificações técnicas, em sua maioria, estão desatualizadas, em alguns casos comprometendo a segurança no processo de esterilização.

Palavras-chave: Vapor. Esterilização. Equipamentos e provisões. Proposta de concorrência.

RESUMEN: Objetivo: Analizar las especificaciones técnicas en los procesos de licitación para la adquisición de autoclaves con más de 90 L, en base a la estandarización relacionada. **Método:** Investigación descriptiva, documental, con enfoque cuantitativo, basada en procesos de licitación disponibles *online*. **Resultados:** Se analizaron 112 casos, de los cuales 106 (94,6%) procedían de Brasil y seis (5,4%) de México, Honduras, El Salvador, Panamá y Paraguay. Los documentos fueron analizados según aspectos constructivos, ciclos de esterilización, opcionales, elementos de seguridad y herramientas de gestión. **Conclusión:** La mayoría de las especificaciones técnicas están desactualizadas, en algunos casos comprometiendo la seguridad en el proceso de esterilización.

Palabras clave: Vapor. Esterilización. Equipos y suministros. Propuestas de licitación.

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INTRODUCTION

Bids are administrative procedures used by public organizations to select a proposal with the most advantageous conditions, providing equal opportunities to suppliers and strictly complying with the regulation, criteria and details of the process[1]. Overall, the permanent or special commission[2] appoints the support team for the bidding. It consists of a technical staff that will describe the characteristics of the equipment based on indications of preliminary technical studies and on the demand. The technical staff can be constituted of a nursing, engineering or maintenance professional, or all these segments.

The bidding has a rigid system that qualifies bidders; a technical analysis is carried out against the technical specifications requested in a method that will tell if it complies or not with details[2,3]. Therefore, if a company does not comply with the specifications, it will not be approved for the second stage, in which the winner with the lowest price will be chosen among the proposals approved in the technical analysis.

This procedure is different in some countries in Latin America, which use a percentage or weight factor to score the technical superiority of the proposals[4,5]. In Bolivia[4], for example, the process is similar to that in Brazil, with the first stage of technical specification and the method "complies/does not comply", named "Form C-1 technical specifications". However, an important difference is found in Form C-2, entitled "Additional conditions" with 35 extra points computed for companies that fulfill certain conditions or benefits other than the stipulated in the bidding, but not being eliminatory.

Another example is Chile[5], where there is no strict procedure for bids, but each customer places a percentage for factors such as delivery time, guarantee, price and requirements. In the technical specifications phase, they indicate the minimum characteristics that the equipment must comply with and the additional requirements, which score and rank the proposals as superior to the request.

In the current scenario, even with different bidding processes, like the examples above, empirical evidence has shown that recent processes in Latin America have specifications that may not be in accordance with the standards related to steam sterilization or make it difficult to interpret items requested. In general, this can substantially impact patient and operator safety, as well as the costs associated with the equipment, thus constituting a subject of interest for health surveillance, managers and users of health services.

OBJECTIVE

To analyze the technical specifications in bidding processes for the acquisition of autoclaves with more than 90 L, based on specific standardization.

METHOD

Descriptive, documentary research with quantitative approach. In descriptive research, researchers observe, describe and document several aspects about a certain phenomenon, discussing them without manipulating variables or searching for cause-and-effect relationships[6].

From January to June 2019, the documents were identified in an electronic search on the websites NET Purchases, Banco do Brasil Portal, Minas Gerais Purchasing Portal, São Paulo Electronic Purchasing Exchange and Public Purchasing Portal.

In total, 112 bidding processes available online for the acquisition of autoclaves with more than 90 L in the year 2018 were characterized as the access sample of this review. The documents were analyzed using a spreadsheet with variables related to the process identification data, constructive aspects, sterilization cycles, optional items, safety items, and management tools.

RESULTS

Of 112 cases analyzed, six (5.4%) were from Mexico, Honduras, El Salvador, Panama and Paraguay, and 106 (94.6%), from Brazil, distributed in 61 cities of the five regions of the country.

On average, the volume of the internal chamber requested was 326 L, varying from 90 to 970 L, with tolerance of variation between 2.4 and 35% of the specified volume. The variable chamber thickness did not comprise 77.7% (n=87) of the processes and varied from 3.12 to 8 mm between the ones that had it specified. The period over which the company must be responsible for defects in the chamber, provided that the manufacturer's guidelines were followed, was absent in 74.1% (n=83) of specifications,

and varied between 5 and 10 years in the others. The constructive aspects are summarized in Table 1.

Regarding the vacuum system, 78.6% (n=88) of them did not contain information about the design and 40.2% (n=45) did not define the type of vacuum pump. In the remainder, simple (37.5%, n=42), two-stage (14.3%, n=16) and water-free (7.1%, n=8) pumps were predominant; and only one requested gravitational equipment (0.9%, n=1). Regarding the power of the vacuum pump, 91.1% (n=102) of them did not disclose information, but among the ones presenting such information, it ranged from 1.5 to 4 horsepower (hp).

The following specifications about the steam generator were not found: material (39.3%, n=44), float or electronic controls (92%, n=103), standardized and calibrated safety valve at 3 kgf/cm², with an access device for cleaning and function check (70.5%, n=79), electrical power (73.2%, n=82) and automatic cleaning (98.2%, n=110). The most common heating system was electric (86.6%, n=97).

As for the cycles, 32.1% (n=36) of the specifications did not provide information on the temperature. In the others, it varied from 90 to 135°C, with range between 121 and 134°C being common (25%, n=28). With regard to the programmed cycles, 40.2% (n=45) did not stipulate the number of cycles, while in the others a variation of 3 to 30 cycles was specified. The characterization of the cycles is described in Table 2.

Table 1. Distribution of the constructive aspects obtained in the technical specifications for the acquisition of autoclaves with more than 90 L, in 2018, according to frequency.

Inner chamber	Material	N	%
	316 L Steel	87	77.6
	NS	14	12.5
	304 Steel	6	5.4
	Stainless steel	5	4.5
	Format	-	-
	NS	75	67
	Rectangular	35	31.3
	Cylindrical	1	0.9
	Finishing	-	-
	NS	74	66.1
	Polished	35	31.3
	Sandblasted	2	1.8
	Electropolished	1	0.9
External camera	**Material**	**-**	**-**
	316 L Steel	45	40.2
	NS	38	33.9
	304 Steel	26	23.2
	Stainless steel	3	2.7
Doors	**Quantity**	**-**	**-**
	Two	72	64.3
	One	31	27.7
	NS	8	8
	One or two	1	0.9
	Opening	-	-
	Automatic	59	52.7
	Hatch	17	15.2
	NS	17	15.2
	Others	14	12.5
	Sliding, no detailing	5	4.5
Autoclave structure	**Material**	**-**	**-**
	NS	57	50.9
	Anti-corrosion, NS stainless steel	37	33
	316 L, 304, 1.020 steel, carbon steel, brass	18	16.1
Hydraulics	**Material**	**-**	**-**
	NS	46	41.1
	316 L Steel	29	25.9
	Anti-corrosion	17	15.2
	Stainless steel	13	11.6
	Others	7	6.3
	Valves	-	-
	NS	88	78.6
	Pneumatic	21	18.8
	Solenoid valves	3	2.7
External enclosure	**Material**	**-**	**-**
	NS	71	63.4
	304 steel	24	21.4
	Stainless steel	14	12.5
	Anti-corrosion	2	1.8
	430 steel	1	0.9

NS: not specified.

Only one process required interaction devices between operator and equipment on the autoclave discharge side (0.9%), while in the others the most frequent request was the touch screen (48.2%), with dimensions between >3.5 and >7 inches. In general, the request for optional items, alarms and software management tools (Table 3) was not commonly expressed, as well as safety items (Table 4).

Table 2. Distribution of the sterilization cycles obtained in the technical specifications for the acquisition of autoclaves with more than 90 L, in 2018, according to frequency.

Cycles	N	Yes (%)	N	No (%)
Bowie & Dick	59	52.7	53	47.3
Leak test	49	43.8	63	56.3
Liquids	52	46.4	60	53.6
Lactary	3	2.7	109	97.3
Integrated F (zero) calculation	13	11.6	99	88.4
Cycle validation	7	6.2	105	93.8

Table 3. Distribution of optional items and software management tools obtained in the technical specifications for the acquisition of autoclaves with more than 90 L, in 2018, according to frequency.

Optional items	N	Yes (%)	N	No (%)
Printer	85	75.9*	27	24.1
Compressor	21	18.7	91	81.3
Water treatment system	92	82.1	20	17.9
Water storage system for recirculation	5	4.5	107	95.5
Connectivity for traceability systems	3	2.7	109	97.3
Remote access	1	0.9	111	99.1
Discharge cooling system	2	1.8	110	98.2
Redundancy in temperature measurement	9	8	103	92
Software management tools	**N**	**Yes (%)**	**N**	**No (%)**
Control of the number of operators	3	2.7	109	97.3
Access levels for operators	3	2.7	109	97.3
Preventive maintenance control	4	3.6	108	96.4

*Including thermal and matrix.

Table 4. Distribution of safety items obtained in the technical specifications for the acquisition of autoclaves with more than 90 L, in 2018, according to frequency.

Items	N	Yes (%)	N	No (%)
Closed door control	17	15.2	95	84.8
Door anti-crushing system	13	11.6	99	88.4
Door interlocking system	13	11.6	99	88.4
Cycle starts only in the presence of steam pressure in the generator or supply line	4	3.6	108	96.4
Emergency button	30	26.8	82	73.2
Depressurization of the chamber when in excess pressure	2	1.8	110	98.2
Automatic purge	3	2.7	109	97.3
Safety thermostat for protection of electrical resistances in the steam generator	10	8.9	102	91.1
System for interrupting the electrical supply of the resistances in the absence of water	9	8	103	92

There was no specification about the temperature sensor in 75.9% (n=85) of the processes, while in 22.3% (n=25) PT-100 was specified and in 1.8% (n=2) the generic term "thermocouple" was used.

The following items were considered vague or difficult to understand: manometer with silicone gasket (0.9%, n=1), system to save energy in standby mode (0.9%, n=1), RS232 port interface (1.8%, n=2), graphic recorder (1.8%, n=2), USB port (10.7%, n=12), water- or energy-saving system (5.4%, n=6), data export interface (1.8%, n=2), drainage system (0.9%, n=1) and water-draining and cooling-process smart system (0.9%, n=1).

No information on the space/side for maintenance was identified in 89.3% (n=100) of the processes.

DISCUSSION

Constructive aspects

The volume of the chambers is usually described in liters, and rectangular chambers allow for greater useful load capacity compared to cylindrical chambers. There are chambers with different nominal volumes, while the useful load capacity is the same, considering the number of sterilization units or baskets, which can vary in shape (trapezoidal or rectangular) in addition to the standard: ISO[7] or DIN[8] (48 or 54 L, respectively).

The specification per sterilization unit may be more advantageous for the chamber capacity, as it translates its useful, not the nominal volume. Another reason for following the concept of sterilization units comes from the shape of the chambers. In this case, the manufacturers define their standard measures according to the cubing in multiples of sterilization units (48 or 54 L), where the width of a chamber can vary from 640 to 670 mm, that is, surplus volumes that do not translate to greater load capacity.

As for the chamber building material, 25.9% (n=29) of the processes specified materials that may be used do not comply with the Brazilian Technical Standards Association (ABNT) 11816, which requires 316 stainless steel[7]. Some models use 316 L or 316 Ti, which are added with titanium to reduce the risk of intergranular corrosion due to the welding process[9].

The structure material was not described in 50.9% (n = 57) of the processes, while the rest described it in a variety of ways: anticorrosive, carbon steel and various types of stainless steel, from 316 to 304 L. "Structure" means all support for the components of the autoclave: the sterilization chamber (known as the internal chamber), the hydraulic and electrical components, and the front and side panels.

For the equipment conservation, it is important that carbon steel structures are not used, because of the contact with other noble metals; then, galvanic corrosion can be avoided[10]. However, any anti-corrosion materials, such as stainless steel or aluminum, can be selected.

Regarding hydraulic piping, 74.1% (n=83) of the processes requested materials that may not comply with the NBR ABNT 11816 rules, which sets the requirements for autoclaves with a volumetric capacity greater than two sterilization units[7]. This document recommends 316 L stainless steel for pipes and does not recommend the use of 304 stainless steel as well as any other type of material, however only 25.9% (n=29) specified 316 L stainless steel. The choice of the hydraulic piping material is important to prevent corrosion or scale formation, which can considerably decrease the autoclave's life and even the efficiency of the cycle, greatly increasing the need for corrective maintenance.

Regarding the doors, 52.7% (n=59) of the bids required automatic doors, while the others did not specify the type of closure or requested a hatch type door. Automatic systems normally operate with dynamic sealing joints, while systems with manual closing use static joints, in which the tightness of the chamber can vary according to the manual force applied and the mechanical adjustment of the positioning sensors. There are numerous sources of air leakage in the autoclaves, including door gaskets, which can compromise the sterilization process[11].

In view of this scenario, automatic closing systems are one of the options to minimize the risk of air leakage. Additionally, the use of devices that check the door seals increases the protection of both the operator and the equipment, such as the leak test, used to demonstrate that the air leakage from the chamber during the use of the vacuum pump does not exceed a level that compromises the quality of the sterilization[8].

Sterilization cycles

As for the programmed cycles, 46.4% (n=52) of the processes requested cycles for liquids, but there was no

specification for their parameters. The controls for these cycles can be different. That is, depending on the equipment, there is a temperature sensor dedicated to the products, while in others the same reference sensor of the camera is used. Therefore, certain equipment does not have a temperature sensor positioned in the liquid, which can result in underestimated or overestimated temperatures, inducing the loss of the liquid's properties, such as culture media.

Likewise, some equipment can technically and more quickly promote forced cooling, while others perform natural cooling in a longer cycle time. The longer cycle can impact productivity and cause the loss of the liquid characteristic.

No bidding process specified the criteria for cycle performance in terms of productivity or time. Some manufacturers offer options to optimize the sterilization process time, with high productivity steam generation systems and vacuum systems with more flow and a better vacuum level. For example, an autoclave that uses a liquid ring vacuum pump can reach a maximum vacuum of 33 mbar, since values with a higher depth are not reached because of the cavitation that occurs inside the pumps, especially in Brazil, where the water temperature easily exceeds the required 15°C[12].

However, there are vacuum systems with better performance that use atmospheric ejectors, with no damage to the system by cavitation, or water-cooling chiller systems, which use electricity.

It is recommended that the autoclaves have controls that identify the vacuum value that must be reached and the vacuum rate or time, in order to emit alarms in the phases in which the vacuum pump is used. The performance of the pump can be influenced by the temperature of the water in different seasons of the year, as well as by the wear or leak in the vacuum system.

Regarding the leak test cycle, also known as leak test or vacuum test, 43.8% (n=49) of the bids analyzed did specify the automatic cycle. NBR ABNT ISO 17665-2 requires that the procedure be performed on a quarterly basis[13]. However, with the modernization of the equipment that brings the automatic leak test cycle, many establishments run it daily, increasing the safety of the process.

It must be considered that the leak test does not guarantee total seal of the chamber in cases in which air enters through the door trim, for example, because the pressure profile of the leak test cycle is made only in vacuum, while the sterilization cycle is dynamic, ranging from vacuum to superatmospheric pressures. Thus, the Bowie & Dick cycle is indicated to complement the leak test.

Optional items and management tools

Of the processes analyzed, 75.9% (n=85) requested matrix or thermal printers to register physical indicators. The thermal printer has the advantage of not using a ribbon ink cartridge as an input, but the major disadvantage is linked to the storage of information. Normally, autoclaves with a thermal printer do not use special papers to maintain the recorded data and, as they are not indelible, the records that should be archived for the purpose of traceability and sanitary inspection can be lost before five years[14]. In this context, dot matrix printers have advantages over data maintenance.

Record systems that do not use paper are also a viable alternative for data maintenance and still allow statistics and speed in the search for information, since they are integrated with management software.

Most processes required water treatment systems already incorporated in the purchase of the equipment, generally describing the treatment by reverse osmosis. According to EN285[8], considered one of the main standards for the construction of large volume autoclaves, the water that feed the autoclaves must meet the minimum requirements for certain contaminants. In some situations, depending on the parameters of the water entering the system that may not undergo pretreatment, reverse osmosis alone is not sufficient. For example, supposing that the reverse osmosis system reduces 95% of conductivity, in an inlet water with 100 $\mu S/cm^2$, 5 $\mu S/cm^2$ would remain, thus meeting the requirements. However, if the water is 200 $\mu S/cm^2$ after treatment, 10 $\mu S/cm^2$ would remain, which would not be in compliance. Therefore, it is recommended that the parameters of the feed water are known to define the most appropriate treatment system.

The bidding processes did not clearly specify the construction characteristics or even the performance of the storage systems for water recirculation in the vacuum pump. Only 4.5% (n=5) of the processes requested a water storage system for recirculation, in order to save the water used in the vacuum system, since the autoclave may require approximately 500 L per cycle in the case if liquid ring vacuum pumps[15]. However, the performance of water recirculation vacuum systems may vary depending on the cycle configuration, load and room temperature.

Currently, not only are recirculation systems available for reusing the water in the pump, but also vacuum systems that do not use water (water free). The reduction in water consumption can be achieved with this type of pump, present in only 7.1% (n=8) of the processes.

Another benefit is the return on investment, since the value of the water consumed and its disposal must be monetized. Additionally, although not tangible for accounting, the lack of water supply can damage vacuum systems or interrupt the equipment's operation indefinitely. From a mechanical point of view, the temperature of the water used in liquid ring pumps directly influences the performance of the system, whereas water-free pumps do not depend on this variable.

Contrary to expectations, 8% (n=9) of the processes specified a redundancy system for measuring the temperature of the internal chamber, although it is considered a critical process variable. Since 1996, the EN285[8] requires redundancy in the sterilization temperature and pressure measurement systems. The document also indicated that the temperature and pressure measurement system must be independent for the registration and indication/control sensors. Thus, a minimum configuration of the autoclave with two-sensors drainage would be allowed, as the registration sensor would be an instrument to validate the measurement of the control sensor, increasing the safety of process.

In the 2015 edition of the same standard, this specification was updated. In addition to requesting at least two temperature and pressure sensors for process redundancy, it also requests communication between sensors, so that one of them can automatically perceive the pre-established temperature deviation and inform the user of a process failure. This update adds safety to sterilization, since new alarms can be automatically generated by the autoclave, without requiring an operator to manually compare values. One way to meet this requirement is to install independent microprocessors, each with its analog system to measure temperature and pressure. There is a tendency in several countries, including Brazil, for the standards for building autoclaves to have this redundancy configuration, and it is wise to consider it in specifications.

Computerized management tools, remote access, operator control, maintenance control and integration with traceability systems were not included in most bids. This goes against the quality control and traceability required for the safety of the processes. No requirements for data recording were found.

Autoclave manufacturers normally have software as an optional item in accordance with Title 21 of the Federal Regulations Code (CFR 21) part 11[16], a United States of America standard that establishes the Food and Drug Administration regulations on electronic records and electronic signatures that are reliable and equivalent to paper records. In practice, this software is applied to manufacturers of medical devices and other industries for the implementation of controls and audit trail, being possible to track the accesses to the autoclave and, in a structured and reliable way, to learn all the changes in revenue from cycle, calibration and other parameters, with constant reporting and recording of the reason for each change.

These items were the least contemplated by the processes, while the most mentioned ones were emergency button (26.8%, n=30) and closed-door control (15.2%, n=17). There were no requests for detectors of non-condensable gases (NCG), which cannot be liquefied at the temperatures and pressures used in saturated steam sterilization[8]. The maximum limit of NCG allowed for the sterilization process is 3.5%. That is, each 100 mL of condensate steam can contain a maximum of 3.5 mL. This criterion was determined in national and international standards, after experiments with an air detector in 1960[8,13].

Currently, the detection of NCG in sterilization processes occurs with challenging packages, with chemical and biological indicators during the cycles, in addition to the Bowie & Dick test in the first cycle of the day[13]; however, there is evidence that the failures related to the presence of NCG do not occur only in the first cycle of the day. Therefore, the recommendation is to control these gases in every cycle[17].

