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THE CORRELATION OF MUSCULOSKELETAL COMPLAINTS WITH NURSING POSTURES AND MOVEMENTS IN THE PREPARATION OF SURGICAL ROOMS

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ABSTRACT

The ergonomics studies the worker, work and its risks. Health workers have the aggravating factor of taking responsibility for the life and health of others. The aim of this study is to analyze the physical repercussions on the health of nursing professionals responsible for preparing operating rooms (circulating rooms). This is a qualitative, exploratory, descriptive study, carried out with circulating patients in the operating room of a teaching hospital in southern Brazil. Comprised of completing the Informed Consent Form (ICF), Health and Work in Service Activities Questionnaire (QSATs, 2015), Sociodemographic Questionnaire, Nordic Questionnaire, and the International Physical Activity Questionnaire (IPAQ). Subsequently, observations and records of labor activity were made. There were a total of 45 participants. 71% are female, 49% have technical training in nursing, 42% have suffered accidents at work. In the IPAQ Questionnaire, 35% of the participants are active. The correlation is low between age, sex, and musculoskeletal disorders, and very strong between shift and work rate. Historically, health care professions are linked to the female public, as observed in the population. The appearance of complaints in regions such as the lumbar and cervical spine are consistent with the movements and postures adopted in labor activity. Regular physical activity practices tend to decrease the appearance of these disorders in the long term, as well as the appropriate use of Personal Protective Equipment (PPE). The appearance of musculoskeletal disorders could be minimized by leveling the education of professionals and adapting the furniture.

KEYWORDS: Ergonomics, Worker's Health, Public Health.

1. Introduction.

Ergonomics is the science that seeks to understand the interaction between humans and work, related to the environment, organization, objects, and human relations. Through the application of knowledge from various other sciences such as physiology and anthropometry, for example, the aim is the physical and psychosocial well-being of the worker through practical actions [1 2 3].

Work is described by Marx (2008)[4] as a process that exceeds man, encompassing his nature, using the physical forces imposed by his body for its execution. During the performance of work, the activity carried out may differ from the activity described in the documents regarding the function; when this happens, the individual exposes themselves to risks and

constraints (consisting of performing an activity that exceeds physical, psychological, or cognitive capacity). Understanding these differences allows adjustments to work dynamics and greater similarity between prescribed and actual work 1 2.

The Worker Health Policy aims to improve and maintain the quality of life, understanding and intervening in the worker's relationships with the function, environment, and organizational aspects, promoting health and preventing occupational disorders 5. Thus, the Worker Health Policy follows the same principles as the Unified Health System (SUS), which provides assignments to managers, its state direction, technical teams, with determinations regarding its functioning mechanism, financing, and monitoring, according to the Ministry of Health.

In this context, in Brazil, the Ergonomics Regulatory Standard (NR17) 29 establishes guidelines for the adaptation of various factors surrounding work activities, aiming at the health of workers. It addresses the lifting, transport, and unloading of materials, furniture, environmental and organizational conditions, all of which can be adjusted according to the physical, psychological, and cognitive needs of the individuals involved 6 7.

In this scenario, the hospital environment and its physical, chemical, psychosocial, ergonomic, and biological aspects emerge as contributing factors to the onset of physical disorders in the health of professionals 8 5. The operating room, in turn, is characterized as an aseptic environment that receives patients for surgical purposes, providing immediate preoperative, intraoperative, and postoperative care during post-anesthetic recovery 9. It is an environment in constant evolution, keeping pace with advances in healthcare, efficiency, and productivity 10.

With a larger volume of professionals in the operating room, the nursing team works at all moments in patient care 11. Work in the operating room requires the presence of nurses for coordination and assistance, nursing technicians, and nursing assistants. Administrative tasks are carried out by the operating room nurse, who also accumulates the care aspect 12 13.