The physical controls of pressure and temperature measurement systems alone are not able to identify NCG[8,16]. Thus, to increase the safety of sterilization, it is possible to install an air detector in the autoclave and unleash it in each cycle. This device is mandatory in some European countries and monitors possible failures in air removal, steam penetration and the presence of NCG in all sterilization cycles.

The main advantages of the NCG detector are: monitoring of all cycles, integration with the equipment, acting independently of the operator to cancel the cycle in the event of failure, and providing objective results instead of the colorimetric results of the chemical indicators, whose reading can be subjective[18].

The main limitation of this study was the sample, since the access to it depended on data available on the internet.

Therefore, not all bidding processes in Brazil and Latin America were analyzed.

This article did not aim to provide rigid models to guide the elaboration of technical specifications or restrict/frustrate the competitive character, but to contemplate theoretical bases that can subsidize the choices.

In this sense, the authors reinforce the need to comply with legislation related to public bids and contracts and to monitor updated scientific evidence for decision-making.

CONCLUSION

We could conclude that certain technical specifications are outdated, in some cases compromising the safety of sterilization and professionals who work directly with the equipment. The applications, as well as the cycles, parameters and performance criteria of the equipment were not adequately described in some processes.

That being said, it is recommended that the technical specifications in new bidding processes consider standardization, new technologies and safety items in accordance with the legislation. Additionally, the direct participation of professionals involved in the health product processing committees should be mandatory in these processes.

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SURGERY CANCELLATION: PERCEPTION OF SURGICAL BLOCK NURSES

Cancelamento cirúrgico: percepção de enfermeiros do bloco operatório

Cancelación quirúrgica: percepción de los enfermeros del quirófano

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ABSTRACT: Objective: To identify the perception of surgical block nurses of the reasons for the cancellation of elective surgeries and strategies to reduce suspension rates. **Method:** This is a qualitative study carried out in a tertiary hospital of Recife, Pernambuco, Brazil, with nurses working in the surgical block. Data were collected through recorded interviews with seven nurses responsible for elective surgeries. Data treatment was based on Bardin's content analysis technique. **Results:** The statements were grouped into two thematic categories: gaps in surgical planning, with three subcategories, and prevention of avoidable situations, with two subcategories. **Conclusion:** The causes for surgery cancellation were related to surgical environment planning and the patient's clinical preparation. The nurses defined these reasons as avoidable situations and considered effective communication and assertive leadership attitudes as strategies that reduce surgical suspension rates.
Keywords: Perioperative nursing. Quality indicators, health care. Elective surgical procedures. Withholding treatment.

RESUMO: Objetivo: Identificar a percepção de enfermeiros do bloco operatório sobre os motivos para o cancelamento de cirurgias eletivas e as estratégias para reduzir as taxas de suspensão. **Método:** Estudo de abordagem qualitativa realizado em um hospital de alta complexidade do Recife, Pernambuco, Brasil, com enfermeiros atuantes no bloco operatório. A coleta de dados foi realizada por meio de entrevistas gravadas com sete enfermeiros responsáveis pelas cirurgias eletivas. Para o tratamento dos dados, utilizou-se a técnica da análise de conteúdo de Bardin. **Resultados:** Os discursos foram agrupados em duas categorias temáticas: lacunas no planejamento cirúrgico, com três subcategorias, e prevenção de situações evitáveis, com duas subcategorias. **Conclusão:** Os motivos para o cancelamento de cirurgias estavam relacionados ao planejamento do ambiente cirúrgico e à preparação clínica do paciente. Os enfermeiros identificaram esses motivos como situações evitáveis e consideraram que a comunicação efetiva e atitudes de liderança assertivas são estratégias que reduzem os índices de suspensão cirúrgica.
Palavras-chave: Enfermagem perioperatória. Indicadores de qualidade em assistência à saúde. Procedimentos cirúrgicos eletivos. Suspensão de tratamento.

RESUMEN: Objetivo: Identificar la percepción de los enfermeros en el quirófano sobre los motivos de cancelación de las cirugías electivas y las estrategias para reducir las tasas de suspensión. **Método:** Estudio cualitativo, realizado en un hospital de alta complejidad en Recife, Pernambuco, Brasil, con enfermeros trabajando en quirófano. La recolección de datos se realizó mediante entrevistas grabadas con siete enfermeros responsables de cirugías electivas. Para el tratamiento de los datos se utilizó la técnica de Análisis de Contenido de Bardin (*Bardin Content Analysis*). **Resultados:** Los discursos se agruparon en dos categorías temáticas: brechas en la planificación quirúrgica, con tres subcategorías, y prevención de situaciones evitables, con dos subcategorías. **Conclusión:** Los motivos para cancelar cirugías estaban relacionados con la planificación del entorno quirúrgico y la preparación clínica del paciente. Los enfermeros identificaron estos motivos como situaciones prevenibles y consideraron que la comunicación eficaz y las actitudes de liderazgo asertivo son estrategias que reducen las tasas de suspensión quirúrgica.
Palabras clave: Enfermería perioperatoria. Indicadores de calidad de la atención de salud. Procedimientos quirúrgicos electivos. Privación de tratamiento.

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INTRODUCTION

Surgical planning is an important organizational process for patients who will undergo an anesthesia and surgical procedure[1]. Its development requires the involvement of a multidisciplinary team consisting of surgeons, anesthesiologists, nurses, administrative services, and technical support, with specific roles for a qualified surgery scheduling[2].

Communication is an important condition for the structural organization of the surgical block (SB) and the strategic planning done by the nurse responsible for the surgical environment[3,4]. The use of tools, such as the surgery schedule board, ensures the scheduling routine and the planning of expected surgeries, guiding the nurse as to the projection and provision of adequate human resources and technology for the procedures[5].

From this perspective, the nurse must carry out the nursing process and systematize the care needed for the surgical experience. Understanding perioperative specificities, especially in the preoperative period, is crucial for a successful surgical process and for reducing complications associated with patient preparation[6].

Strategies to optimize the preoperative preparation and minimize occurrences that can influence the surgical schedule are recommended, including the preoperative visit, which is a step described in the systematization of perioperative nursing care. This step contributes to the therapeutic involvement of nurses and patients, as it provides adequate information and guidance concerning care prior to the surgical intervention, in addition to reducing patient anxiety[6,7].

The leadership of SB nurses mitigates operational gaps, such as failures stemming from the surgical schedule method, especially surgery suspensions due to avoidable mistakes[8].

The main indicators of the process that evaluates the quality of care provided by surgical services include determining the surgery cancellation rate and its contributing factors. An avoidable event has repercussions for the patient, family, surgical team, and health facility[2,9].

Despite efforts to plan and manage surgical scheduling, surgery cancellation is a public health problem. Studies indicate that the consequences of surgical suspension affect: patients and families, who need to reschedule their activities to suit the surgical experience; the administrative structure, which spends time, as well as human and material resources, for new scheduling; and, mainly, the financial structure, with considerable costs to enable rescheduling the surgery[2,3,5].

The literature corroborates the method of monitoring cancellation rates and the investigation of the main reasons or factors that cause the suspension of surgical intervention. Faced with this reality, solutions must be implemented[2].

Several factors contribute to surgery cancellation: clinical reasons, such as uncontrolled chronic diseases; lack of preoperative examinations; patient absence; prolonged operative time; lack of hospitalization beds; fragile communication and information technology processes[1,3,10,11].

Some strategies are recommended to minimize the suspension of interventions, such as: confirming the schedule on the eve of surgery; encouraging assertive communication between the facility's surgical team and users; implementing periodic meetings to discuss and plan future procedures; making preanesthetic visits; investigating and monitoring the reasons for suspension[5,12-14].

The relevance of this research is grounded in the evidence that surgery cancellation is a challenge for health professionals since studies have reported the feelings experienced by professionals when they assume the responsibility of notifying patients about the suspension of the anesthesia and surgical procedure. In addition, few qualitative studies have addressed nurses' perception of the causes of surgery suspension and the need to reflect on attitudes, decision-making, and effective actions to deal with the problem[8,15].

OBJECTIVE

To identify SB nurses' perception of the reasons for the cancellation of elective surgeries and strategies to reduce suspension rates.

METHOD

This descriptive qualitative study was conducted in a public tertiary hospital, reference in neurosurgery, traumatology and orthopedics, general surgery, and vascular surgery. The facility is located in the city of Recife, Pernambuco, Brazil. It has 830 registered beds and performs a monthly average of 400 elective surgeries and 500 emergency surgeries.

The population consisted of SB nurses of the said hospital. The non-probabilistic and intentional sample comprised

seven day-shift nurses. This shift was chosen because elective surgeries are only performed during this period.

For the selection of participants, the inclusion criteria were nurses with SB experience greater than six months and with experience in elective surgeries. The exclusion criteria were nurses on leave for more than three months and those working exclusively in emergency surgeries.

Information was collected between January and February 2016. The interviews were face-to-face, lasting, on average, 20 minutes, and conducted by the same interviewer in a private room in their own work environment.

The interviews were recorded for data gathering and had the following guiding questions:

- What factors contribute to the suspension of elective surgeries?
- What actions can the nurse who works in the surgical center take to change surgery suspension rates?

The data obtained from the guiding questions, through recorded interviews, were transcribed, and the nurses' statements were organized into three stages: sorting, classification, and final analysis of the information collected. The nurses were named by the letter E and listed according to the order of the interview.

Data treatment was based on Bardin's content analysis technique[16], as "a set of communication analysis techniques" characterized by a variety of forms and adaptation to communication. The data interpretation of the nurses' interviews produced units of analysis, which were categorized and subcategorized. The categories used were based on a priori analysis.

The Ethics Committee of the facility approved the research project, under opinion No. 48766215.0.0000.5198. The study complied with Resolution No. 466/2012 on ethical aspects of research involving human beings. Each nurse was invited to participate in the study and asked to sign the Informed Consent Form.

RESULTS

Seven nurses who worked in elective surgeries of the facility participated in the study. Aiming at meeting the research objectives and taking into account the analysis of the material collected, two thematic categories emerged from the transcription and interpretation of the interviewees' statements:

- gaps in surgical planning;
- prevention of avoidable situations.

The first thematic category, gaps in surgical planning, consists of arguments that reinforce three subcategories: mistakes in surgical scheduling, prediction and provision of materials and equipment, and failures in preoperative care.

The first subcategory, mistakes in surgical scheduling, denotes the nurses' perceptions of the surgical scheduling process performed in the referred service and its influence on surgery cancellation rates. The second subcategory, prediction and provision of materials and equipment, represents the factors that comprise the administrative and managerial organization of surgical services. The third subcategory, failures in preoperative care, indicates the nurses' perception of important factors, such as preparation of preoperative fasting, as well as performance and verification of laboratory and imaging tests. The units of analysis express unmet clinical conditions for the confirmation of the surgical procedure (Table 1).

The second thematic category, prevention of avoidable situations, has two subcategories: effective communication and assertive leadership. The units of analysis emphasize the actions and attitudes that the nurse can strengthen to contribute to reducing suspension rates (Table 2).

Table 1. Factors that contributed to the suspension of elective surgeries, according to conceptual categories and subcategories.

Category	Subcategory	Unit of analysis
Gaps in surgical planning	Mistakes in surgical scheduling	"*We know that we can't perform more than one major surgery. So, despite the residents scheduling three, four, we know that only one will happen.*" (E-1) "*So, scheduling more surgeries for a room that everybody knows can only have one is the reason for this surgical suspension rate.*" (E-2)

Continua...

Table 1. Continuation.

Category	Subcategory	Unit of analysis
Gaps in surgical planning	Prediction and provision of materials and equipment	"*To reduce suspensions, we must have quality materials to use. Many items are lacking. It's not causing surgery suspension, but stress in general since we're going through a crisis in the hospital.*" (E-3) "*Surgeries are often suspended for lack of certain equipment necessary for a particular procedure.*" (E-4) "*We have to check before starting the surgery, especially the surgical tables, light, and instruments, like the electric scalpel, which are the main materials and can't fail* [...]. *So, to reduce the suspension rate, the nurse should check these materials and equipment that always act up.*" (E-2)
	Failures in preoperative care.	"*The ideal would be confirming that the patient is fasting and checking the exams before they leave their room since many suspensions occur because the patient has low platelets, low Hb and Ht, ending up without clinical conditions for the surgery.*" (E-4) "*Additional tests should be scheduled; greater attention should be given to zero out the patient's diet because we see this problem all the time.*" (E-6) "*To reduce suspensions, we should improve in 100% the patient's preoperative period, not only the nursing team but the medical team as well, regarding fasting, hygiene, preoperative examinations. That's basically it.*" (E-7)

Hb: hemoglobin; Ht: hematocrit.

Table 2. Actions of surgical block nurses to change surgery suspension rates, according to conceptual categories and subcategories.

Category	Subcategory	Unit of analysis
Prevention of avoidable situations	Effective communication	"*The nurse can help reduce suspension rates because, knowing in advance the surgeries that will happen by checking the surgery schedule board, we can prepare our part ahead in regard to materials that will be required in the room and even the equipment as well.*" (E-1) "*The surgical center nurse has to confirm if the patient's name is on the board, pick up the patient's examinations. If they notice any changes, they must show it immediately to the doctor, confirm with the team if the patient who is next on the board will really be admitted.*" (E-5)
	Assertive leadership	"*The nurse must test the materials that are in the room to see if they are in good conditions. We should always call the engineers to fix the issues, and if the surgery can't happen in that room, we, unfortunately, have to close it off.*" (E-3) "*The block nurse can contribute to reducing suspension rates by paying attention to laboratory tests, the diet, the use of medications that might interfere with the surgery and cause its suspension.*" (E-6)

DISCUSSION

The SB is an environment marked by complex practices that require high accuracy and efficiency. As a high-risk sector, with several anesthesia and surgical, diagnostic, and therapeutic procedures, it demands an interdisciplinary effort to satisfy the patients' needs and mediate technologies and work processes peculiar to health care[8].

SB management seeks to provide a safe intraoperative period and has proven to be an important nursing role. The management duties of this professional have the purpose of qualifying the nursing care and ensuring the effective working of the surgical service[6].

Failure in the nurse's managerial actions can lead to surgery delay and even cancellation, an event stemming from the lack of planning and with potentially preventable reasons[1,10].

The surgical planning weaknesses identified in a study on strategies for reducing surgery suspensions and delays were: communication between the SB and the sterile processing department (SPD), communication between the SPD and surgical teams, surgical scheduling, and technological suitability[5].

As a solution to these issues, systematic meetings called schedule review have been consolidated as a tool for managing the quality of the surgery cancellation indicator. The practice promotes the active participation of those responsible for planning the procedure and brings solutions to the main reasons that lead to surgery suspension, delay, or transfer[5].

Among the main challenges faced by SB nurses, the following stand out: material management, nursing team management, and cooperation with the multidisciplinary team's work. However, the nurse's cooperation with the SB support services optimizes time and the prediction and provision of material resources, in addition to favoring a workflow based on more efficient instruments of communication[8].

The challenges faced by SB nurses enhance surgery cancellation causes related to human resources, especially to the health team and the patient[11,17]. Nevertheless, studies underline non-declared reasons or unjustified causes[3,14].

Preoperative evaluation and preparation are highlighted as important tools to avoid surgery suspension. Nurses and anesthesiologists describe double-check verification systems as structured interventions to confirm a proper preoperative evaluation[18].

The preoperative visit is an example of a tool used to reduce the risk of inadequate preoperative preparation. It aims to provide information about the pre-, intra-, and postoperative periods, decreasing patient anxiety and stress, thus contributing to better recovery after the procedure[5].

Study on the frequency of and reasons for surgery cancellation after the admission of patients to the operating room (OR) identified that some cases of suspension could have been avoided or that surgery could have been postponed before the admission to the OR and anesthesia[19].

Cancellation prevention can be supported by advanced methods to confirm the surgical schedule, such as implementing a standardized preoperative assessment checklist, which analyzes risks, essential preoperative examinations, clinical history, and hemodynamic stability of the patient. In addition, the reinforcement of effective communication among surgical teams, nurses, patients, and family members is a strategy that improves administrative planning[20-22].

The SB interviewees' statements emphasized that the nurse's work can reduce surgery suspension rates. Studies[6-8] underline this professional's responsibility in predicting and providing materials and equipment required for the proper performance of anesthesia and surgical procedures.

Other investigations have also identified the nurses' attitudes before the issue of surgery suspension. These attitudes range between passivity, restlessness, and involvement in effective actions to deal with the problem. The actions performed include: identifying the reasons for cancellation, fretting over the problem for feeling responsible for the patient, proposing solutions to the reasons for cancellation, guiding the nursing team regarding the damage to the patient, systematizing direct care to decrease tensions caused by surgery suspension, and preparing for a new surgical scheduling[23,24].

From this perspective, the nurse's personal attitude raises the health care quality, especially by demonstrating the importance of the nursing process and the actions of multidisciplinary care[19].

We stress the difficulties in categorizing the reasons for surgery cancellation due to issues such as accuracy and definition of the causes for suspension and, especially, to the characteristics of cancellation records, which depend on the individual responsible for the notification, as well as how the description was made. Such differences lead some causes to be listed in more than one category[21].

The scarcity of studies concerning health professionals' perception of surgery cancellation and the predominance of studies on suspension rates according to surgical specialties and on the reasons for surgery suspension based on surgery cancellation indicators represent limitations of the research. In addition to the above issues, multifactorial causes hinder the understanding of the theme and need to be investigated in order to contribute to actions for the planning and management of surgical services.

FINAL CONSIDERATIONS

SB nurses' perception of the reasons for surgery cancellation is related to gaps in surgical planning and prevention of avoidable situations. These reasons are regarded as situations arising from failures in surgery scheduling, prediction and provision of materials and equipment for the procedure, and preoperative care. Effective communication and assertive leadership attitudes are considered strategies that minimize suspension rates.

The multidisciplinary systematization of preoperative evaluation and preparation is an advanced method that reduces the likelihood of surgery suspension. Thus, the nurses who work in the SB should know the causes for surgery cancellation and propose solutions for managing its indicator.

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FACTORS THAT INTERFER IN THE TURNOVER TIME: OPINION OF NURSING PROFESSIONALS

Fatores que interferem no tempo de intervalo entre cirurgias: opinião de profissionais de enfermagem

Factores que interfieren en el intervalo de tiempo entre cirugías: opinión de profesionales de enfermería

Talitha Peralta[1], Fernando Bourscheit[2], Patrícia Treviso[3]*

ABSTRACT: Objective: To know the opinion of nursing professionals about the factors that interfere with the turnover time. **Method:** This is an exploratory, descriptive, prospective study, with qualitative data analysis. Data collection was carried out in a hospital complex in southern Brazil, with the application of a questionnaire on the perception of nursing professionals who work in the surgical center (SC). For data analysis, Bardin content analysis was used. **Results:** A total of 25 professionals participated in the study, four nurses and 21 licensed practical nurses. Two categories were listed, factors related to the team and factors related to the processes of the SC, and seven subcategories. **Conclusion:** Several factors interfere in the turnover time, highlighting team training, adequate staff, collaboration among teams, surgery size, and bureaucratic processes.

Keywords: Surgical centers. Perioperative nursing. Operating room nursing.

RESUMO: Objetivo: Conhecer a opinião de profissionais de enfermagem sobre os fatores que interferem no tempo de intervalo entre as cirurgias. **Método:** Estudo exploratório, descritivo, prospectivo, com análise qualitativa. A coleta de dados foi realizada em um complexo hospitalar no sul do Brasil, com aplicação de questionário sobre a percepção de profissionais de enfermagem que atuam no centro cirúrgico. Para o tratamento dos dados, utilizou-se análise de conteúdo de Bardin. **Resultados:** Participaram do estudo 25 profissionais, sendo quatro enfermeiros e 21 técnicos de enfermagem. Foram elencadas duas categorias, fatores relacionados à equipe e fatores relacionados aos processos do centro cirúrgico, e sete subcategorias. **Conclusão:** Diversos fatores interferem no tempo de intervalo entre cirurgias, destacando-se: capacitação da equipe, dimensionamento de pessoal, colaboração entre as equipes, porte cirúrgico e processos burocráticos.