In the preoperative phase, the team is responsible for preparing the surgical environment, checking patient data, and providing information about the procedure, with caution regarding their psychosocial state. During the procedure, the team provides the instruments to be used by surgeons and maintains the necessary conditions for the least possible risk of complications, such as supporting the medical team, patient records, supplies, equipment arrangement, among others. In the postoperative period, they provide assistance until the stabilization of vital signs 9. Each moment and function are performed by different professionals who work synchronously, and their harmony is important to ensure the success of the procedure 14 11.

The minimization of risks to patients occurs through the application of checklists by the team. These instruments, through questions, guide the actions of professionals as part of the safe surgery protocol proposed by the World Health Organization. The questions cover preoperative, patient identification, anesthetic check, and issues related to the team and procedure 15.

As a member of the nursing team and the focus of this investigation, the circulating nurse whose function extends from receiving the patient to transporting them for post-anesthetic follow-up, including the preparation of the operating room. They are responsible for making all the materials requested for the room available on-site, assisting the medical team by providing and recording the consumption of supplies, organizing the arrangement of materials, and recording aspects related to the patient, incidents, quantities, and times related to the procedure 9.

At the end of the surgery, the circulating nurse is responsible for transporting the patient to the

post-anesthetic recovery room with the medical records and informing the cleaning team about the end of the procedure and the need for asepsis. Once sterilized, they must organize the room and its supplies for the next surgical intervention. This activity requires mastery of sterilization and handling of equipment, its functionalities, patient management, and assistance to other team members involved 9 16.

Circulating nurses are also responsible for placing the grounding electrode (metal plate) in cases of procedures using an electric scalpel. It is also their responsibility to correctly remove the electrode after the procedure and check the skin and nearby regions, recording any possible incidents. It is up to this professional to choose the location where the electrode will be positioned, respecting precautions regarding its use such as ulcers, bony prominences, among others 10.

During work activities, many postures and movements can cause musculoskeletal discomfort and constraints when performed repeatedly or in a biomechanically incorrect manner. These efforts can make the individual susceptible to musculoskeletal injuries 17.

Repetitive Strain Injuries (RSI) result from the constant use of the same joint or musculature, repeating the same movement for long periods. The main affected tissues are: muscular, nervous, osseous, and articular, being directly influenced by the conditions to which the individual is exposed. When arising from work activities, they can also be defined as Work-Related Musculoskeletal Disorders (WRMSD), which are characterized by inflammatory or degenerative processes of tissues, causing pain, changes in mobility, and functional limitation. Even after treatment and discharge, a loss or reduction of productive capacity is common due to the injury 14 18 19. In the United States, the incidence of RSI/WRMSD among nurses is approximately 72.5% 17.

Despite being little explored, various aspects related to the worker and their function influence the onset of RSI/WRMSD and assist in characterizing the individual and understanding the health-disease process in which they are involved, such as age, sex, function, time in the position 20.

The most observed musculoskeletal injuries in this population are related to disorders in the vertebral column, especially the lumbar spine. Some movements that may be linked to these injuries include the transport of equipment and patients, prolonged time in the orthostatic position, and improper postures during routine activities 14 21 19 22.

According to the Bureau of Labor Statistics, in 2014, the occurrence of affections in the lumbar spine is between 40-50% among nurses involved in patient mobilization. In Portugal, complaints in the lumbar region reach 60%, surpassing the cervical and lumbar regions 17.

In addition to the intrinsic problems of physical disorders (pain, numbness, fatigue, among others), the extent of the individual's involvement extends to other fields, such as the psychosocial. The presence of RSI/WRMSD is closely related to psychological disorders, reduced performance, and difficulties in interpersonal relationships with colleagues and in family life 22.

Just as physical conditions impact the psychological and cognitive aspects, the reverse occurs with the aggravation, which can lead to the development of musculoskeletal disorders. Occupational origin injuries are common reasons for absenteeism and work leave, resulting in the absence of the worker, overburdening the rest of the team, and creating a conducive environment for new injuries 20 11 23 19.