Palavras-chave: Centros cirúrgicos. Enfermagem perioperatória. Enfermagem de centro cirúrgico.

RESUMEN: Objetivo: Conocer la opinión de los profesionales de enfermería sobre los factores que interfieren en el intervalo de tiempo entre cirugías. **Método:** Estudio exploratorio, descriptivo, prospectivo, con análisis cualitativo. La recolección de datos se realizó en un complejo hospitalario en el sur de Brasil, con la aplicación de un cuestionario sobre la percepción de los profesionales de enfermería que laboran en el quirófano. Para el tratamiento de los datos se utilizó el análisis de contenido de Bardin. **Resultados:** Participaron del estudio 25 profesionales, cuatro enfermeros y 21 técnicos de enfermería. Se enumeraron dos categorías, factores relacionados con el equipo y con los procesos del quirófano, y siete subcategorías. **Conclusión:** Varios factores interfieren en el intervalo de tiempo entre cirugías, destacando: formación de equipos, dimensionamiento del personal, colaboración entre equipos, tamaño quirúrgico y procesos burocráticos.

Palabras clave: Centros quirúrgicos. Enfermería perioperatoria. Enfermería de quirófano.

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INTRODUCTION

Time is a relevant variable in surgical centers (SC). In it, average time of cleaning operating rooms (OR) in the interval between surgeries and average time of delay for the beginning of the anesthetic-surgical procedure can be found. In addition, SC productivity assessment is another important factor that goes through monitoring, in which the OR occupancy rate is measured.[1] The latter, in turn, represents the real use of the SC operational capacity.[2] A prospective study carried out in São Paulo found a direct relation between the occupancy rate and other indicators in the SC, such as the optimization and overload indices, which relate to the gain and loss of operational capacity, respectively. The study also shows that the occupancy rate was inversely proportional to the resistance index, which is related to the use of operational capacity.[3] In order to maintain an accessible occupancy rate for use, carrying out effective bed management is essential, a factor considered fundamental for the planning of operational capacity and for the adequate use of resources.[4]

Taking into account the impact caused by time on the dynamics of the SC, the participation of nurses becomes essential to manage the unit, since they are the professionals who act, in general, in monitoring, evaluating and decision-making, continuously seeking to improve the unit and aiming for excellence.[5]

Therefore, understanding how time optimization in ORs occur is basic to the necessary improvements for the proper functioning of the SC. The implementation of strategies aimed at optimizing the unit is relevant, obtaining the reduction of surgical delays and the improvement in the occupancy rate among its results.[6]

Given the importance of knowing the factors that interfere in the turnover time, the need to expand knowledge about these factors and measures that can contribute to the quality of the service and to the improvement in occupancy rates, in addition to contributing to the quality and safety of care in the SC, gave rise to the present study, with the following research question: What is the opinion of professionals about the factors that affect the turnover time?

OBJECTIVE

To know the opinion of nursing professionals about the factors that interfere with the turnover time.

METHOD

This is an exploratory, descriptive, prospective study, with qualitative data analysis. Research comprised nurses and licensed practical nurses who work in the SC of a hospital size IV, philanthropic, located in Southern Brazil. Roughly 1,490 surgeries are performed per month, of small, medium, and large sizes, of different specialties, the main ones being: general surgery, plastic surgery, cardiac surgery, and oncology surgery. The scheduling of surgeries is done by a team of technical-administrative employees, through its own electronic system. The routine in this institution consists of maintaining a 30-minute interval between scheduling of each surgery. The schedule of appointments is reviewed by the unit's leading nurse the previous day, aiming at sector management.

All licensed practical nurses and nurses in the shift in which the study was developed (afternoon) were invited to participate in research, obtaining the participation of 57% of nurses (four) and 48% of licensed practical nurses (21).

The inclusion criteria were two: being a nursing professional and working at the SC of the hospital. The exclusion criterion referred to nursing professionals who, during data collection, were on vacation, certificate, or leave.

Data collection was carried out from January to February 2020, with the auxiliary researcher conducting interviews, recorded in audio and later transcribed. For the interviews, a script developed by the researchers was used, composed of two open questions, with emphasis on professionals' opinion on the factors that interfere in the turnover time. The instrument addressed the following questions:

- What factors do you understand that contribute to the increase in time between one surgery and the next one?;
- What factors do you understand that can or could contribute to reducing this time?

Besides that, information on sample profile was collected: age, profession, and time of work in the SC.

For data analysis, Bardin's content analysis was used,[7] which involves three stages: pre-analysis; exploration of the material and treatment of the results obtained; and inference and interpretation. To guarantee participants' anonymity, identification by the initial letter of their professions was systematized, followed by the Arabic numbering according to

interview order (N1, LPN1...). Results are presented according to the analysis categories.

The research project was approved by the Research Ethics Committee of the proposing and co-participating institutions, through Plataforma Brasil, under the Certificate of Presentation of Ethical Appreciation (CAAE) No. 24350919.5.0000.5335 and 24350919.5.3001.5308, respectively. Participants signed the Free and Informed Consent Form (FICF). Research was guided by Resolution No. 466/2012, of the Brazilian National Health Council, on ethics in research involving human beings.[8]

RESULTS

A total of 25 nursing professionals participated in the study: four nurses (N) and 21 licensed practical nurses (LPN), aged between 21 and 52 years old and working at the SC between three months and 18 years.

The results are presented according to the two categories of analysis emerging from the subjects' interviews — factors related to the team and to the processes of the surgical center — followed by the seven subcategories, three from the first category and four from the second, as described in Table 1.

Category 1: Factors related to the team

Subcategory 1.1: Training and qualification

Training and qualification of professionals who work in the SC were described by the participants as influencing the turnover time, as can be seen in the following statements:

> *I believe* [...] *that the time depends a lot on the employee who is in the room, there are employees who are quicker, who can clean a room and prepare it for the next surgery in* [...] *15 minutes, and there are employees who cannot, who may need 30 to 40 minutes.* [...] *I think they need guidance, improved training, answers to their questions, because they are often lost in some documentation; then it ends up affecting time between surgeries; it takes time for the room to be ready* (N1).

> *"Sometimes new people are not so agile; it also* [...] *increases the time needed to arrange the material, tools... So, this also increases the turnover time"* (N3).

> *What can increase the time of surgeries starts in the reception, in patients' hospitalization, if the hospitalization is inattentive* [...] *as to the place the patient will be taken, which happens a lot here, they take patients to the wrong surgical center.* [...] *And the clock is running* (LPN18).

Table 1. Categories and subcategories emerging from the speeches of nurses and licensed practical nurses.

Categories	Subcategories
Factors related to the team	• Training and qualification; • Adequate staff; • Cooperation and organization of the multidisciplinary team.
Factors related to the operating room processes	• Delays by patients and professionals; • Assembly and disassembly of operating rooms and other activities; • Surgery size; • Bureaucratic processes.

Subcategory 1.2: Adequate staff

Participants pointed out that the lack of employees has a negative influence on the interval time and care routine:

> *The lack of employees is a major factor, you do not have the employee needed for the next surgery, you have to take employees from an on-going surgery to take them to another surgery.* [...] *Sometimes you don't have a sanitation employee available either* (N4).

> *"What can increase* [the turnover time] *is that we do not have a sanitation employee, because it is not only up to nursing staff to manage the turnover time"* (LPN14).

In participants' opinions, adequate staffing would be a beneficial strategy for care:

> *It often happens to have few employees* [...]. *So I think that the reduced number of employees ends up interfering in this factor and increasing the turnover time.* [...] *I believe that an increase in staff would also be a necessary thing for us to be able to streamline and optimize the occupancy rate even more* (N2).

> *"If there was a person to prepare patients it would be wonderful* [...]. *If someone dressed them for surgeries, care would* be streamlined" (LPN5).

In addition to the lack of employees, the challenge of communication between teams is also a factor that interferes in the analyzed process:

> *The cleaning staff is made of one cleaning person here* [...] *and she serves the post-anesthesia care unit (PACU), all seven rooms in the surgical center, the dressing room for employees, for patients, so sometimes we go look for the sanitation employee and don't find her; it also contributes to the increase in the turnover time* (N2).

The cleaning time of the ORs was pointed out as one of the reasons for increasing the turnover time: *"Room time means cleaning the room between surgeries.* [...] *It has to be a little more agile for us to perform surgeries"* (LPN3).

Subcategory 1.3: Cooperation and organization of the multidisciplinary team

Participants mentioned that the lack or non-conformity of information provided by the medical team interferes with the organization of the sector and, therefore, with the time between one surgery and the next one:

> *There is also a lack of scheduling organization on the doctors' agenda, they often change it* [...]. *The change in the order of surgical schedule significantly delays the rooms, besides the lack of equipment because doctors do not say what they will need in surgeries; then it turns out that at the time of the surgery, they want something we don't have. Until we get this material, more time is lost in the operating room* (LPN13).

Some statements relate the commitment and cooperation of the multidisciplinary team in view of the increase in time between each surgery, stating that changes in these factors could reduce the idle time of ORs:

> *Sometimes, if it is the same team, they go out often, go to their break and take a long time to come back, and then* [...] *the room gets idle* [...] *Just as it is when surgery is scheduled for 1* pm, *they come at* 2pm, *and this room* also spends one additional hour. [...] *What would decrease the turnover time would be if* [...] *each one tried to leave it more organized.* [...] *Not to mention the delays, right?!* (LPN8).

> *"I think* [...] *showing them the numbers regarding delays in meetings, this type of issue... Guidance"* (LPN15).

The behavior of professionals and students has also been described as a factor that can interfere with the increase in the interval time and idleness of the OR:

> *The turnover time? What does increase it? The confusion with residents and medical students in rooms; we don't have that collaboration, people don't go out, they don't help, they leave a mess, they throw everything on the floor. And we need to collect everything, right?! This ends up taking a little longer.* [...] *Having someone who teach these things, they are interested in learning, right?!* (LPN10).

Another aspect mentioned by two participants is the collaboration in filling out the documents related to the surgery performed:

> *"Sometimes, doctors leave the room without signing documents and we end up having to go after them! Search and see where they are, because we need to deliver documents signed, so we end up holding an unused room"* (LPN11); *"Doctors also sometimes get tangled up to do the papers, they take time; then the papers do not come out with the patient, you have to wait; when we all have other things to do, right?!"* (LPN9).

Category 2: factors related to the surgical center processes

Subcategory 2.1: Delays of patients and professionals

Delays were listed as one of the subcategories for covering a large part of the aspects responsible for increasing the turnover time, in participants' opinion:

> *Usually there are surgeries that have to start at 7 am or 8 am, but they start at 8:30 am, 9 am.* [...] *I believe that the main factor is organization; in fact, the lack of it, of having someone to control, to plan.* [...] *Especially because, if you don't arrive on time, you'll delay the next surgery and so on* (LPN12).

> *"It also delays the surgery, because the patient has to wait before entering the room.* [...] *Sometimes doctors are late, you know. Anesthesiologist"* (LPN17); *"Ah, if it is delayed, sometimes patients are late, sometimes the anesthesiologist or the surgeon are late, it depends. The turnover time increases a lot. Right?! Half an hour, an hour* of delay" (LPN20); *"I often think that it is an anesthesiologist's delay and, sometimes, it is the patient's delay, the displacement from hospitals to here"* (LPN21).

Subcategory 2.2: Operating room breakdown and set up and other activities

The numerous tasks related to preparing patients and the OR for surgery were pointed out by participants as factors that interfere with the time needed to clear the room for the beginning of the next surgical procedure:

> *"I think that what increases the turnover time is having to dress patients, to take the material back to the pharmacy, listing the material that was used in surgery"* (LPN4); *"Currently, there's a new protocol for us to clean materials inside the room.* [...] *We stay there for some time to clean it and then it increases time... I believe it is a little unnecessary"* (LPN19).

In addition, professionals revealed that the lack of material interferes with the turnover time. Accidentally, one of the participants responded to the interview in a moment in an idle room caused by this reason:

> *"The lack of material* [...] *this harms* the process [...] it *lacks sheets, everything; bed clothes have not arrived until now, I haven't managed to fix it yet, because there is no sheet in my room"* (LPN10).

Employees also need to displace themselves to search for material in another sector of the hospital, which was also evidenced:

> *"There is a great lack of material. We are left with scarce material that comes from the material center, this greatly delays our surgeries, having to go to other hospitals within the complex, borrow materials, and* take them" (LPN13).

Subcategory 2.3: Surgery size

Surgery size was reported as a determinant of the turnover time, as observed in the following statement:

> *Between the beginning and the end of a surgery, the most important factor is the type of surgery, which determines if we will need to get material from the pharmacy, what we will need to get from our arsenal and set up the room so that it can start* (LPN6).

This element can even be a proportional factor: the bigger the surgery, the longer the time, and vice versa:

> *First, there is the time required for the room, for minor surgeries,* [...] *as you use less material and dirty the room less, surgeries are faster* [...] *and, cleaning and organizing the rooms is easier, because little material and little equipment is needed. Larger and more complex surgeries* [...] *demand more from the nursing team, the cleaning team, they require more materials, occupy the room more, dirty it more,* [...] *so they take longer in relation* [...] *to* surgery size (LPN1).

> *"In very large surgeries, cleaning is extensive, things get a lot dirtier, we have to clean everything, leave the room clear. So, I think that very large surgeries increase the time needed to* deliver rooms" (LPN16).

However, one of the participants considered that, in situations of small surgeries, when in large numbers, one after the other, there may be an increase in the release time of the room, differing from the previous statements:

> *"I think that surgeries happen very fast here, the circulator nurse sometimes doesn't even have time to prepare the next patient. This ends up delaying the process"* (LPN7).

Subcategory 2.4: Bureaucratic processes

Bureaucratic issues, according to participants, can also interfere with the turnover time: *"Everything in the system will contribute to make things last a little longer"* (LPN2).

> *There is a bureaucratic aspect,* [...] *and this ends up increasing the preparation time from one patient to*

> *another; so we need to register the piece that goes to the anatomopathological analysis; we need to close the system with a* checklist, [...] *print papers, which are partially sent to the financial officer; the other part goes to the post-anesthesia care unit (PACU) or with the patient*. [...] *This ends up increasing the turnover time* (LPN11).

Still, one of the statements emphasizes the importance of records, but with the condition that the documentation unification would help in reducing the time:

> *Trying to unify some information*. [...] *Of course everything has to be registered, everything needs to be described, but we realize that what is asked for in a record is asked for exactly in the other, just with different words, so maybe trying to unify it would be good* (N4).

DISCUSSION

Study results point to the importance of training and qualification of the professionals who work in the SC, showing that, many times, they arrive at the institution without previous experience, and qualification could have a positive impact in reducing the turnover time and, therefore, in the occupancy rate of the SC. Continuing education is fundamental for the quality of care provided.[9]

In the SC, nurses play a relevant role, both in the continuing education of the team and in training, and in the adequate dimensioning of the nursing team to meet the needs of patients and the unit, with quality and safety.[1,10]

Licensed practical nurses at the SC perform the functions of scrub nurses and circulating nurses;[1] they are indispensable professionals in the functioning of the SC and patient care. Continuing education contributes to the quality of the work delivered by this team. Likewise, to promote qualified and safe care, the entire surgical team must be updated.[11]

The lack of professionals reported by the interviewees is corroborated by the literature,[12] which points out the relation between suspending surgical procedures and the lack of employees. A study carried out in São Paulo[13] found that the reduced number of sanitation professionals is a factor that negatively affects the turnover time. Similarly, the authors observed that the increase in the number of employees could decrease this time. In addition, perioperative nursing aims to provide safe and quality care to patients throughout the perioperative period, and the proper dimensioning of the nursing team is essential in this process.[14] In this context, another study[15] found that hospitals that invest in human resources have better results, such as, for example, low mortality rate and lower costs, which is a measure that confirms the duty of health institutions to the culture of patient safety.[10]

As for hygiene, the professionals who clean the ORs at the institution hosting research are hired by the hospital complex, composing the hosting team. Study participants mentioned that they need to call the hosting team to clean the OR and, many times, these professionals are not easily found, since they clean the entire sector or even other units, a factor that leads to an increase in waiting time or idleness between surgeries. This practice is also described in a study that analyzed the turnover time.[13]

OR organization process is essential for the quality of care, because the preparation of rooms and the provision of necessary resources are details that contribute to smooth surgeries and, therefore, to patient safety.[16] In addition, the lack of materials interferes not only in the turnover time, but also in the suspension of elective surgeries.[13,17] Similarly, the shortage of materials is a management challenge for nurses who work in the SC.[18]

Surgery size was identified as one of the factors that increase the turnover time, related to the number of materials used and the time spent on cleaning. Accordingly, the literature states that surgery size is linked to the need for more time for cleaning and preparing ORs.[13,19]

The bureaucracy and the large amount of documents that need to be filled out, both on paper and in a system, and, often, documents with repeated information that occupy a precious time that could be used for care, increase the idle time of ORs, contributing to delays in surgeries.[20] In accordance with such information, a study demonstrated that filling out documentation was the activity which required the longest time by the nursing team during the transoperative period.[19]

As for the delay of professionals in the surgical team, a fact observed in this study, it affects the dynamics and scheduling of the surgical agenda.[4] When the first surgery of the day starts late, the entire surgical schedule is compromised, causing the upcoming surgeries to exceed their limit hours.[21] Another study pointed out a general average of 50 minutes of OR delay due mainly to the delay of the medical team, followed by other factors, such as: delay

of patients, support services, nursing human resources and organization problems, and provision of materials.[21] Another study reinforces the relation between delayed staff and idle room time, besides the suspension of surgeries at a teaching hospital.[22]

Professionals must be committed to the work, even when they are not directly involved in surgical procedures.[23] Taking into account that the increase in the turnover time can negatively impact the productivity of the SC, teams affect this time according to their actions, their organization, and their individual behaviors.[13] The transoperative period involves several people, with different knowledge, who have the same objective: to provide safe care to patients, with an effective outcome. Collaboration and effective communication contribute positively to the SC and OR environments. Besides that, developing a culture of cooperation and respect among professionals helps in patient safety.[24]

Study results confirm the findings of other similar studies, regarding the factors that interfere with the turnover time. As to weaknesses, there is still a long way to go, permeating the management of the work processes in the SC and the complex communication process among teams. A study limitation is the non-inclusion of professionals from other teams, in addition to the nursing team.

Study results combined with that evidenced by the literature show the relevance of nurses' role in the management of the SC, in conflict resolution, in decision making, and in continuing education.

FINAL CONSIDERATIONS

The study made it possible to know the opinion of professional nurses and licensed practical nurses on the factors that interfere with the turnover time. The results showed that the interviewees believe several factors contribute to extend the turnover time, such as lack of training and qualification, adequate staff, cooperation and organization of the multidisciplinary team, delays by professionals and patients, delay in providing materials, assembly and disassembly of the OR, surgery size, and bureaucratic processes.

The study also highlighted opinions on factors that could contribute to the optimization of time between surgeries, such as: staff training and qualification, adequate dimensioning of professionals, effective communication and collaboration among teams, punctuality and follow-up of scheduled procedures, and reduction of number of documents, unifying the information to be registered.

Therefore, the institution must promote continuing education, ensuring the qualification of care and strengthening patient safety, in addition to improving the performance of quality indicators.

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PHYSICAL, EMOTIONAL, AND SOCIOECONOMIC REPERCUSSIONS IN INDIVIDUALS WHO EXPERIENCE THE PROLONGED WAITING FOR SURGERY

Repercussões físicas, emocionais e socioeconômicas nos indivíduos que vivenciam a espera prolongada por cirurgia

Repercusiones físicas, emocionales y socioeconómicas en individuos que experimentan la espera prolongada por la cirugía

Giovanna Brichi Pesce[1], Alysson Carraschi Da Silva[2], Eduardo Rocha Covre[3], Maria Fernanda do Prado Tostes[4]

ABSTRACT: Objective: To describe the physical, emotional, and socioeconomic repercussions resulting from the prolonged waiting for surgery by users of the Brazilian Unified Health System (SUS). **Method:** Descriptive study with a qualitative approach, carried out based on the electronic database "Caixa Preta da Saúde". The registered records were collected in 2015. The results were presented in thematic categories and interpreted according to the Theory of Praxic Intervention of Nursing in Public Health. **Results:** The prolonged waiting for surgery contributed to: 1) the worsening of physical health, characterized mainly by pain and disability; 2) emotional suffering, evidenced by despair, indignation, frustration, among others; 3) the socioeconomic impact related to the inability to work and defray health expenses. **Conclusion:** The prolonged waiting for surgery had a negative impact on the lives of individuals. Comprehensive care in the care of patients who need surgery will be guaranteed if it is addressed in the structural, singular, and particular dimensions.