Given the negative conditions associated with work activities, institutional actions reduce the incidence of musculoskeletal disorders and improve the quality of life, satisfaction, and

performance of workers, often presenting themselves as the primary form of prevention and reduction of work-related damage 24 11 18.

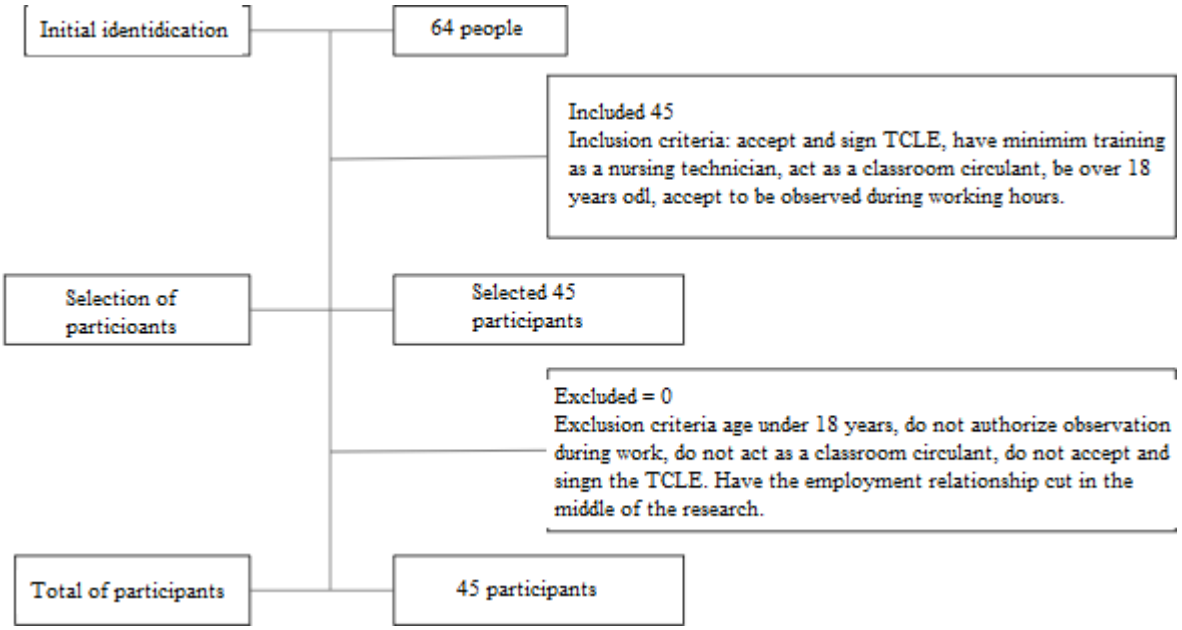
Therefore, the objective of this study was to correlate the occurrence of musculoskeletal complaints with the postures and movements performed during the work activities of circulating nurses during the preparation of the operating room in a university hospital in southern Brazil.

2. Methodology

The present study, characterized as qualitative and quantitative, exploratory, and descriptive, was approved by the Research Ethics Committee of the institution under the number 2,168,920. It was conducted in the surgical center of a university hospital in southern Brazil between January and December 2018, where surgical procedures are performed. The center attends to patients of all ages, on an elective, urgent, or emergency basis, covering various surgical disciplines, with an average of 590 surgeries per month.

The research procedures were divided into two stages: Stage 1 involved participant recruitment and questionnaire administration, and Stage 2 included the observation of individuals and the work process, as described in the flowchart in Figure 1.

Figure 1. Stages followed in the study for participant selection and inclusion/exclusion.



In the first stage of the research, participants were recruited through individual approaches during breaks between surgeries, where the project and the Informed Consent Form (ICF) were explained to those meeting the study's inclusion criteria. After signing the ICF, individuals completed the Health and Work in Service Activities Questionnaire (QSATs, 2015), including sociodemographic questions, the Nordic Questionnaire, and the International Physical Activity Questionnaire (IPAQ).

In the second stage, participants were approached and observed during the preparation of surgical rooms from the end of the previous procedure to the start of the surgery, with verbal and photographic records.

The Nordic Questionnaire maps symptoms and discomfort in the body, serving as a practical and self-applicable instrument often used for research, especially in the occupational health field. It considers the time the individual has been symptomatic (from one week to one year) and the characteristics of the symptom, such as pain, tingling, and numbness. It includes topographical options for symptoms: neck, shoulders, upper back, elbows, wrists and hands, lower back, hips and thighs, knees, ankles, and feet. The Brazilian version of the questionnaire is validated 25.

The IPAQ questionnaire assesses the level of physical activities performed. It calculates the time spent weekly on moderate and vigorous activities, in addition to time spent sitting with low energy expenditure. Individuals can be classified as very active, active, irregularly active, or inactive 26.

To be considered very active, one must engage in at least 30 minutes of vigorous activities on 5 days per week or 20 minutes for 3 days of vigorous activities with moderate activities and/or a 30-minute walk on 5 weekly days. An active individual is someone with at least 3 days (20 minutes per day) of vigorous activities, moderate activities, or a walk on 5 weekly days (30 minutes), or any activity totaling 150 minutes or more in 5 weekly days. Irregularly active individuals are classified into two groups: the first with activities on 5 weekly days or with a total duration of up to 150 minutes, and the second group that did not meet any of the previous criteria. To be considered sedentary, an individual cannot engage in 10 continuous minutes of physical activity per week 26.

The circulator's work was monitored during the preparations of various surgeries, involving different professionals, on different days and times, to understand the execution of the work, the relationships between the necessary individuals for the successful performance of this activity, identify repetitive movements, incidents, unforeseen events, and verbalizations during this moment.

Displacements and postures (correlated with their purpose) were also recorded. During observations and records, questions were asked to understand the actions and intentions of the individual, aiming to avoid discomfort and constraints. Actions were described in chronological order, in written form, and through photographic documentation 27 2.

For the analysis of the correlation results between responses in the Nordic Questionnaire, age, gender, and time in the function, the Pearson correlation coefficient was used. This instrument measures the degree of linear correlation between two variables, with values ranging from -1 to 1.

Regarding values: values closer to 0 indicate a neutral correlation; values closer to 0.5 suggest a moderate correlation; values between 0.7 and 0.8 represent a strong correlation; values closer to 1 indicate a very strong correlation. Regarding the sign: a negative sign indicates an "inverse" association, where one variable increases, and the other decreases. A positive sign

indicates an "accompanying" association, where both variables increase together.

3. Results

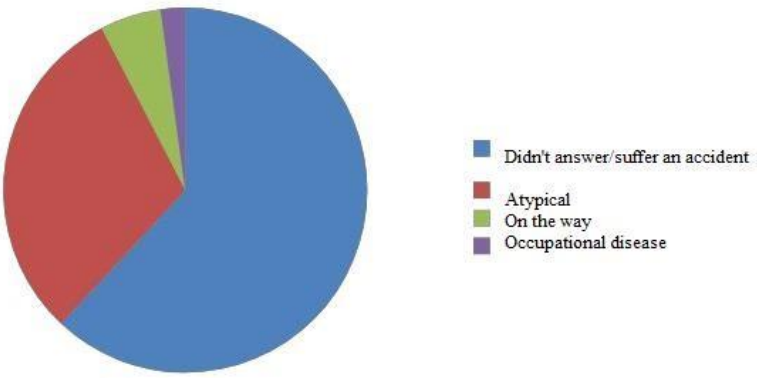
The sample characteristics indicate that 32 individuals (71%) are female, while 13 (28%) are male. The findings related to work are presented in Table 1.