Keywords: Surgical procedures, operative. Health services accessibility. Nursing.

RESUMO: Objetivo: Descrever as repercussões físicas, emocionais e socioeconômicas decorrentes da espera prolongada por cirurgia pelos usuários do Sistema Único de Saúde. **Método:** Estudo descritivo, com abordagem qualitativa, realizado com base no banco de dados eletrônico "Caixa Preta da Saúde". Os registros cadastrados foram coletados em 2015. Os resultados foram apresentados em categorias temáticas e interpretados segundo a Teoria de Intervenção Práxica da Enfermagem em Saúde Coletiva. **Resultados:** A espera prolongada por cirurgia contribuiu para: 1) o agravamento da saúde física, caracterizado principalmente por dores e incapacidades; 2) o sofrimento emocional, constatado pelo desespero, indignação, frustração, entre outros; 3) o impacto socioeconômico relacionado à incapacidade para trabalhar e custear gastos com a saúde. **Conclusão:** Evidenciou-se que a prolongada espera por cirurgia impactou negativamente a vida dos indivíduos. Acredita-se que a integralidade do cuidado na assistência ao paciente que necessita de cirurgia será garantida se for abordada nas dimensões estrutural, singular e particular.

Palavras-chave: Procedimentos cirúrgicos operatórios. Acesso aos serviços de saúde. Enfermagem.

RESUMEN: Objetivo: Describir las repercusiones físicas, emocionales y socioeconómicas derivadas de la prolongada espera quirúrgica de los usuarios del Sistema Único de Salud. **Método:** Estudio descriptivo, con abordaje cualitativo, realizado mediante la base de datos electrónica "Caixa Preta da Saúde". Los registros fueron recolectados en 2015. Los resultados fueron presentados en categorías temáticas e interpretados de acuerdo a la Teoría de la Intervención Práxica de Enfermería en Salud Pública. **Resultados:** La espera prolongada para la cirugía contribuyó a: 1. Empeoramiento de la salud

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física, caracterizada principalmente por dolor y discapacidad; 2. Sufrimiento emocional verificado por desesperación, indignación, frustración, entre otros; 3. Impacto socioeconómico relacionado con la incapacidad para trabajar y los costes sanitarios. **Conclusión:** Se hizo evidente que la larga espera para la cirugía tuvo un impacto negativo en la vida de las personas. Se cree que la integralidad en la atención de los pacientes que requieren cirugía estará garantizada si se aborda en las dimensiones estructural, singular y particular.

Palabras clave: Procedimientos quirúrgicos operativos. Accesibilidad a los servicios de salud. Enfermería.

INTRODUCTION

Surgery is an indivisible and indispensable part of health care and can help millions of people lead healthy and productive lives. Thus, it must be a fundamental component of the national health system in all countries, regardless of their level of socioeconomic development.[1]

In the next 20 years, because of the epidemiological transition in many low- and middle-income countries, the need for surgery will continually and substantially increase.[1] Affordable and safe surgical care contributes to the reduction of morbidity and mortality, and disabilities resulting from surgical conditions. In addition, it improves the well-being of the population, economic productivity, individual capacity and freedom, contributing to the long-term development of countries and the strengthening of health systems.[1-4]

Despite the undeniable relevance of surgery in the context of public health in Brazil, in a survey conducted in 2014 to assess the opinion of Brazilians on health care, most respondents pointed out that surgery is one of the procedures most difficult to be accessed in health services. They also stated that the wait is too long and, for 29% of those in the queue, it can exceed six months.[5] In addition, waiting for treatment can be a factor that generates anxiety, stress, and uncertainty, interfering with daily social activities and affecting work capacity.[6]

In the indexed literature, this is the first study to address the physical, emotional, and socioeconomic repercussions of users of the Brazilian Unified Health System (SUS) who are waiting for surgery in southern Brazil. Seen that, given the global importance of surgical care, its impact on patients' quality of life, the limited access and the interest in answering some emerging challenges in Nursing, the present study is proposed.

OBJECTIVE

To describe the physical, emotional, and socioeconomic repercussions resulting from the prolonged waiting for surgery by users of the Brazilian Unified Health System (SUS).

METHOD

Documentary study, with a qualitative approach, carried out based on a secondary source of public domain data from the electronic database "Caixa Preta da Saúde". Created on March 12, 2014, the result of a non-governmental initiative of the Brazilian Medical Association (*Associação Médica Brasileira* - AMB), this database is an electronic communication channel with users of health services and aims to receive and compile complaints/records about problems affecting public and private health in Brazil.[7]

Through the electronic address http://www.caixapretadasaude.org.br/, anyone, from any location in the country, can register and send their complaint with the description of the event, selecting the city and the state.

Data collection was carried out collectively by two researchers in December 2015. In the electronic database, on the aforementioned website, a check box was available to select each state in the country. After this choice, the municipalities that had registered complaints were available for selection. With the selection of each municipality, text boxes were opened with the record of the complaint in full.

In the data collection process, the records of the period of one year were recovered from the creation of the electronic page. Therefore, it happened from March 2014 to February 2015, for each municipality in the Southern region of the country. The recovered records were separated by states and stored in Excel spreadsheets. In each of these, the following variables were filled out: date of the complaint, municipality, health service involved, complete description, relation with surgical care (yes or no), relation with the prolonged waiting time (yes or no). Each complaint was read in its entirety and those that met the following inclusion criteria were selected: the complaint should address the waiting for surgery and the repercussions resulting from this waiting on the individual's life.

In data analysis, two other researchers participated collectively in the process. The reports were grouped into thematic categories and analyzed qualitatively. For the codification of reports, the city of origin of the complaint and the waiting time for the surgery were mentioned.

In this study, the Theory of Praxic Intervention in Nursing in Collective Health (*Teoria de Intervenção Práxica da Enfermagem em Saúde Coletiva* - TIPESC) was chosen as the theoretical basis. Based on the materialistic, historical, and dialectical worldview, this theory is therefore born in the field of collective health and within the framework of the social determination of health-disease processes. It seeks to capture and interpret a phenomenon linked to the social production and reproduction processes related to the health-disease of a given community, within the framework of its conjuncture and structure, in a historically determined social context: the phenomenon of intervening in this reality and continuing to reinterpret objective reality to interpose again an intervention instrument.

There are three dimensions of objective reality in the operationalization of TIPESC: the structural, the particular, and the singular. The structural approach is the approximation of the macroscopic or macrostructural aspects of the focused object. The particular one refers to the epidemiological profile of the class, the reproductive profile, the health-disease profile, and health practices and ideologies. The singular highlights the processes that lead to falling ill or dying, or the development of the biopsychic nexus given by the individual's functioning and consumption-work pattern.[8]

The study complies with Resolution No. 466/2012 of the National Health Council, and the project was approved by the Ethics Committee, via Plataforma Brasil, under Certificate of Presentation for Ethical Appreciation (CAAE) No. 44899215.0.0000.0104 and opinion No. 1.124.424/2015.

RESULTS

According to data from Caixa Preta da Saúde, 3,773 complaints involving health care were registered and came from all regions of Brazil. In the Southern region, there were 462 complaints, of which 72 involved surgical care. Of these, most (n=51) mentioned difficulties in accessing surgery. In addition, there was a predominance of complaints (n=26) that reported physical repercussions, followed by those that addressed emotional repercussions (n=17), and eight that mentioned socioeconomic impacts. In most reports, patients were simultaneously affected by physical, emotional, and/or socioeconomic repercussions resulting from the situation of waiting for surgery, as shown in Table 1.

Next, the reports that involved the long wait for surgical care are categorized and presented in three categories.

Physical health worsening due to prolonged waiting for surgery

Regarding the reports, the prolonged waiting time contributed to the appearance of physical discomfort evidenced by pain, worsening of the pain or physical limitations of patients, preventing them from performing routine activities that were previously considered simple. There were also other symptoms reported, as shown in the following excerpts:

> *"Release of gallbladder surgery* [...] *only for September 29... I suffer constant pain"* (Cachoeira do Sul City/Rio Grande do Sul State, five months of waiting).

> *"I've been in line for tonsil surgery since 2010* [...], *I'm having pain in the back of my neck, which goes*

Table 1. Characterization of the complaints registered at Caixa Preta da Saúde, differentiated by states in the Southern region of Brazil.

Variables	Southern Region States			
	Paraná	Santa Catarina	Rio Grande do Sul	Total
Complaints topic				
General	185	89	188	462
Surgical care	35	16	21	72
Waiting for surgery	26	9	16	51
Repercussions due to prolonged waiting for surgery				
Physical	14	4	8	26
Emotional	7	4	6	17
Socioeconomic	5	1	2	8

through my neck and into my ear" (Londrina City / Paraná State, five years of waiting).

"She had a twisted femur that when she went to see it, was broken, but as she was weak from the bones, the doctors claimed that the surgery could not be done, so she has been like this for four years on a wheelchair" (Porto Alegre City / Rio Grande do Sul State, four years of waiting).

"Since 2008, I have been waiting for a surgery to remove materials from the elbow […] *, I feel a lot of pain"* (Joinville City / Santa Catarina State, six years of waiting).

"My father was admitted to the UPA […], *but until today he has not been able to find a vascular surgeon. He has a fever every day"* (Curitiba City / Paraná State, waiting time not mentioned).

"My father-in-law […] *has a 90% blockage of his carotid artery, compromising the vascularization of the brain, having to perform more a very urgent surgery* […], *until today the surgery has not been done, he has dizziness and loss of concatenation of ideas"* (Maringá City / Paraná State, eight months of waiting).

"My sister […] has *been waiting for bariatric surgery for over three years, she became blinded due to the complications of diabetes"* (Canoas City / Rio Grande do Sul State, three years of waiting).

Although the waiting time for care was not long, it put the patient at risk. Additionally, the wait for surgery was due to the lack of materials, as described below:

"Pregnant for three days with a dead baby in her belly, she is still waiting for a cesarean" (Rolândia City / Paraná State, three days of waiting).

"I have a kidney stone of 0.8 cm stopped in my ureter, I need a double J catheter placement surgery […], *I have to wait because there are no materials for the surgery, I feel constant cramps* […], *I run the risk of losing my left kidney functions"* (Londrina City / Paraná State, 20 days of waiting).

Physical health worsening due to prolonged waiting for surgery

In this category, feelings identified were despair, helplessness, psychological suffering, frustration, shame, feeling of disrespect, humiliation, neglect, disbelief, revolt against the SUS and the care provided by some professionals. Patients and their family members experienced prejudice and embarrassment:

"My aunt was diagnosed with a tumor in her leg bone and it's been over a year […], *I would like to ask for help, for the love of God"* (São João do Sul City / Santa Catarina State, more than a year of waiting).

"I've been waiting for surgery for seven years […], *I don't know what else to do"* (Curitiba City / Paraná State, seven years of waiting).

"I have hemorrhoids […], *after almost two years, they called me to book the surgery* […], *then they called me to cancel it because of a holiday* […]. *I found it disrespectful to me, I felt humiliated* […], *I came home frustrated, feeling ashamed of being Brazilian, a worker"* (Florianópolis City / Santa Catarina State, proctology, two years of waiting).

"I was referred for the placement of a knee prosthesis almost eight years ago and until now nothing […], *disregard with the Brazilian people!"* (Guaíba City / Rio Grande do Sul State, orthopedics, eight years of waiting).

"I have been waiting for vascular surgery on the lower limbs for five years […], *I am afraid of losing my legs. God help me! I paid* the *INSS* [National Social Security Institute] *all my life and now that I need it, they turn their back to me"* (Porto Alegre City / Rio Grande do Sul State, vascular, five years of waiting).

"I have been waiting for bariatric surgery for four years […], *not to mention the prejudice that all obese people face on a daily basis"* (Sapiranga City / Rio Grande do Sul State, four years of waiting).

In some cases, the waiting period evolved to more serious conditions, such as death. In these situations, the repercussions

were not restricted to the individual, but included close people and family members. In addition, according to the reports, there are situations in which there was negligence in the care, as shown in the following reports:

> *"I lost a friend, simply because doctors did not touch patients when assessing them; her appendix burst* […]*, she had to wait 13 hours for a surgery that should have been done urgently* […]*, she lost her life due to irresponsibility and delayed care"* (Rio Grande City / Rio Grande do Sul State, 13 hours).

> *"My father* […]*, 89 years old, was waiting* […] for *an appointment with a cardiologist, because he needed a pacemaker* […]*, unfortunately his heart couldn't take the wait"* (Viamão City / Rio Grande do Sul State, five months).

> *"My father needed to be seen in the emergency room* […] *because he had severe pain in his abdomen* […]*, they applied dolantine, a potent medicine for pain... There was an improvement in the pain and my father was released* […]*. When it was midnight (already Saturday) my father enters in the ER again with the same complaint* […]*, my father was left with no care of a professional until 4 pm* […]*. My mother was desperate* […]*. When they opened it, he had a perforated ulcer, the intestine was necrotic, a kidney no longer worked... Anyway... My father passed away"* (Guaíba City / Rio Grande do Sul State, 16 hours).

Socioeconomic impact due to prolonged waiting for surgery

In this category, the impossibility of working due to the worsening of physical health was a frequent complaint, according to the following narrations:

> *"I have been waiting for varicose vein surgery since August 2012* […]*, I am out of work, as I feel a lot of pain"* (Santa Maria City / Rio Grande do Sul State, three years of waiting).

> *"I ruptured the cruciate ligament on my left knee three years ago* […]*, I am unable to work"* (Almirante Tamandaré City / Paraná State, public, three years of waiting).

> *"I am waiting for the surgery until today* […]*, I can no longer work due to the hernia"* (Curitiba City / Paraná State, one year and six months of waiting).

> *"My mother has been in line for stomach reduction surgery for three years* […]*, she can't work anymore, and no news about the surgery"* (Londrina City / Paraná State, three years of waiting).

> *"My husband is awaiting knee surgery* […]*. He is away from work indefinitely"* (Londrina City / Paraná State, waiting time not mentioned).

> *"To do thyroid surgery, which is in an advanced state and penetrating the rib cage, there were 2,287 people in line* […]*, we will have to sell things (car, other objects) to pay for a private surgery"* (Foz do Iguaçu City / Paraná State, waiting time not mentioned).

DISCUSSION

The present study revealed that the long wait for surgery experienced by SUS users in the Southern region of Brazil had a wide and negative impact on the lives of individuals. In addition to the worsening of physical condition, emotional and social problems emerged from this unacceptable condition of waiting.

In a study conducted with a similar purpose, the authors showed that waiting for surgery involved a prolonged period of decreased health in the lives of individuals. In addition to physical condition, the psychological and social dimensions were affected. The variation in the severity of these consequences among patients indicates that prioritizing cases could reduce this personal burden resulting from waiting. Early information on the length of the delay can further promote patient acceptance for waiting.[6]

In an attempt to take a broader look at this issue and its contradictions, we must understand it and approach it from the structural, particular, and individual points of view, as it is believed that this phenomenon stems from the contradictions found in the interpretation of such a dramatic reality.

In an analysis from the structural point of view, the Brazilian Federal Constitution of 1988 is used, which puts health as a right for all and a duty of the State, guaranteed through social and economic policies to reduce the risk of disease and other conditions, and universal and egalitarian access to actions and services for their promotion, protection, and recovery. For the operationalization of health policy, SUS was created, with the purpose of offering the Brazilian population health services from primary to tertiary care, based on the following principles: universality, equity, and integrality.[9]

In view of the lack of access and guarantee of surgical care, evidenced by the results of this study, the current health policy, guided by solid principles, did not fulfill its purpose. One of the contributing factors is believed to be the historical and unacceptable underfunding, in addition to the inefficient management of the health sector in Brazil, with *per capita* public spending on health lower than in countries with universal systems just like ours.[7]

Among the services provided by SUS, surgical procedures are the second most requested. Consequently, 143.2 million reais (BRL) were allocated to elective surgeries in 2015, as regulated by ordinance No. 1,034, of the Ministry of Health.[10] However, governmental initiatives like this are important, but not resolving for those who experience the waiting situation. To overcome this macro-structural challenge, political will is needed to make health a government priority.

The delay in care led some users to declare that they had sought private health care. Thus, the mechanisms for installing private medicine as the main and non-supplementary system are strengthened, deepening the crisis in Brazilian public health. This crisis started in the post-1988 Federal Constitution as a normative contradiction, because, if on the one hand a legal system promises universal and unrestricted health, on the other, the reality of little concreteness of the citizenship right to health in Brazil is evident by its underfunding.[11]

Since it is estimated that 5 billion people do not have access to anesthetic and surgical care when needed, the Lancet Commission on Global Surgery was created in 2013 to assess the current state of worldwide surgical care and make concrete recommendations for universal access to anesthetic and surgical care. This commission established the performance of 5,000 surgical procedures per year for 100,000 people by 2030. This indicator corresponds to an adequate supply of the needs in anesthetic and surgical care. To achieve this goal, ensuring a wide expansion of health and surgical systems will be imperative, which implies hiring twice the surgical workforce by 2030. This expansion of the surgical volume must be accompanied by an increase in quality, safety, and equity, which must be guaranteed by local managers in the countries.[12]

In the particular dimension, many access failures are revealed due to poor management of health services. The organizational causes related to health institutions are lack of beds and professionals, scheduling errors and communication failures, as well as administrative problems of another nature.[13] As an example of this, in a study conducted to investigate the number of elective surgeries canceled in a university hospital and to identify its causes, the authors pointed out that, for three months, 1,699 elective surgeries were scheduled, of which 466 (27.4%) were canceled. Most cancellations occurred "at the surgeon's discretion", which was found in 264 cases (56.7%), without specifying the reason for the decision.[14]

During the period prior to the surgery, individuals remained unattended by health services and professionals, which was demonstrated in the reports characterized by insecurity, fear, revolt, and disbelief in relation to these services. This lack of care and complete absence of a bond between individuals and health professionals largely violates the principle of integrality. This reality is not exclusive to Brazil, as verified in a study carried out in Canada, which showed that patients waiting for bariatric surgery did not receive care in the period prior to the procedure. The researchers suggest that the health system should provide a contact person who could provide information about the waiting time, the place on the waiting list, and explanations of the delays.[15]

This gap in care for patients in the waiting phase, for those who need surgery, leads us to primary care, since it is the user's gateway to SUS for later referral to the specialized service.[16] In this study, the results revealed the existence of care demands on individuals, either to minimize problems arising from the pathological process, or to prevent the occurrence of other psychosocial disorders arising from the waiting situation. It is therefore suggested that, in the scope of basic and specialized care, there has been negligence in care. In this regard, Nursing, in the care of patients with surgical needs, can act in a relevant way outside the Surgical Center/Hospital. This is because nurses, in primary and secondary care, have

a fundamental role in this process and can be leaders in preventive care actions to problems arising from waiting for surgery and, thus, strengthen the health care of those who wait for the procedure.

In England, a strategy considered successful in managing waiting is the definition of the minimum time recommended and established time for different types of elective procedures, and the association of hospital incentives or penalties for fulfilling this objective. Moreover, other interventions to reduce the long waiting list are screening actions which can be performed, that is, prioritizing cases taking into account the severity of the disease, the benefit that the surgical procedure would bring, and the possibility or not of working in a clinical way with that patient.[17]

In the singular context, these citizens are in a state of vulnerability, weakened in guaranteeing their rights as citizens. The prolonged wait can evolve to worsen the health-disease process, resulting from the space of social production, characterized by inequities and lack of care.[18] Besides that, impaired physical and emotional conditions prevented professional functions from being performed, functions that are not only a source of livelihood, but also of status and part of personal identity.

Therefore, the social determination of health in the dilemma of waiting for surgery is notorious, because of the following social contradictions: lack of access to surgery and lack of care in other levels of care to prevent physical and psychosocial problems resulting from prolonged waiting for surgery. This reveals the invisibility of care actions, even of nurses, in this useful field for their performance and for exercising the role of Nursing.