Table 1. Work Information

	Quantity	Percentage
Employment Bond		
CLT	23	51%
Foundation	3	7%
Unified Legal System (RJU - Regime Jurídico Único)	19	42%
Weekly Work Hours		
30 Hours	20	44%
36 Hours	23	51%
40 Hours	1	2%
12 Hours	1	2%
Role		
Nursing Technician	22	49%
Nurse	5	11%
Other Role/Did not respond	6	13%
Time in the role		
Up to 10 years	18	39%
11 to 20 *years*	9	18%
21 to 30 *years*	10	22%
31 to 40 *years*	4	8%
41 to 50 *years*	1	2%

For aspects related to health being influenced by work, 26% consider that health has been affected due to current work, and 15% undergo regular treatment for some sequelae acquired due to work. Regarding the use of Personal Protective Equipment (PPE), 51% consider it important, while 31% do not. 42% of the subjects have experienced a work-related accident recognized by law, of which 26% required taking leave. The types of accidents are described in Graph 1.

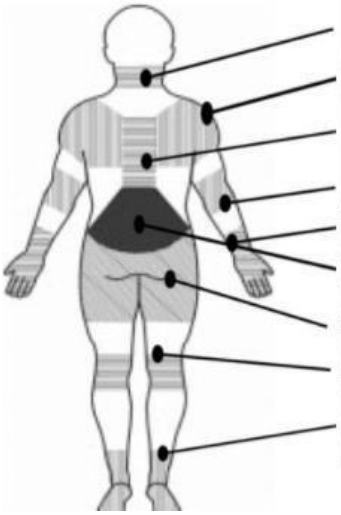
Graph 1: Types of Work-Related Accidents



Source: The authors

With respect to the results presented by the IPAQ questionnaire, it showed that 13% of the survey participants are sedentary, 28% are irregularly active, 8% are regularly active, 35% are active, and 13% are very active. The results obtained from the Nordic questionnaire are presented separately in Figure 2.

Figure 2. Results of the Nordic Questionnaire.



	In recent years 12 months you had problems no:	In the last 12 months you've been prevented from carry out activities normal by problems in:	In the last 12 months you consulted some professional health for some condition no:	Us last 7 days you had some problem:
neck	33%	8%	17%	13%
Shoulders	37%	6%	11%	15%
UPPER BACK	37%	17%	11%	22%
Elbows	11%	8%	8%	22%
FISTS / HANDS	31%	17%	13%	4%
LOWER BACK	51%	20%	20%	33%
HIP / THIGHS	22%	4%	8%	4%
Knees	33%	13%	20%	20%
ANKLES / FEET	37%	13%	15%	15%

The findings of the correlation between the results of the Nordic Questionnaire and the characteristics of the population are presented in Table 2.

Tabela 2. Correlação entre questionário Nórdico e características da população.

Place	Correlation	Result	Conclusion
Neck	Age	0.1040806	Low correlation
Neck	Gender	-0.06933752	Low and negative (no correlation with gender)
Neck	Time in the position	0.2205528	Low correlation
Head	Age	0.01580395	Low correlation
Head	Gender	0.02679967	Low correlation
Head	Time in the position	-0.05213035	Low and negative (no correlation with gender)
Shoulder	Age	0.142603	Low correlation
Shoulder	Gender	-0.02620712	Low and negative (no correlation with gender)
Shoulder	Time in the position	0.06142399	Low correlation
Upper Back	Age	0.02352727	Low correlation
Upper Back	Gender	-0.02620712	Low correlation
Upper Back	Time in the position	-0.1968782	Low correlation

Elbow	Age	-0.1135011	Low correlation
Elbow	Gender	-0.1454839	Low correlation
Elbow	Time in the position	-0.3085091	Low correlation
Wrist And Hands	Age	0.07165124	Low correlation
Wrist And Hands	Gender	0.03989657	Low correlation
Wrist And Hands	Time in the position	-0.02035574	Low correlation
Lower Back	Age	0.07165124	Low correlation
Lower Back	Gender	-0.04902903	Low correlation
Lower Back	Time in the position	-0.02035574	Low correlation
Thighs	Age	0.1448333	Low correlation
Thighs	Gender	0.03989657	Low correlation
Thighs	Time in the position	-0.02035574	Low correlation
Knees	Age	-0.06134187	Low correlation
Knees	Gender	-0.03846154	Low correlation
Knees	Time in the position	-0.0922921	Low correlation
Ankles And Feet	Age	-0.06134187	Low correlation
Ankles And Feet	Gender	0.1057692	Low correlation
Ankles And Feet	Time in the position	-0.02035574	Low correlation
Sleeping At Unusual Hours	Work shift	-0.4197635	It presented a moderate and negative correlation. Individuals with a daytime schedule do not feel bothered by sleep, as expected. Due to having many categories, it ended up focusing only on one category, and that's why the correlation appeared higher.
Intense work pace	Shift	0.09469792	Very strong correlation, with the daytime shift being the most intense.