As a limitation, this study covered the dilemmas arising from patients who experienced prolonged waiting for surgery in southern Brazil and who were registered voluntarily in the database consulted. Therefore, this reality may not be representative for the entire country.

Despite this, this investigation provided an opportunity to learn about the situation of health service users waiting for surgery, in the three dimensions of objective reality. In the structural dimension, the issue was analyzed from the perspective of the governmental role of the State and its contradictions: health as a constitutional guarantee and health policy with solid foundations and principles, but which is not widely guaranteed to citizens. As it is not a government priority, the State is deserting its role in guaranteeing it. In the particular dimension, the reorganization of health services must provide comprehensive health care at all levels of care. However, the contradiction is evident in the inefficient management and the lack of care promoted by health services and professionals. In the singular dimension, the following contradiction stands out: individuals have health needs that go beyond the scope of the pathological process that generated it, because they are unassisted, and other problems and demands for care arise in the physical, mental, and social aspects.

Regarding the implications for Nursing, these results act as a call to nurses at all levels of health care, given that surgical patients are in different points of the care network and, therefore, must be fully cared for strengthening the health system and the current health policy.

FINAL CONSIDERATIONS

The main repercussions resulting from the wait for surgery experienced by individuals first covered the physical aspects, characterized mainly by pain and physical disability, and other physiological changes. The following emotional repercussions were found: despair, indignation, frustration, neglect, prejudice, and embarrassment. In the socioeconomic implications, the following stood out: inability to work and defray excessive spending on the private health sector. The patients who used the Caixa Preta da Saúde e-mail address did so in an outburst tone, mentioning only the negative aspects that waiting for a surgical procedure brought about in their lives, regardless of the nature of these impacts.

The reports carry wide discontent and dissatisfaction with the current situation of SUS in Brazil. There were no reports revealing positive experiences with the service or the performance of professionals during the waiting period. When telling their personal story or that of a family member or friend, individuals had the opportunity to expose their fears and concerns regarding health, in the expectation that the scheduling of the surgery would be streamlined. This shows that this individual misfortune, in essence, is collective, involving family members, friends, services, health professionals, and the State.

In conclusion, the long wait for surgery is a multifactorial problem. Comprehensive care in patient care that requires surgery can only be guaranteed when it is understood and addressed in all its dimensions.

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CARDIAC SURGERY: CLINICAL PROFILE OF PATIENTS AND 30-DAY FOLLOW-UP

Cirurgia cardíaca: perfil clínico dos pacientes e acompanhamento em 30 dias

Cirugía cardíaca: perfil clínico del paciente y seguimiento en el período de 30 días

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ABSTRACT: Objective: To characterize the clinical profile of patients who underwent cardiac surgery in the perioperative period and describe the follow-up after 30 days of hospital discharge. **Method:** Retrospective study, with a sample of 54 patients, both male and female, aged ≥18 years. The analyzed variables were: sociodemographic, clinical and those related to the perioperative period and 30-day follow-up. **Results:** The mean age of patients was 65.5±15 years; most were male (79.6%). The most prevalent risk factors were: hypertension (72.2%), dyslipidemia (48.1%) and ischemic heart disease (31.5%). Valve procedures had higher prevalence (50.0%). The most prevalent complication in the postoperative period was arrhythmia (18.5%). At post-discharge, statins (78.4%) were the most prevalent medication, followed by antiplatelet agents (50.9%) and anticoagulants (31.3%). After 30 days of hospital discharge, the percentage of readmission was 11.7%, being the main causes of readmission respiratory infection/pleural effusion and surgical site infection. **Conclusion:** Surgical patients were mostly elderly men who had comorbidities; arrhythmia was the main complication found after surgery. The incidence of readmission 30 days after discharge was related to pulmonary complications and infections.

Keywords: Nursing care. Perioperative nursing. Cardiac surgical procedures.

RESUMO: Objetivo: Caracterizar o perfil clínico dos pacientes submetidos à cirurgia cardíaca no perioperatório e descrever o acompanhamento após 30 dias da alta hospitalar. **Método:** Estudo retrospectivo, com amostra de 54 pacientes, de ambos os sexos, com idade ≥18 anos, submetidos à cirurgia cardíaca. As variáveis analisadas foram: sociodemográficas, clínicas e relacionadas ao perioperatório e seguimento em 30 dias. **Resultados:** A média de idade dos pacientes foi de 65,5±15 anos; a maioria do sexo masculino (79,6%). Fatores de risco mais prevalentes: hipertensão (72,2%), dislipidemia (48,1%) e cardiopatia isquêmica (31,5%). Os procedimentos valvares tiveram maior prevalência (50,0%). A complicação mais prevalente no pós-operatório foi arritmia (18,5%). No pós-alta, o uso das estatinas predominou (78,4%), seguido de antiagregante plaquetário (50,9%) e anticoagulante (31,3%). Após 30 dias da alta hospitalar, houve 11,7% de readmissões, sendo a infecção respiratória/derrame pleural e a infecção de sítio cirúrgico as principais causas de reinternação. **Conclusão:** Os pacientes cardícos foram na maioria homens, idosos e que apresentavam comorbidades; arritmia foi a principal complicação após a cirúrgia. A incidência de readmissão após 30 dias da alta foi relacionada a comprometimentos pulmonares e infecciosos.

Palavras-chave: Cuidados de enfermagem. Enfermagem perioperatória. Procedimentos cirúrgicos cardíacos.

RESUMEN: Objetivo: Caracterizar el perfil clínico de los pacientes sometidos a cirugía cardíaca en el período perioperatorio y describir el seguimiento a los 30 días del alta hospitalaria. **Método:** Estudio retrospectivo, con una muestra de 54 pacientes, de ambos sexos, ≥18 años, sometidos a cirugía cardíaca. Las variables analizadas fueron: sociodemográficas, clínicas y relacionadas con el período perioperatorio y seguimiento en 30 días. **Resultados:** La edad

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media de los pacientes fue de 65,5±15 años; la mayoría eran hombres (79,6%). Factores de riesgo más prevalentes: hipertensión (72,2%), dislipidemia (48,1%) y cardiopatía isquémica (31,5%). Los procedimientos valvulares tuvieron una mayor prevalencia (50,0%). La complicación más prevalente en el postoperatorio fue la arritmia (18,5%). Al alta, predominó el uso de estatinas (78,4%), seguido de antiagregantes plaquetarios (50,9%) y anticoagulantes (31,3%). Treinta días después del alta hospitalaria hubo un 11,7% de reingresos, siendo la infección respiratoria / derrame pleural y la infección del sitio quirúrgico las principales causas de reingreso. **Conclusión:** Los pacientes cardíacos eran en su mayoría hombres, ancianos y con comorbilidades; la arritmia fue la principal complicación después de la cirugía. La incidencia de reingreso a los 30 días del alta se relacionó con alteraciones pulmonares e infecciosas.
Palabras Clave: Atención de enfermería. Enfermería perioperatoria. Procedimientos quirúrgicos cardíacos.

INTRODUCTION

Chronic diseases involve a set of pathologies, such as heart disease, which presents high rates of morbidity and mortality. The World Health Organization (WHO) points to heart disease as the main causes of death around the world. The most recent survey, with data from 2015, shows that 17.7 million deaths were caused by cardiac diseases[1]. In Brazil, in 2019, more than 289 thousand people died due to cardiac diseases and their complications. Such diseases present multiple etiologies, associated with functional incapacities, which, consequently, potentialize socioeconomic, cultural and environmental impacts.

Cardiovascular disease represent a major public health issue, requiring efficient methods aiming at potentializing resolutive actions regarding health care. The estimations point out to the possibility that, in the next 20 years, in Brazil, the number of elders will be higher than 30 million people, representing almost 13% of the population. Considering that life expectancy has been increasing, the consequence is that the elderly will require some type of cardiac intervention, thus leading to more longevity and improved quality of life[2,3].

Studies show changes in the clinical profile of the patients. With new technologies and improvements in care processes, cardiac surgery has been indicated later on, which leads patients to have several associated pathologies. However, the higher number of comorbidities influences the clinical outcomes, with more postoperative complications[4].

Surgical treatment aims at increasing survival rates, improving the quality of life of patients. Among cardiac surgeries, myocardial revascularization is the most prevalent one (64% in Brazil), followed by valve repair. Considering the limitations generated by the surgical procedure, it is necessary that patients maintain their functional independence, thus allowing their return to activities of daily living[5-7].

Data from DATASUS in the past five years (between 2014 and 2019), in an analysis of the Brazilian population, showed there were 72,157 surgical cardiac procedures, being 43.57% in the Southeast Region of the country. In the past year (2019), there were 32,732 surgical cases, and mortality rates of 7.05%. Heart diseases account for several readmissions and long periods of hospital stay[7].

Most patients who undergo cardiac surgery presents with high levels of anxiety and expectation regarding the procedure, which may compromise the evolution. Therefore, the nursing staff is responsible for giving information to patients, increasing their knowledge and reassuring them in the pre, peri and post-operative periods[8]. In that sense, care processes require continuous improvement, as well as the follow-up of these patients both in the perioperative period and after hospital discharge. The first 30 days after discharge are important for the readaptation of the patient to the activities of daily life, due to the complexity of the anesthetic-surgical procedure and hospital stay.

Perioperative nursing care plays a relevant role in this scenario, not only due to the direct care provided to the patients submitted to cardiac surgeries, but also for the guidance and orientation addressed to patients and their relatives during hospitalization and after hospital discharge.

OBJECTIVE

To characterize the clinical profile of patients submitted to cardiac surgery in the perioperative period and describe the follow-up of these patients 30 days after hospital discharge.

METHOD

This is a retrospective study carried out in a major general hospital, in the South of Brazil, city of Caxias do Sul, Rio

Grande do Sul state (RS). The institution has been a reference in cardiac surgery since 2004, and contains a thoracic pain unit, with six beds, and two intensive care units for adults, with 10 beds each, where patients who underwent cardiac surgery recover. The surgical demand is approximately six to eight surgeries a month. The analyzed period was from March to September 2019.

The study included patients of both sexes, aged ≥18 years, who underwent cardiac surgery procedures (myocardial revascularization, valve procedures, aneurysms and combined surgeries), both elective and emergency surgeries. Patients whose surgeries were related to congenital heart defects were excluded.

The sample was composed of 54 patients, in total, who met the inclusion criteria in the period. Data collection was based on a secondary database, updated by the nursing staff of the operating room (OR), which follows-up patients for up to one year after the anesthetic-surgical procedure. Patient follow-up includes one telephone call made by the nurse 1, 3, 6 and 12 months after the surgery. For this study, we only considered the 30-day follow-up period.

In the preoperative period, the sociodemographic and clinical variables were analyzed; in the perioperative period, the analyzed variables were time of extracorporeal circulation (ECC) and time of clamping; the variables in the postoperative period were time of extubation after admission to the intensive care unit (ICU), use of medicines, use of circulatory assist device, use of blood components, complications (cardiocirculatory, renal, respiratory complications and others related to the procedure), and death. In the 30-day follow-up period, hospital readmissions, cardiopulmonary outcomes and surgical site infection (SSI) were assessed.

The data are presented through absolute (n) and relative (%) numbers, mean and standard deviation, when normally distributed, or median with 25 and 75 percentile, when there is no normal distribution. Normality was verified by the Shapiro-Wilk test. The data were verified using the Statistical Package for Social Sciences (SPSS), version 25.

This study is characterized as a sub-analysis of a larger project, with the sample, and followed the recommendations of Resolution n. 466/2012, of the National Health Council. It was approved by the Research Ethics Committee of the institution that hosted the study, via Plataforma Brasil – Certificado de Apresentação para Apreciação Ética (CAAE) 33329114.3.0000.5523 / Report 3.935.050.

RESULTS

We analyzed data of 54 patients, and the mean time of stay in the ICU was 4.19±4.31 days. The mean age of the sample was 65.5±15 years. The prevalent sex was male, with 43 (79.6%) patients. The procedure with the highest prevalence was valve surgery, with 27 (50.0%) patients, followed by myocardial revascularization surgery (MRS), with 17(31.5%) patients. Most surgeries were elective – 50 (92.5%). The sociodemographic and clinical characterization of the sample is described in Table 1.

Regarding intraoperative variables, the mean time of ECC was 109±39 minutes, and clamping time was, in average, 76±28 minutes. The longest time of ECC was found in patients who underwent MRS (105±44min), followed by patients submitted to valve surgeries (100±33 min). Regarding extubation, we observed that 37 (68.5%) patients were extubated in the six postoperative hours, and valve surgeries presented the highest number of extubation procedures – 21 (77.8%), as recommended.

Vasopressors were the most used medicine, mostly in patients who underwent valve surgery (21 / 77.8%), followed by vasodilating drugs (9 / 52.9%), in MRS surgeries.

Table 1. Sociodemographic and clinical characterization in the preoperative period of patients submitted to cardiac surgery (n=54).

Variables	Total n=54 n (%)	MRS n=17 n (%)	Valve n=27 n (%)	Others n=10 n (%)
Procedures	54 (100.0)	17 (31.5)	27 (50.0)	10 (18.5)
Male	43 (79.6)	15 (88.2)	18 (66.7)	10 (100.0)
Age*	65.5±15	65±13	63±14	56±16
SAH	39 (72.2)	14 (82.4)	21 (77.8)	4 (40.0)
Dyslipidemia	26 (48.1)	12 (70.6)	11 (40.7)	3 (30.0)
Ischemic cardiomiopathy	17 (31.5)	17 (100.0)	0 (0)	0 (0)
Smoking	15 (27.8)	6 (35.3)	5 (18.5)	4 (40.0)
DM	14 (25.9)	9 (52.9)	4 (14.8)	1 (10.0)
Alcoholism	4 (7.4)	2 (11.8)	0	2 (20.0)
CKD	1 (1.9)	0 (0)	1 (3.7)	0
DPOC	1 (1.9)	0 (0)	0 (0)	1 (10.0)
Fração de ejeção	60±1	60±1	63±1	63±0

*mean and standard deviation; MRS: myocardial revascularization surgery; SAH: systemic arterial hypertension; DM: diabetes *mellitus*; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease.

Concerning blood transfusion, we identified that 11 (20.4%) patients needed this therapy. Most patients were discharged from the ICU with satisfactory Swift score (Table 2).

Mortality rate in the immediate postoperative period (IPO) was three (5.5%) patients. Regarding postoperative complications after 48 hours, arrythmia stood out (10/ 18,5%), followed by bleeding and vasoplegia (6 / 11.1%). Such data are shown in Table 3.

Concerning the complications presented by patients after 48 hours until hospital discharge, arrythmia was prevalent and affected seven (13.7%) patients (Table 4).

Among the medications the patients of the sample took in the household, after hospital discharge, the following stand out: statins (40 / 78.4%), platelet antiaggregants (26 / 50%), angiotensin-converting enzyme (ACE) inhibitors (20 / 39.2%) and oral anticoagulants (16 / 31.3%).

Six (11.7%) patients were readmitted 30 days after hospital discharge due to complications. The main complications in this period were: respiratory infection/ pleural effusion (3 / 5.9%) and SSI (3 / 5.9%). Other data are shown in Table 5.

Table 2. Data referring to immediate postoperative care in the intensive care unit (ICU) (n=54).

Variables	Total n=54 n (%)	MRS n=17 n (%)	Valve n=27 n (%)	Others n=10 n (%)
Extubation in up to 6 hours	37 (68.5)	8 (47.1)	21 (77.8)	8 (80.0)
Vasopressor	47 (87.0)	16 (94.1)	21 (77.8)	10 (100.0)
Vasodilator	20 (37.0)	9 (52.9)	8 (29.6)	3 (30.0)
Inotropic agents	8 (14.8)	5 (29.4)	3 (11.1)	0 (0)
Precedex	10 (18.5)	5 (29.4)	3 (11.1)	2 (20.0)
Fentanyl	5 (9.3)	2 (11.8)	3 (11.1)	0 (0)
Midazolam	3 (5.6)	3 (17.6)	0 (0)	0 (0)
Intra aortic balloon	1 (1.9)	1 (5.9)	0 (0)	0 (0)
Renal replacement therapy	1 (1.9)	0 (0)	1 (3.7)	0 (0)
Blood transfusion	11 (20.4)	5 (29.4)	4 (14.8)	2 (20.0)
ICU discharge - Swift	--	--	--	--
Low	46 (85.2)	14 (82.4)	24 (88.9)	8 (80.0)
High (≥15)	8 (14.8)	3 (17.6)	3 (11.1)	2 (20.0)

MRS: myocardial revascularization surgery.

Table 3. Complications presented by postoperative patients (up to 48 hours) (n=54).

Variables	Total n=54 n (%)	MRS n=17 n (%)	Valve n=27 n (%)	Others n=10 n (%)
Arrhythmia	10 (18.5)	2 (11.8)	7 (25.9)	1 (10.0)
Bleeding	6 (11.1)	2 (11.8)	3 (11.1)	1 (10.0)
Vasoplegia	6 (11.1)	4 (23.5)	1 (3.7)	1 (10.0)
Kidney failure	3 (5.6)	1 (5.9)	2 (7.4)	0 (0)
Acute respiratory failure	3 (5.5)	1 (5.9)	1 (3.7)	1 (10.0)
Death	3 (5.5)	1 (5.8)	1 (3.7)	1 (10.0)

MRS: myocardial revascularization surgery.

Table 4. Complications presented by patients 48 hours after hospital discharge (n=51).

Variables	Total n=51 n (%)	MRS n=16 n (%)	Valve n=26 n (%)	Others n=10 n (%)
Arrhythmia	7 (13.7)	2 (12.5)	4 (15.4)	1 (11.1)
Kidney failure	3 (5.9)	1 (6.3)	1 (3.8)	1 (11.1)
Respiratory failure	1 (2.0)	1 (6.3)	0 (0)	0 (0)
Surgical wound infection	1 (2.0)	0 (0)	0 (0)	1 (11,1)
Acute pulmonary edema	2 (3.9)	2 (12.5)	0 (0)	0 (0)
Pneumonia	1 (1.9)	0 (0)	1 (3.8)	0 (0)

MRS: myocardial revascularization surgery.

Table 5. Readmissions and complications oft he patients 30 days after hospital discharge (n=51).

Variables	Total n=51 n (%)	MRS n=16 n (%)	Valve n=26 n (%)	Others n=9 n (%)
Hospital readmission in 30 days	6 (11.7)	1 (6.3)	2 (7.7)	2 (22.2)
Pleural effusion and respiratory infection	3 (5.9)	1 (6.3)	2 (7.7)	0 (0)
Surgical wound infection	3 (5.9)	1 (6.3)	0 (0)	2 (22.2)

MRS: myocardial revascularization surgery.

DISCUSSION

The study included data from 54 patients submitted to cardiac surgeries and the male gender was prevalent, with mean age of 65 years. The most prevalent comorbidity was systemic arterial hypertension (SAH), followed by dyslipidemia. Among the most prevalent cardiac surgeries, valve replacements and MRS stood out. Other studies, also performed with patients who underwent cardiac surgery, showed the prevalence of elderly men; however, the most common procedure was MRS, and the most prevalent comorbidities were SAH, diabetes mellitus (DM) and dyslipidemia[9-11].

Regarding the perioperative period, it is observed that the duration of ECC and clamping is similar to the mean found in the literature. In a case-control study that compared patients that were not part of the protocol and those who were part of the Enhanced Recovery After Surgery (ERAS) protocol, the authors observed higher time of ECC and clamping, similarly to the information found in this study. The ERAS protocol aims at improving the outcomes and complications in the postoperative period by proposing specific preoperative care[12]. However, another study carried out in the Northwest of Rio Grande do Sul state showed that the duration of ECC was shorter, considering the profile of patients attributed to MRS. The long duration of ECC is associated with systemic inflammatory disease and may cause complications such as vasoplegia, renal disease, among others; besides, it may increase hospitalization time[13].

As to the time of extubation, studies point out to a superior interval in comparison to that presented in this study. An analysis carried out in the Southeast of Brazil, which assessed 200 postoperative cardiac surgery patients, showed mean time of extubation superior than 12 hours[10]. Another study, which assessed 47 patients submitted to heart valve surgery, showed mean time of 14.5 hours. Early extubation, or before a 6-hour period, favors outcomes such as reduced hospitalization time, whereas extubation after a 6-hour period is associated with postoperative complications[3,10,14].

Regarding the drugs used in the IPO, vasopressors stood out and were followed by vasodilators (nitroglycerin). In MRS, when the mammary artery is used as a bypass, the use of vasodilators is necessary to maintain bypass permeability. Vasopressors, on the other hand, are necessary in the IPO, given the hemodynamic instability. The most used vasopressor in the IPO is noradrenaline; the most used vasodilator is nitroglycerin, and both use the central venous access[10].

Regarding the need for blood components in the IPO, half of the patients in this study needed a blood transfusion, mostly those submitted to MRS. Postoperative bleeding is the main reason why patients received blood components[15]. The transfusion of blood components is associated with transfusion reaction, postoperative infection, increased postoperative morbidity and mortality, risk of immunosuppression and longer duration of hospitalization[15].

Atrial fibrillation (AF) is one of the most common complications in the IPO and can also be present in the late postoperative period. According to the II Brazilian Guidelines for Atrial Fibrillation, in the postoperative period AF can occur from 24 to 72 hours after surgery, especially in valve surgeries[16].

In accordance with the data in this study, another analysis that approaches patients in the postoperative period identified that the most common complication in patients who undergo cardiac surgery was arrhythmia, especially AF, observed in 45% of them[17]. Besides arrhythmias, other complications can be found in the postoperative period, such as bleeding and vasoplegic syndrome; both stand out due to high mortality rates. A study that described clinical outcomes of patients in an institution in the Northwest of Rio Grande do Sul state indicated bleeding as the second most common complication in the postoperative period, with several possible causes: surgical techniques, coagulation disorders, excessive use of heparin and complications owed to the long duration of ECC. These complications can be related to preexisting conditions, considering that many patients present with multiple comorbidities. Therefore, it is important that patients be clinically compensated[13].

One study that aimed at describing the complications in the IPO of cardiac surgeries, involving a mostly male population who underwent MRS, showed that patients presented with hydroelectrolytic disorders, followed by cardiac arrhythmia, as the main complications[18]. Another study aimed at describing complications in 2,648 patients who underwent cardiac surgery in an institution in the State of São Paulo, describing the following as main complications: acute kidney injury and lung pathologies coming from respiratory infection and pleural effusion, both related to the long duration of ECC[19].

After hospital discharge, six (11.7%) patients were readmitted, all due to reasons related to the surgical procedure. The main causes were respiratory infection and SSI. In a descriptive study carried out in the Southeast of Brazil, the authors identified a lower readmission rate (5.9%) than the one found in this analysis, but SSI was also the main cause. Some of the factors that contribute with SSI are DM,

dyslipidemia, obesity, chronic obstructive pulmonary disease (COPD) and smoking[6].

Mediastinitis was the focus of a study carried out in Universidade de São Paulo (USP), in which most patients presented with infection after hospital discharge (54.7%); and, of these, 85.1% needed to be hospitalized again for a mean period of 31.8 days[20].

The complications from the intraoperative period and the IPO cause longer hospitalization time, and patients become vulnerable to readmission. Bleeding in the intraoperative period and prolonged mechanical ventilation, the difficulty to stabilize blood sugar, among others, are triggering factors for the unsuccessful hospital discharge.

Therefore, the control and prevention measures are essential and are directly related to the evolution of the patient in the postoperative period. Health care programs that provide preoperative care to patients with preexisting diseases aim at optimizing treatment, thus preventing clinical decompensation in the postoperative period, with repercussions after hospital discharge[6,21]. A study carried out with 20 patients submitted to reconstructive heart surgery showed that most of them was not advised about how to care for the surgical wound. That study shows a gap in terms of guidance, which is only provided at the time of hospital discharge[22]. Adequate rehabilitation, allied to household care, is essential to prevent rehospitalization. Control and care with comorbidities are essential. Therefore, the work of the multidisciplinary staff is essential to obtain success in the postoperative period[6].

The mortality rate in this study was of three (5.5%) patients. Two of them presented with prolonged ECC time (214 min and 136 min), and this was a risk factor for mortality. Deaths occurred in the first 48 hours after the anesthetic-surgical procedure; in two cases, it was necessary to intervene again due to bleeding; and, in another situation, the patient presented with vasoplegic syndrome. The national literature demonstrates mortality rates ranging from 8.7 to 14.2%[23,24]. When associated with infectious endocarditis, these rates increase, ranging from 15 to 30%[25], reaching incidence of 10.5% in patients who developed mediastinitis[20].

The clinical and sociodemographic variables demonstrate results that are compatible with other studies related to this matter. This study reaffirms the importance to get to know the profile of patients who undergo cardiac surgery, in order to contribute with orientations during hospitalization, thus subsidizing strategies to improve adherence to treatment and control of complications.

The limitation of this study is the fact that the sample is small, since this is a hospital with fewer surgical interventions per month.

CONCLUSION

Most patients whose data were analyzed were male, with comorbidities, who underwent valve replacement and myocardial revascularization procedures. Mortality rate was 5.5%, and deaths occurred up to 48 hours after the anesthetic-surgical procedure. The complications shown in the postoperative period were mostly arrhythmias, bleeding and vasoplegia. The main cause for readmission, 30 days after discharge, was respiratory infection/pleural effusion, and surgical site infection.

The knowledge about the profile and evolution of patients who underwent cardiac surgery in the hospital that hosted the study subsidize strategies to implement improvements in care processes, as well as continued training for patient care team, promoting safe practices. Besides, orientations for discharge addressed to the cardiac rehabilitation of patients submitted to surgery must be increased and varied, including family members and empowering the patient and the perioperative nursing team.

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NURSING DIAGNOSES IN THE PERIOPERATIVE PERIOD: INTEGRATIVE REVIEW

Diagnósticos de enfermagem no período perioperatório: revisão integrativa

Diagnósticos de enfermería en el periodo perioperatorio: revisión integrativa

Aline Fritzen[1]*, Luísa Pimentel Silva[2], Rita Catalina Aquino Caregnato[3], Graciele Fernanda da Costa Linch[4]

ABSTRACT: Objective: To assess scientific publications related to nursing diagnoses (NDs) for surgical patients in the perioperative period. **Method:** This is an integrative review conducted in the Web of Science, Scopus, and Wiley Online Library databases and in the platform of the National SOBECC Journal. The keywords used in the search were: "nursing diagnosis" and "surgery". The inclusion criteria were: studies published between 2014 and 2019, available in Portuguese, English, or Spanish, and that answered the guiding question. **Results:** We selected 15 articles, of which 8 were published in international journals, even though all studies were produced by Brazilian researchers. Six publications identified the main NDs in the perioperative period, while the others investigated a specific ND. The postoperative period was the most studied. Studies were classified according to their level of evidence (LE): six with LE 4, six with LE 5, and three with LE 6. **Conclusion:** The postoperative period was the one most associated with NDs. Only one study addressed NDs specifically in the intraoperative period. The most studied population was that of patients submitted to cardiac surgery.
Keywords: Nursing diagnosis. Perioperative care. Nursing process.

RESUMO: Objetivo: Conhecer as publicações científicas relacionadas aos diagnósticos de enfermagem (DEs) no período perioperatório do paciente cirúrgico. **Método:** Revisão integrativa nas bases de dados Web of Science, Scopus, Wiley Online Library e na plataforma da Revista SOBECC Nacional. Descritores utilizados na busca: *"nursing diagnosis"* e *"surgery"*. Critérios de inclusão: estudos publicados entre 2014 e 2019, disponíveis em português, inglês ou espanhol, e responder à questão norteadora. **Resultados:** Selecionados 15 artigos, sendo oito publicados em periódicos internacionais, entretanto todos produzidos por pesquisadores brasileiros. Seis publicações identificaram os principais DEs no perioperatório, os demais pesquisaram um DE específico. Evidenciou-se o pós-operatório como o período mais pesquisado. Os estudos foram classificados conforme níveis de evidência (NE): seis com NE 4, seis com NE 5 e três com NE 6. **Conclusão:** O pós-operatório foi o período mais relacionado aos DEs. Apenas um estudo abordou o DE especificamente no intraoperatório. Constatou-se que a população mais estudada foi a de pacientes submetidos à cirurgia cardíaca.
Palavras-chave: Diagnóstico de enfermagem. Assistência perioperatória. Processo de enfermagem.

RESUMEN: Objetivo: Conocer las publicaciones científicas relacionadas con los Diagnósticos de Enfermería (DEs) en el período perioperatorio del paciente quirúrgico. **Método:** Revisión integrativa en las bases de datos de Web of Science, SCOPUS, Wiley Online Library y la plataforma de Revista SOBECC Nacional. Descriptores utilizados en la búsqueda: "diagnóstico de enfermería" y "cirugía". Criterios de inclusión: estudios publicados entre 2014 y 2019, disponibles en portugués, inglés o español y que respondan a la pregunta orientadora. **Resultados:** Se seleccionaron 15 artículos, ocho de los cuales fueron publicados en revistas internacionales, sin embargo, todos producidos por investigadores brasileños. Seis publicaciones identificaron los principales DEs en el período perioperatorio, las otras investigaron un DE específico. El postoperatorio se convirtió en el período más investigado. Los estudios se clasificaron según niveles de evidencia (NE): seis con NE 4, seis con NE 5 y tres con NE 6. **Conclusión:** El postoperatorio fue el período más relacionado con la DE. Solo un estudio abordó la DE específicamente durante la operación. Se encontró que la población más estudiada fueron los pacientes sometidos a cirugía cardíaca.
Palabras clave: Diagnóstico de enfermería. Atención perioperativa. Proceso de enfermería.

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INTRODUCTION

In Brazil, the nurse adopts the nursing care systematization (NCS) as a scientific methodology to help in care organization, aiming to increasingly improve how to meet patients' individual needs in a complementary and multidisciplinary way[1]. According to the Brazilian Association of Surgical Center, Anesthesia Recovery, and Sterile Processing Department Nurses (*Associação Brasileira de Enfermeiros de Centro Cirúrgico, Recuperação Anestésica e Centro de Material e Esterilização* — SOBECC), perioperative nursing care systematization (PNCS) was proposed before the Brazilian resolution by the Federal Nursing Council (*Conselho Federal de Enfermagem* — Cofen), in 1990, when Castellanos and Jouclas extended the nursing process (NP) to surgical patient care, covering the concepts of holistic, continued, participatory, individualized, documented, and evaluated care[2].

In perioperative patient care, the Association of periOperative Registered Nurses (AORN) uses a model called Perioperative Nursing Data Set (PNDS), which documents the nursing care in a standardized manner. This model involves domains related to safety and physiological and behavioral responses, allowing recording the patient's problems, interventions, and actual or potential nursing outcomes, in order to evidence the concern with care[3].

The Cofen Resolution no. 358/2009 recommends that all health facilities providing nursing care should adopt the NCS, implementing its technical-scientific knowledge in care practice, and organizing the professional work as to method, human resources, and instruments, which would enable the operationalization and documentation of the NP. NP is organized into five steps: nursing history, nursing diagnosis (ND), nursing planning, care implementation, and evaluation of the care provided. Although didactically divided, these steps do not happen separately; on the contrary, they are interconnected and concurrent[4].

PNCS allows the surgical center (SC) nurse to qualify patient care in the perioperative period, planning actions and promoting better communication between teams, as well as monitoring and analyzing indicators to enable NP effectiveness. Studies emphasize the importance of communication between teams to improve perioperative care, developing actions that aim to guide and assess each patient's needs, resulting in quality care planning throughout the anesthesia and surgical process[5]. The perioperative period consists of three phases: preoperative, intraoperative, and postoperative. Each one starts and ends sequentially, based on events that define the patient experience in the anesthesia and surgical process[6].

The nurse has the legal responsibility of diagnosing human responses related to health or activities of daily living. When they detect a problem, these professionals can provide solutions and act on preventing complications and adverse events. Thus, researchers stress the importance of NCS, aiming at the early identification of NDs and the resolution of possible complications[7].

Studies[8,9] agree on the relevance of identifying NDs in surgical practice to guide nursing care, allowing the prior recognition of patients' needs and providing elements to implement validated nursing interventions tailored to individual needs. Investigating NDs in a surgical context is also important because they represent the nurse's specific knowledge, with the potential to qualify nursing records, improving communication and the quality of care.

OBJECTIVE

To assess scientific publications related to NDs for surgical patients in the perioperative period.

METHOD

This is an integrative literature review aimed at identifying primary findings of the investigated topic, as well as its knowledge status, allowing us to conduct a critical analysis to recognize reinforcement points and, at the same time, gaps that could be filled with new studies[10,11].

We adopted six stages recommended for the elaboration of an integrative review[10]:

- identification of the theme and definition of the guiding question;
- establishment of inclusion and exclusion criteria;
- definition of the information to be extracted from the articles;
- assessment and categorization of the included studies;
- result interpretation;
- presentation of the synthesis of the review.

The guiding question was defined as: what has been scientifically produced about NDs in the perioperative period? Based on this question, we chose the keywords "nursing

diagnosis" and "surgery", according to the Medical Subject Headings (MeSH). The operator used between the descriptors was AND, since its application prevented the recovery of studies whose subject addressed areas of knowledge different from those intended for the current analysis. The inclusion criteria were studies published from 2014 to September 2019; available in Portuguese, English, or Spanish; answering the guiding question; and having in its title one of the keywords searched or related terms: "surgical", "nursing outcomes", "nursing interventions and outcomes", "operative", and "postoperative". As one of the inclusion criteria was the year of publication, we only selected articles from 2014 onward, since the study aimed to list recent publications.

The search for studies was conducted in the Web of Science, Scopus, and Wiley Online Library databases. We complemented the search on the platform of the National SOBECC Journal, given its great relevance as a technical journal of the studied area. In the databases, the following associative strategy was employed: "nursing diagnosis" AND "surgery", always selecting the most generic search field in all of them. On the platform of the National SOBECC Journal, which has the technical-scientific papers from SOBECC, we used only the descriptor "nursing diagnosis" because the publications from this base are already targeted at the surgical area.

The database searches yielded 98 articles. We read the titles of the publications retrieved and removed those that did not meet the inclusion criteria, leaving 30 articles. Next, these articles were screened based on their abstracts, reducing the sample to 24 articles. The remaining publications were read in full, reaching the final selection of 15 articles, excluding a duplicate found in 2 databases. Figure 1 presents the flowchart for the selection of articles included in this study.

Data were collected in September 2019, and the publications retrieved were organized for analysis in a database with

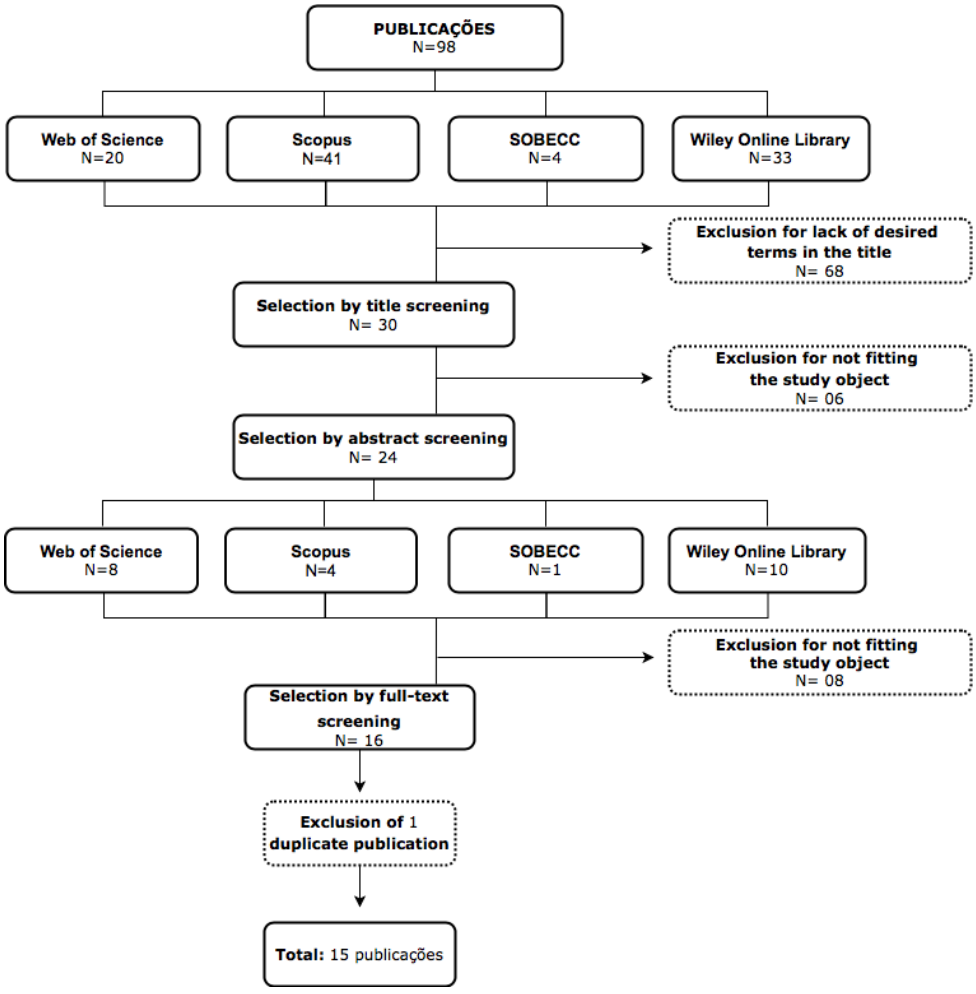

Figure 1. Flowchart of the article selection process.

the following items: title, database, journal, year, language, country of origin, objective, method, level of evidence (LE), and perioperative period covered in the article.

Subsequently, the articles were evaluated regarding their LE, which characterizes how the evidence was classified according to hierarchy and the methodological approach adopted[10].

RESULTS

The selected sample included eight articles published in international journals, but they were all produced by Brazilian researchers. Regarding the year of publication, productivity reached its peak in 2015, with five articles. We identified a gap in publications on the theme between 2016 and 2017. In the remaining years, the production was: three publications in 2014, four in 2018, and three in 2019.

The articles are presented in two tables, according to their objectives. Table 1 describes six articles investigating the main NDs affecting a specific population. Table 2 grouped articles with different objectives, addressing specific NDs previously listed.

A total of 105 NDs were cited, but 39 were repeated; therefore, 66 distinct NDs were found, of which 42 were actual diagnoses, and 24 were risk diagnoses. Based on this result, we elaborated two charts (Charts 1 and 2) for the ten most prevalent actual and risk NDs found in the studies. We reported the percentage of mentions of each ND in the 15 publications studied. For instance, the anxiety ND was cited in 4 of the 15 publications, representing 26.67% of recurrence.

Table 1. Selected articles addressing a specific population according to year of publication, objective, investigated nursing diagnoses, and level of evidence.

Year	Objective	Investigated NDs	LE
2015[7]	To identify human responses presented by postoperative patients of bariatric surgery, classified into the cardiovascular/pulmonary response class of NDs	• Risk for ineffective gastrointestinal perfusion; • Risk for activity intolerance; • Ineffective peripheral tissue perfusion; • Risk for shock; • Decreased cardiac output; • Risk for decreased cardiac tissue perfusion; • Activity intolerance; • Risk for ineffective cerebral tissue perfusion; • Impaired spontaneous ventilation; • Risk for ineffective renal perfusion; • Ineffective breathing pattern; • Dysfunctional ventilatory weaning response; • Risk for bleeding.	4
2015[8]	To identify NDs in postoperative patients of cardiac surgery	• Risk for ineffective renal perfusion; • Risk for decreased cardiac tissue perfusion; • Risk for bleeding; • Risk for perioperative positioning injury; • Impaired skin integrity; • Risk for falls; • Risk for vascular trauma; • Risk for constipation; • Risk for electrolyte imbalance; • Risk for unstable blood glucose; • Risk for acute confusion; • Risk for shock; • Risk for infections; • Risk for spiritual distress; • Risk for impaired religiosity; • Impaired physical mobility; • Impaired bed mobility; • Readiness for enhanced family processes; • Readiness for enhanced self-concept;	5

Continue...