4. Discussion

The analysis of the results highlights that the majority of the research population is female, consistent with Santos (2017). Correspondingly, the time in the position exceeds 10 years for most of the population, although the weekly working hours for the majority are less than 40 hours, deviating from a study that found an average weekly working hours of 42, as in Prieto (2015).

In this study, a percentage of 26% was found, representing participants whose lives were affected by work, and 15% needed treatment for sequelae of work-related dysfunctions. In light of this, it is evident that 42% have experienced work-related accidents, with 26% requiring time off. In the study by Santos et al., 2017, a prevalence of 65% of the population needed leave, with 42% of these being due to musculoskeletal disorders.

The results presented by the IPAQ questionnaire align with Santos's study (2017), where the majority of individuals are reported as active. These aspects are important to observe, as physical activities condition the musculoskeletal system, potentially reducing the incidence of

painful processes.

In Santos's study (2017), the highest percentage of pain, tingling, or numbness in the last 12 months was in the lower back, coinciding with the present study. Predominant complaints about hindrance in performing normal activities in the last 12 months were more common in the ankle and foot region, unlike the present study, which showed a higher percentage in the lower back region. Regarding the need for healthcare professional attention, the lower back region had the highest affirmative responses, as in this study, with affirmative responses also evident for the knee region. The presence of any problem in the last 7 days was equal (11%) for both the lower and upper back. In the studied population, the majority of responses were related to the lower back only.

The explanation for the significant presence of painful complaints in the lower back, as pointed out by Santos (2017), is due to the postures and movements adopted during professional activities, including transporting and lifting loads, along with prolonged standing, as confirmed by Lima et al., 2018, and Prieto (2015).

These characteristics were observed during the observational analysis, where it was noted that the same route was taken approximately 5 times to gather materials needed for the surgical procedure. Antalgic postures were common during the preparation of the surgical room, as well as squatting using trunk flexion with extended knees most of the time.

Despite studies like Santos (2017) pointing out causes such as the majority of the female population experiencing pain due to the double workload, in this study, the individual's gender did not show great significance for the onset of pain.

The factor that showed a high correlation was the intensity of work with the shift. This can be explained by the nature of the service provided. Since surgeries on weekdays are pre-scheduled following a constant flow, daytime shift professionals have higher occupational demands. Those scheduled for weekends have a lower demand, despite the discomfort of procedures being announced suddenly, without sufficient time for professional planning.

Regarding the organization of work, it suggests adapting norms and production methods, pace and working time, and the content of tasks to the capacities and needs of the worker. It is worth noting that in professionals with constant use of physical force, especially with muscular overload of the neck, upper and lower limbs, and back, remuneration should consider these physical factors, and breaks should be offered for rest. With these measures, the standard regulates various forms of work activities, contributing to the maintenance of the worker's health and safety.

The rearrangement of furniture can reduce the need for unnecessary squatting, but the greatest need presented by the population is the lack of instruction on the correct method of performing activities. It is the institution's responsibility to provide training as well as rearrangement, within physical and financial possibilities. Improving the instruction of these professionals about the physiological repercussions of adopted postures and gestures can minimize the adoption of incorrect movements. In this way, complaints of musculoskeletal origin tend to be reduced, and consequently, improvement is achieved in various other aspects, including quality of life.

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