Table 1. Continuation.

Year	Objective	Investigated NDs	LE
2015[8]	To identify NDs in postoperative patients of cardiac surgery	• Impaired comfort; • Dysfunctional gastrointestinal motility; • Impaired walking; • Acute pain; • Delayed surgical recovery; • Disturbed sleep pattern; • Fear; • Fatigue; • Ineffective breathing pattern; • Insomnia; • Impaired spontaneous ventilation; • Deficient diversional activity; • Impaired verbal communication; • Anxiety • Ineffective self-health management; • Ineffective family therapeutic regimen management; • Risk for ineffective peripheral tissue perfusion; • Relocation stress syndrome; • Hyperthermia; • Ineffective thermoregulation; • Deficient fluid volume; • Constipation; • Impaired gas exchange; • Decreased cardiac output; • Self-neglect; • Nausea; • Impaired swallowing; • Imbalanced nutrition: less than body requirements; • Impaired social interaction; • Impaired oral mucous membrane.	5
2018[12]	To propose nursing diagnoses, outcomes, and interventions for postoperative patients of orthognathic surgery	• Ineffective self-health management; • Knowledge deficient; • Impaired verbal communication; • Risk for compromised human dignity; • Risk for situational low self-esteem; • Anxiety • Risk for infection; • Impaired oral mucous membrane; • Acute pain.	6
2015[13]	To identify the main NDs for older adults in the postoperative period of urological surgeries	• Impaired skin integrity; • Activity intolerance; • Acute pain; • Knowledge deficient; • Imbalanced nutrition: less than body requirements; • Risk for constipation; • Fatigue; • Impaired physical mobility; • Disturbed sleep pattern; • Risk for infection; • Risk for deficient fluid volume; • Risk for impaired religiosity.	5

Continue...

Table 1. Continuation.

Year	Objective	Investigated NDs	LE
2015[14]	To identify the frequency of NDs for patients treated in a surgical clinic	• Risk for infection; • Impaired skin integrity; • Risk for constipation; • Anxiety • Acute pain; • Risk for bleeding; • Delayed surgical recovery; • Dysfunctional gastrointestinal motility; • Risk for relocation stress syndrome; • Risk for unstable blood glucose; • Impaired comfort; • Risk for impaired skin integrity; • Fear; • Imbalanced nutrition: less than body requirements; • Risk for situational low self-esteem; • Risk for deficient fluid volume; • Disturbed body image.	5
2015[15]	To identify the profile of NDs for heart transplant patients in the early postoperative period, based on NANDA's Taxonomy II, and discuss it from the perspective of Horta's assumptions and the scientific literature	• Impaired bed mobility; • Ineffective protection; • Impaired walking; • Impaired tissue integrity; • Imbalanced nutrition: less than body requirements; • Decreased cardiac output; • Acute pain; • Impaired gas exchange; • Ineffective breathing pattern; • Impaired urinary elimination; • Risk for infection; • Risk for constipation.	4

ND: nursing diagnosis; LE: level of evidence; NANDA: North American Nursing Diagnosis Association.

Table 2. Selected articles discussing a nursing diagnosis in the perioperative period according to year of publication, objective, investigated nursing diagnosis, and level of evidence.

Year	Objectives	Investigated ND	LE
2019[16]	To select NOC outcomes to assess the impaired tissue integrity in patients submitted to orthopedic surgeries and develop conceptual and operational definitions for their indicators	• Impaired tissue integrity	6
2019[17]	To evaluate the benefits of NIC interventions in postoperative patients with ineffective airway clearance.	• Ineffective airway clearance	4
2019[18]	To select and refine NOC outcomes and indicators for the diagnosis of risk for perioperative positioning injury	• Risk for perioperative positioning injury	4
2019[19]	To evaluate the healing of surgical wounds in orthopedic patients with impaired tissue integrity according to NOC	• Impaired tissue integrity	4
2018[20]	To identify the risk factors associated with cases of excessive bleeding in patients submitted to cardiac surgery with cardiopulmonary bypass	• Risk for bleeding	4
2018[21]	To elucidate the concept of risk for delayed surgical recovery and define the empirical referents to identify predictive factors for delayed recovery	• Risk for delayed surgical recovery	6
2015[22]	To verify the accuracy of the defining characteristics of the diagnosis of delayed surgical recovery in patients after the fifth postoperative day	• Delayed surgical recovery	5
2015[23]	To analyze the accuracy of the defining characteristics of impaired gas exchange	• Impaired gas exchange	5
2014[24]	To compare the incidence of the ND delayed surgical recovery among adults and older adults	• Delayed surgical recovery	5

ND: nursing diagnosis; LE: level of evidence; NOC: Nursing Outcomes Classification; NIC: Nursing Interventions Classification.

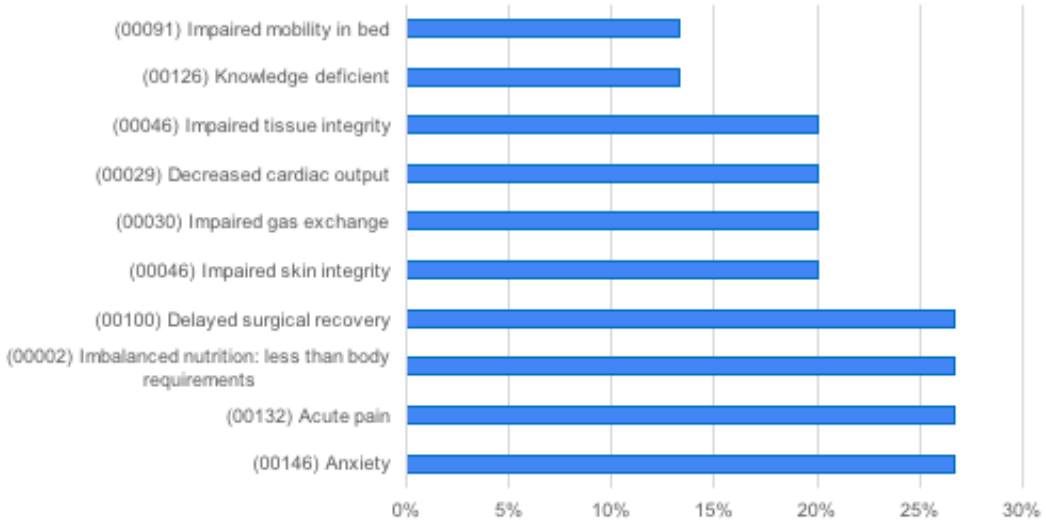

Chart 1. Actual nursing diagnoses listed in the articles.

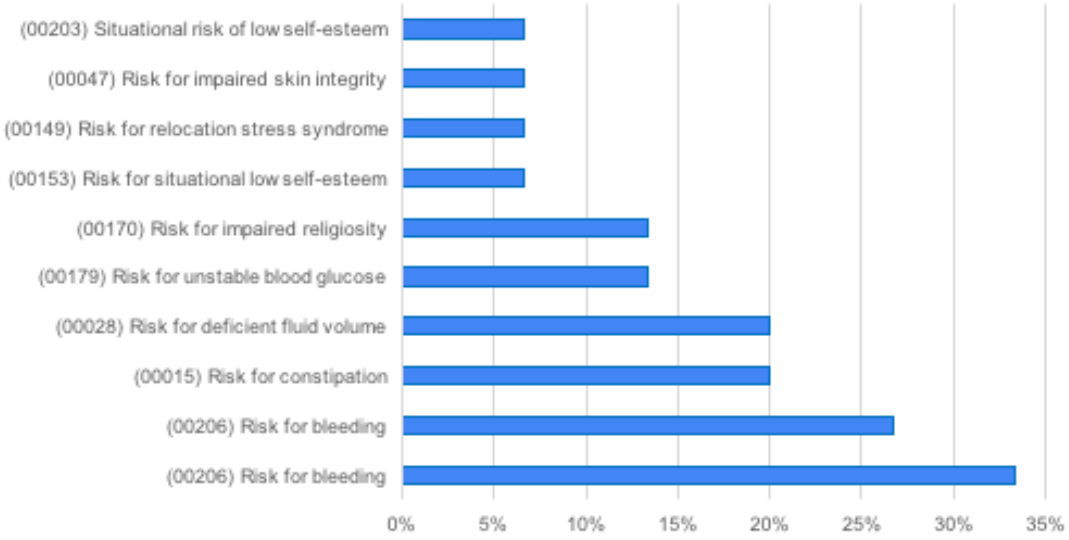

Chart 2. Risk nursing diagnoses listed in the articles.

DISCUSSION

The analysis of the selected publications allowed us to demonstrate that most studies (ten articles) on the investigated theme discussed the postoperative period of surgical patients in different scenarios. At the same time, studies addressed various NP stages, such as NDs, interventions, and outcomes.

The theoretical framework of basic human needs by Wanda de Aguiar Horta was applied to two studies[12-15] to list NDs in postoperative patients. One of them[12] identified nine NDs in postoperative patients of orthognathic surgery related to psychobiological and psychosocial needs. The other study[15], performed with heart transplant patients, detected 12 NDs, with 10 actual NDs and 2 potential NDs, all associated with basic human psychobiological needs. No NDs were found for psychosocial or psychospiritual needs.

Two studies[13,14] carried out with different populations but with the same objective detected the main postoperative NDs applicable to each patient population. The first[13] reviewed the medical records of 100 older adults in the postoperative

period of urological surgeries and found 13 NDs, of which 10 were actual NDs and 3 were risk NDs. The other[14], with a sample of 99 postoperative patients of general surgery, reported 17 NDs — 9 actual NDs and 8 risk NDs. In both studies[13,14], the findings allowed guiding the nursing care, prioritizing the patient's condition, with effective and prompt actions to solve the problems.

The importance of PNCS and the need to implement institutional protocols to facilitate the nursing care provided to each patient profile were also highlighted in a study[7] performed with a population of postoperative patients of bariatric surgery. The study aimed to identify human responses presented by patients classified into the cardiovascular/pulmonary response class of NDs. It listed 13 NDs, which allowed guiding the nursing care and reducing postoperative complications.

The most studied population was that of patients submitted to cardiac surgery. A study[20] sought to identify risk factors for bleeding after cardiac surgery with cardiopulmonary bypass (CPB) and concluded that the variables associated with excessive bleeding were: body mass index (BMI) lower than 26.35 kg/m^2, CPB time exceeding 90 minutes, esophageal temperature lower than 32°C, metabolic acidosis, and thromboplastin time greater than 40 seconds. These variables can be operational, clinical indicators to better characterize the risk factor "treatment regimen" and improve the knowledge related to CPB-induced coagulopathy.

Two other studies[8,23] assessed the postoperative period of cardiac surgery in intensive care units. One of them evaluated the medical records of 26 patients, from which specialists collected NDs, defining characteristics, and associated factors, resulting in 34 actual NDs and 15 risk NDs, established according to the North American Nursing Diagnosis Association (NANDA)[8]. The other study[23] involved a sample of 93 patients. Data were collected by three nurses to analyze the accuracy of defining characteristics of the ND "impaired gas exchange". Both studies[8,23] evidenced the relevance of nursing knowledge about the early identification of signs and symptoms (defining characteristics) when choosing a specific ND for each patient profile, guiding the nursing care (interventions), and supporting the development of appropriate interventions for the individual needs of patients.

With respect to nursing interventions, a study[17] evaluated the benefits of the Nursing Interventions Classification (NIC) in postoperative patients with the ND "ineffective airway clearance". A sample of 101 patients was assessed based on the nursing outcome "breathing pattern: airway permeability". On the one hand, the authors concluded that interventions such as breathing techniques, cough improvement, ventilatory assistance, and airway management contributed to discharging the secretion, with expressive improvement in airway permeability, strength, and recovery of patients. Six airway patency indicators improved significantly throughout the study. On the other hand, some patients did not improve after the interventions, which may be associated with factors intrinsic to the patient, clinical characteristics, and surgical variables.

Two studies[22,24] specifically addressed the ND "delayed surgical recovery". Interestingly, both studies had the same first author and evaluated 72 surgical patients after the fifth postoperative day. In one study[24], the population was divided into adults and older adults to compare the incidence of this ND between groups. The findings indicated that the prevalence was slightly higher among older adults due to their movement difficulty, self-care dependence, and perceived need for longer recovery time, requiring nursing care specific to the human aging process. Differentiating the assistance for adult and older adult patients can favor perioperative care in the desired time.

The other study[22] verified the accuracy of the defining characteristics of the same ND "delayed surgical recovery". The identification of NDs was based on the clinical assessment of two Ph.D. nurses. Seven characteristics showed high positive predictive values: delayed return to work activities, fatigue, perceived need for longer recovery time, need for help in performing self-care, report of discomfort, evidence of healing disruption in the surgical site, and movement difficulty. The only factor in the study associated with the diagnosis was postoperative infection in the surgical site.

A study[21] related to the ND "risk for delayed surgical recovery" conducted an analysis to clarify the concept of this diagnosis and define the empirical referents to identify predictive factors of delayed recovery. The study selected nurses specialized in surgical nursing and ND, according to NANDA's Taxonomy I. Based on an integrative literature review, the authors found no studies directly addressing the investigated diagnosis, showing gaps in its exploration. This diagnosis groups a number of risk factors in the best evidence and establishes empirical referents for instrumentation and evaluation, which can help guide nurses in obtaining the expected results in practice.

In the assessed sample, two studies[16,18] involved validation by a consensus of specialists, seeking to select and refine results and indicators of the Nursing Outcomes Classification (NOC)

for the NDs "risk for perioperative positioning injury" and "impaired tissue integrity". Both works allowed us to select the most relevant results and indicators for these diagnoses in clinical practice.

Still on the NOC, researchers[19] evaluated the healing of surgical wounds in 24 orthopedic patients of hip replacement with the ND "impaired tissue integrity", established by two nurses and documented in electronic health records by the application of data collection instruments, which includes interviewing patients and assessing the surgical wound. When comparing the first and last days, the patients showed progressive improvement in three indicators: skin approximation, drainage and inflammatory signs, and unpleasant smell.

CONCLUSION

By investigating the scientific production related to NDs in the patient's perioperative period, we identified the postoperative period as the most researched. However, most studies addressed the theme from the perspective of the entire anesthesia and surgical process. Studies show a higher prevalence of NDs in surgical patients, encompassing the three stages of the perioperative process; however, only one study analyzed the ND "risk for perioperative positioning injury" specifically in the intraoperative period. The most studied population was that of patients submitted to cardiac surgery.

Of note, all selected articles were produced by Brazilian nurses, even those published in international journals, evidencing the national interest in this topic.

We suggest further research on NDs in the perioperative process, exploring current NDs, such as "risk for surgical site infection", approved in 2016, but not mentioned in the studies reviewed. Nurses should continuously seek knowledge and improvement in order to contribute to advancing the care process. For the nurse to feel safe in their clinical assessment and reasoning, the NP should be steadily worked on in training and educational activities.

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RISK OF PERIOPERATIVE HYPOTHERMIA: AN INTEGRATIVE REVIEW

Risco de hipotermia perioperatória: revisão integrativa

Riesgo de hipotermia perioperatoria: Una revisión integradora

Monique Alves Mendes[1], Natália Kaizer Rezende Ortega de Barros[1], Thalita Gomes do Carmo[2]*

ABSTRACT: Objective: To identify the occurrence and the risk factors that determine the development of the nursing diagnosis 'risk for perioperative hypothermia'. **Method:** Integrative review, using the acronym PIO (patients, intervention, outcomes), in which P=adult and older adults; I=elective surgeries; O=risk factors associated with perioperative hypothermia. The review was conducted and reported based on the Check-list Preferred Reporting Items for Systematic Reviews and Meta-Analyzes (PRISMA), following the seven steps proposed by the PRISMA method. **Results:** The search generated 854 articles, excluding duplicates and non-relevant titles. After applying the exclusion criteria, 13 articles were submitted to the final analysis. Low body mass index, advanced age and prolonged surgical time were the factors most related to the development of hypothermia in surgical patients. The management of hypothermia helps to reduce the risk of adverse cardiac events, infectious complications, and bleeding, besides bringing greater comfort to patients. **Conclusion:** Nurses need to act before the hypothermic condition sets in, recognizing the risk factors inherent to each patient and identifying which care technologies to apply.
Keywords: Perioperative nursing. Nursing diagnosis. Hypothermia. Nursing process. Intraoperative care.

RESUMO: Objetivo: Identificar a ocorrência e os fatores de risco determinantes para o desenvolvimento do diagnóstico de enfermagem risco de hipotermia perioperatória. **Método:** Revisão integrativa, usando o acrônimo PIO (pacientes, intervenção, *outcomes* / desfecho), em que P=pacientes adultos e idosos; I=cirurgias eletivas; O=fatores de risco associados à hipotermia perioperatória. A revisão foi conduzida e reportada com base no Check-list Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), seguindo-se as sete etapas propostas pelo método PRISMA. **Resultados:** A busca gerou 854 artigos, sendo retirados os duplicados e os sem relevância. Após aplicação dos critérios de exclusão, 13 artigos foram submetidos à análise final. Índice de massa corporal baixo, idade avançada e tempo cirúrgico prolongado foram os fatores mais relacionados ao desenvolvimento de hipotermia nos pacientes cirúrgicos. O manejo da hipotermia colabora para diminuição dos riscos de eventos adversos cardíacos, complicações infecciosas, sangramentos e traz maior conforto para o paciente. **Conclusão:** O enfermeiro precisa agir antes do quadro hipotérmico se instalar, reconhecendo os fatores de risco inerentes ao paciente e identificando quais tecnologias do cuidado aplicar.
Palavras-chave: Enfermagem perioperatória. Diagnóstico de Enfermagem. Hipotermia. Processo de Enfermagem. Cuidados intraoperatórios.

RESUMEN: Objetivo: Identificar la ocurrencia y los factores de riesgo que determinan el desarrollo del Diagnóstico de Enfermería Riesgo de Hipotermia Perioperatoria. **Método:** Revisión integrativa, utilizando el acrónimo PIO (Pacientes, Intervención, *Outcomes* / Resultado), donde P=pacientes adultos y ancianos; I=cirugías electivas; O=factores de riesgo asociados a hipotermia perioperatoria. La revisión se llevó a cabo y se informó utilizando los elementos de informe preferidos de la lista de verificación para revisiones sistemáticas y metaanálisis (*Check-list Preferred Reporting Items for Systematic Reviews and Meta-Analyses* – PRISMA), siguiendo los siete pasos propuestos por el método PRISMA. **Resultados:** La búsqueda generó 854 artículos, eliminando los duplicados y los no relevantes. Tras aplicar los criterios de exclusión, se sometieron 13 artículos al análisis final. El bajo índice de masa corporal, la edad avanzada y el tiempo quirúrgico prolongado fueron los factores más relacionados con el desarrollo de hipotermia en los pacientes quirúrgicos. El manejo de la hipotermia ayuda a reducir los riesgos de eventos cardíacos adversos, complicaciones infecciosas, hemorragias y brinda mayor comodidad al paciente. **Conclusión:** La enfermera debe actuar antes de que se presente la condición hipotérmica, reconociendo los factores de riesgo inherentes al paciente e identificando qué tecnologías de atención aplicar.
Palabras clave: Enfermería perioperatoria. Diagnóstico de enfermería. Hipotermia. Proceso de enfermería. Cuidados intraoperatorios.

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INTRODUCTION

Every year, approximately 63 million people undergo surgical treatment for traumatic injuries; another 10 million procedures are performed for complications related to pregnancy; and another 31 million, to treat malignancies.[1] Although the procedures are intended to save lives, failures in the surgical care process can cause considerable damage, stressing that about half of them could be prevented. The perioperative care team is the party responsible for improving communication and reducing damage to patients.

In addition, surgical care has been an essential component of health care around the world for almost a century. As the incidences of traumatic injuries, cancers, and cardiovascular diseases continue to increase, the impact of surgical intervention on public health systems will also grow. However, the lack of access to high quality surgical care has been a significant problem, even though surgical interventions can be beneficial in terms of saved lives and prevented disabilities.[1]

Prevention and treatment of hypothermia are extremely important to prevent increased morbidity related to adverse cardiac events, surgical site infection, impaired platelet function, changes in protein metabolism, changes in drug metabolism, variations in serum potassium levels, peripheral vasoconstriction, reduction of subcutaneous oxygen tension, coagulation abnormalities, among other harm.[2]

According to the North American Nursing Diagnosis Association (NANDA-I), the nursing diagnosis of risk of perioperative hypothermia was approved in 2013, being reviewed in 2017, published in several countries and in many languages,[3] demonstrating the importance of deepening the evidence of diagnosis validity in clinical nursing practice, comparing different locations, participants or interventions, specifying means of measuring effectiveness, efficacy and costs related to possible health complications due to perioperative hypothermia.

The nursing diagnosis (00254) risk of perioperative hypothermia (2013, 2017, level of evidence 2.1) is defined as "susceptibility to an inadvertent drop in central body temperature below 36°C, which occurs in the period between one hour before 24 hours after surgery, which can compromise health".[3] It is inserted in the taxonomic structure in domain 11, safety and protection, class 6, thermoregulation.[3]

Thus, it can be highlighted as risk factors, that is, determinants for the development of perioperative hypothermia: "Low ambient temperature; excessive heat transfer by conduction; excessive heat transfer by convection; excessive heat transfer by radiation".[3] Therefore, this diagnosis allows thinking about classifying patients with or without risk, anticipating complications, enabling early intervention, estimating prevalence and incidences.[3]

The population at risk of developing perioperative hypothermia is the group of individuals who have one or more characteristics that increase the likelihood of developing perioperative hypothermia, such as: "Low preoperative temperature (<36°C); low body weight; classification score>1 for physical status by the American Society of Anesthesiologists (ASA).[3] This diagnosis leads a reflection on preventive measures before, during, and after the surgery, a situation in which the patient will be more likely to present a risk of hypothermia.

According to a study by the Association of periOperative Registered Nurses (AORN), nurses should be alert to demographic factors (such as age and sex) and surgical factors (type of surgery, for example).[4] In addition, anemia, sepsis, and postoperative mortality are factors significantly associated with hypothermia. Thus, perioperative nurses must understand the risk factors and complications associated with perioperative hypothermia to develop and test evidence-based initiatives, improving care and promoting better results for patients.[4]

The associated conditions include: "Combined local and general anesthesia; cardiovascular complications; diabetic neuropathy; surgical procedure".[3] The deepening of these questions aims to better understand the diagnosis and its influence on the recovery of patients in the postoperative period. And, mainly, to contribute to the effective implementation of quality care, as an influencing factor in the reduction of health costs and in the full recovery of patients, in order to guarantee their safety.

Through a validation study, the existence of an indicator/determining factor for the diagnosis is verified and, in a certain way, the construction of characteristics that better define the existing clinical manifestations, the causal contributing factors of that diagnosis, and the predisposing risk factors for the phenomenon also are, thus encouraging evidence-based nursing practice.

The present study can help to improve care provided by perioperative nurses and is also relevant for institutions providing this type of care, as hypothermia increases the risk of intra and postoperative complications, increasing hospitalization time and hospital expenses.

OBJECTIVE

To identify the occurrence and risk factors determinant to the development of the nursing diagnosis 'risk of perioperative hypothermia'.

METHOD

This is an integrative review conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyzes (PRISMA — Statement)[5] tool, based on seven main steps:

- construction of a research protocol;
- formulation of the question in evidence-based practice (EBP), using the acronym PIO (patients, intervention, outcomes);
- definition of descriptors, search strategies in each of the databases selected by the researcher, which must be varied;
- determination, selection, and review of inclusion and exclusion criteria;
- critical evaluation of studies;
- data collection using tools that can analyze in pairs (two researchers simultaneously);
- summary of results/data grouped by similarity.

Eligibility criteria

In order to meet the first stage of the review, the researchers developed a research protocol, in which they included: how the studies would be found, the inclusion and exclusion criteria of articles, the definition of the outcomes of interest, the verification of the accuracy of the results of articles, and determination of the quality of studies.

In the second stage, the construction of the research question was carried out, using the PICO strategy, which represents an acronym for patients, intervention, comparison, and outcomes. In the present study, as there was no comparison, PIO was used, in which P=patient/problem, I=intervention, O=outcome/result:

P – adult and older patients;

I – elective surgeries;

O – risk factors associated with perioperative hypothermia.

The following research question was then formulated: What are the risk factors associated with perioperative hypothermia in adult patients undergoing elective surgery?

Information sources

The third stage consisted of establishing the descriptors drawn based on the thesaurus Medical Subject Headings – MESH (PubMed), Health Sciences Descriptors (*Descritores em Ciências da Saúde*) – DeCS (Latin American and Caribbean Literature in Health Sciences – LILACS), TreeTerm (EMBASE), and Cumulative Index to Nursing and Allied Health Literature (CINAHAL): "adult", "older adult", "risk factors", "operative surgical procedures", "hypothermia", "perioperative period", "adults", "older adults", "elective surgical procedures"; both in Portuguese and in English and associated with each other. As a search strategy, the Boolean operators OR and AND were used for associations.

Online searches in databases Medical Literature and Retrieval System Online (MEDLINE) via PubMed, LILACS via BVS, CINAHAL, and EMBASE via Elsevier began on February 18, 2020; March 6, 2020; and March 11, 2020, respectively.

In the fourth stage, the determination, selection, and review of the inclusion and exclusion criteria took place. The inclusion criteria of the study were: articles that address perioperative hypothermia in adults and older adults. And the exclusion criteria were: articles without a clear methodology, articles that do not address risk factors, studies from secondary sources, guidelines , research protocols, theses, dissertations, and previous notes. As filters, the studies considered had to be published between 2015 and 2020, age (adults and older adults), type of publication (articles), and in Portuguese and English.

In the fifth stage, a critical evaluation of studies was carried out. Scientific papers were selected according to their concepts, collected by a tool, with the following items: data identifying the article (authors and year of publication), country, database in which it was found, quality of studies regarding the level of evidence, methodology, and risk factors for perioperative hypothermia (Figure 1).

The included studies were classified according to the level of evidence and the strength of recommendation, proposed by the Centre for Evidence-Based Medicine (CEBM), Oxford, 2009 (Charts 1 and 2).

In the sixth stage, data collection was performed using tools, in an Excel spreadsheet, for peer analysis (two researchers simultaneously) of the studies according to the inclusion and exclusion criteria adopted.

In the seventh and last stage, interpretation and discussion of results were carried out, highlighting the studies that brought, in a more clear and concise way, the risk factors for perioperative hypothermia. After that, the review and synthesis of the knowledge produced about the established outcomes was presented.

RESULTS

Figure 1 details the flowchart for selecting articles, from the initial search to the final inclusion of studies. The search strategy used generated 854 publications, 54 in LILACS, 70 in PubMed, 34 in CINAHL, and 696 in EMBASE. A total of

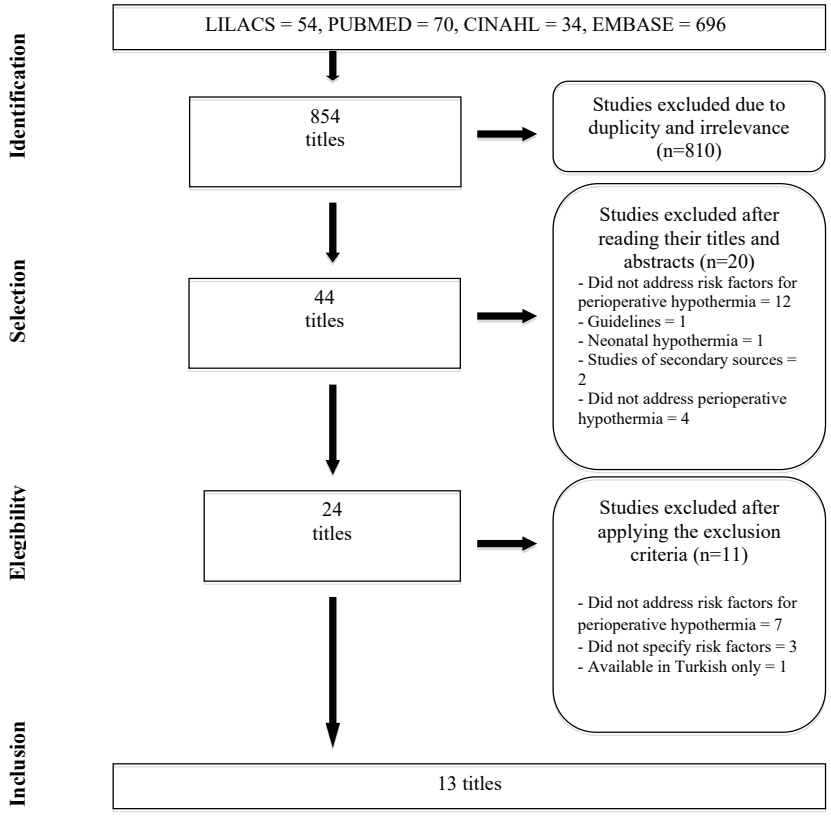

Figure 1. Flowchart of the selection process and inclusion of studies according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2009). Niterói City, Rio de Janeiro State, 2020.

Chart 1. Level of evidence for treatment studies — Oxford Center for Evidence-based Medicine.

Classification	Type of study
1A	Systematic review (SR) of homogeneous controlled and randomized clinical trials (RCT) of good methodological quality.
1B	ECR with small confidence interval.
2A	SR with homogeneity of cohort studies.
2B	Cohort studies; RCT of low methodological quality.
2C	Observational studies of therapeutic studies (research outcomes) and ecological studies.
3A	SR with homogeneity of control case studies.
3B	Control case studies.
4	Case series; cohort or case studies of low methodological quality.
5	Expert opinion without critical evaluation.

Source: adaptation of the Centre for Evidence-Based Medicine (CEBM). Free translation by the authors.

810 articles were excluded due to duplicity and irrelevance. When analyzing the titles and abstracts, 20 were excluded. After reading the articles in full and applying the exclusion criteria, 11 were not related to the theme, which led to their exclusion. Therefore, 13 articles were considered for final analysis, which made up the sample of this study.

In chart 3, the 13 articles included in the study are presented, highlighting authors, year, country in which the study was developed, database, level of evidence, method, and risk factors for perioperative hypothermia. Of the 13 articles included in the study, eight were available in the EMBASE database, and five, in PubMed. The years of publication vary from 2016 to 2020, with one article published in 2020, five in 2019, three in 2018, two in 2017, and two in 2016.

The oldest studies were "Warming before and after epidural block before general anesthesia for major abdominal surgery prevents perioperative hypothermia" and "Effect of perioperative inadvertent hypothermia on the ECG parameters in patients undergoing transurethral resection", published in 2016; and the most recent, "Prevalence and multivariable factors associated with inadvertent intraoperative hypothermia in video-assisted thoracoscopic surgery: a single-center retrospective study", published in 2020.

Publications were found in nine different countries. Germany was the country with the largest number of articles related to the topic, totaling three publications. The United States and Canada had two publications each. China, Brazil, France, Spain, Greece, and Turkey had one study included. Regarding the language, all studies are in English. Most studies are observational.

All the studies analyzed exposed the intrinsic and extrinsic factors to patients, and their correlations with the incidence and prevalence of hypothermia in the perioperative period.

Chart 2. Degree of Recommendation — Oxford Center for Evidence-based Medicine.

Classification	Type of study
A	Level 1 studies with consistent results. Example: Systematic review (RS) of controlled and randomized clinical trials (RCT).
B	Level 2 studies with consistent results. Example: Cohort RS; cohort; research outcomes; ecological studies; SR of case control and case control studies.
C	Series or case reports.
D	Expert opinion or studies classified at any other level that present inconsistent or inconclusive results.

Source: adaptation of the Centre for Evidence-Based Medicine (CEBM). Free translation by the authors.

Chart 3. Articles selected as a sample, according to authors, year, country of origin, database, level of evidence, method, and risk factors for hypothermia.

Author	Year	Country	Database	Level of Evidence	Method	Risk factors for perioperative hypothermia
Akers et al.[4]	2019	United States	EMBASE	3B	Observational Cross-sectional Retrospective Documentary	Age >60; Colectomy; Hysterectomy; Laparoscopic cholecystectomy; Hernia repair.
Li et al.[6]	2020	China	EMBASE	3B	Observational Cross-sectional Retrospective Documentary	Age 51 and 66; BMI <24 kg/m^2; Surgery duration >2h; Surgeries in the morning shift (8 am to 2 pm); Combined general anesthesia.
Kleimeyer et al.[7]	2018	United States	EMBASE	3B	Observational Cross-sectional Retrospective Documentary	Female; Low BMI (<18.5 kg/m$^{2)}$); Advanced age (average =51.4 years); Hip arthroscopy; Low preoperative temperature (minimum 36°C).
Emmert et al.[8]	2018	Germany	PUBMED	3B	Observational Cross-sectional Retrospective Documentary	Anesthesia induction time (mean = 75.26 min); Smaller body surface area (mean = 1.92 m); Infusion of fluids intraoperatively; Thoracotomy; Epidural catheter; Low BMI (<18.5 kg/m^2).

Continue...

Chart 3. Continuation.

Author	Year	Country	Database	Level of Evidence	Method	Risk factors for perioperative hypothermia
Mendonça et al.[9]	2019	Brazil	EMBASE	2B	Observational Longitudinal Prospective Multicentric	Older adults (average = 70 years); Combined anesthesia.
Chalari et al.[10]	2019	Greece	EMBASE	1A	Prospective randomized clinical trial	Transurethral resection in saline solution (TURi); Transurethral resection (TUR); BMI <26.9 kg/m^2; Advanced age >86.
Bayir et al.[11]	2016	Turkey	PUBMED	2C	Observational Longitudinal Prospective	Transurethral resection of the prostate; Transurethral resection of the bladder.
Alfonsi et al.[12]	2019	France	EMBASE	2B	Observational Prospective Multicentric	Age ≥70; Anesthesia duration (one to two hours); Decrease in temperature of >0.5°C induction of anesthesia and surgical incision.
Becerra et al.[13]	2019	Spain	EMBASE	2C	Observational Longitudinal Prospective	Transurethral resection (TUR); Male; Infusion of liquids at room temperature.
Horn et al.[14]	2016	Germany	PUBMED	1A	Prospective randomized clinical trial	Long duration of abdominal surgery (≥120 min).
Ziegler et al.[15]	2019	Germany	EMBASE	3B	Observational Cross-sectional Retrospective Documentary	Sedatives; Mechanical ventilation; Extensive burn; Inhalation injury; Third-degree burns.
Ziolkowski et al.[16]	2017	Canada	PUBMED	3B	Observational Longitudinal Retrospective Documentary	Surgery duration ≥3h.
Desgranges et al.[17]	2017	Canada	PUBMED	2C	Observational Longitudinal Prospective	Total volume of fluids infused 650 mL; Patient temperature on arrival at the operating room <37.1°C; Patient's skin incision temperature <36.6°C.

DISCUSSION

Most articles included in the present study cited low body mass index (BMI), advanced age, and prolonged surgical time as significant factors for the development of hypothermia.[4,6-10,12] One study cited the use of heating devices for 15 minutes before surgery as an important procedure in preventing hypothermia.[12] Transurethral prostate resection surgery was the most related to postoperative hypothermia situations.[10-13]

One study showed that the prevalence of hypothermia in video-assisted thoracoscopy surgeries was 72.7% and these cases were correlated with risk factors such as: advanced age, preparation time, long surgeries, low ambient temperature, surgeries that occurred in the morning, and combination of general anesthesia with paravertebral block before intubation. Overweight proved to be a protective factor against hypothermia.[6]

In addition to the risk factors mentioned, other authors also identified low preoperative temperature, female gender, low BMI, and pelvic and hip procedures in this category.[7] People who have any of these risk factors need specific interventions to prevent hypothermia and to limit their morbidity.

Hypothermia was also found to be more common in patients who have already undergone orthopedic surgery. Impaired lung function was related to perioperative hypothermia as well.[8]

In another publication, in which the authors studied 78 patients, 69.2% had hypothermia at the time of admission to the post-anesthesia care unit (PACU); of these, 65.4% had a temperature between 34 and 35.9°C, and 3.8% had a temperature below 34°C.[9] The group that presented hypothermia had received predominantly regional anesthesia

associated with morphine and sufentanil; the normothermia group had received only fentanyl. Patients were predominantly male, aged between 30 and 70, and classified as ASA II and III. As to older adults, the predominant surgery was transurethral resection of the prostate; in younger patients, cesarean surgery predominated. Regarding the type of anesthesia, young people were submitted to regional or general anesthesia, whereas most older adults was submitted to regional anesthesia.

Patients undergoing transurethral resection are at high risk for developing hypothermia. The cases of hypothermia in these surgeries were slightly higher (64.1%) than in those who underwent transurethral resection of the prostate (60%).[10] The postoperative temperature is considerably lower than the preoperative temperature in all patients. The reduction of hypothermia contributes to the reduction of the risk of adverse cardiac events.[11]

According to a multicenter study conducted in France, the drop in body temperature occurs after the anesthetic induction process and remains until admission to the PACU.[12] The authors emphasized that the heating systems, in most cases, are used poorly, in which professionals simply put the thermal blanket on patients, which is not enough to prevent perioperative hypothermia. Combining preheating before surgery in addition to warming up during surgery is necessary. Therefore, professionals should make better use of these heating mechanisms and perform intermittent monitoring of patients' temperature to early identify hypothermia.

Preheating is an important technique, performed before the operation. The preheating times before the transurethral resection of the prostate with spinal anesthesia were related. Patients were divided into: group 1 (without preheating), group 2 (preheating for 15 minutes), group 3 (preheating for 30 minutes), and group 4 (preheating for 45 minutes). Patients in groups 1 and 4 had more hypothermia at the end of the surgical procedure, 96.4 and 90.5%, respectively. Patients in groups 2 and 3 had similar rates for developing hypothermia (approximately 74.0%).[13]

Thus, preheating for 15 minutes proved to be more effective than longer preheating times or no preheating. Episodes of tremors in the PACU were mostly observed (42.9%) in patients who did not suffer pre-heating and in those who underwent heating for 45 minutes (9.5%); patients in groups 2 and 3 did not show tremors. The time spent in the PACU was shorter for groups 2 and 3, compared to group 1.[13] In another study, the benefit of preheating for 15 minutes before placing the epidural catheter was evidenced as being sufficient to prevent hypothermia in all patients analyzed.[14]

Hypothermia is also a triggering factor for worse outcomes in patients with burns, and may cause a number of other harm. Temperature monitoring should be performed with special rigor in patients with burns, as hypothermia determines the need for more attention in their primary treatment.[15]

Patients with hypothermia had major burns and a higher incidence of respiratory problems. Hypothermia increases the risk of infectious complications, such as sepsis, pneumonia, urinary tract infections, and injuries.[16]

In cesarean surgeries, obesity, active heating, and the administration of oxytocin during labor are factors associated with a reduced risk of hypothermia. The infusion of more than 650 mL of liquids was a major risk factor for the occurrence of hypothermia.[17]

Nurses have a primary role in preventing hypothermia, associating the patient's risk factors and the complications that perioperative hypothermia can cause, focusing their interventions on an evidence-based practice, in order to promote better outcomes for surgical patients.[18]

As a study limitation, search systems, which are flawed and may have failed to include potentially eligible studies, as well as the fact that no searches were made in other databases can be mentioned.

CONCLUSION

The present study identified the occurrence and risk factors determining the development of the nursing diagnosis 'risk of perioperative hypothermia', exposing the intrinsic and extrinsic factors that predispose patients, their correlations with the incidence and prevalence of hypothermia in the perioperative period. In the 13 articles analyzed, low BMI, advanced age, and prolonged surgical time were the factors most related to the development of hypothermia in surgical patients. Managing hypothermia contributes to reducing the risks of adverse cardiac events, infectious complications and bleeding, and brings greater thermal comfort to patients.

Promoting nurses' knowledge to identify factors that threaten patients in groups at risk of hypothermia is of utmost importance. Nurses must know how to act even before hypothermia sets in, recognizing the risk factors inherent to patients and knowing which care technologies to apply to reduce this frequent surgical complication.

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