



CORRELATION OF MUSCULOSKELETAL COMPLAINTS WITH NURSING POSTURES AND MOVEMENTS IN THE PREPARATION OF OPERATING 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 man and work, related to the environment, organization, objects and human relationships. Through the application of knowledge from several other sciences such as physiology and anthropometry, for example, the physical and psychosocial well-being of the worker is sought 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 the work, the activity performed may differ from the activity described in the documents about the function, when this situation occurs the individual is exposed to risks and constraints

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(it consists of performing an activity that exceeds physical, psychic or cognitive capacity). Understanding these differences allows adjustments in the work dynamics and greater similarity between the prescribed work and the real ^{1 2}.

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

In this context, in Brazil, the Ergonomics Regulatory Standard (NR17) ²⁹ establishes Guidelines for the adequacy of various factors that surround the work activity, aiming at the health of workers. It provides for the surveying, transporting 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 subjects involved ^{6 7}.

In this scenario, the hospital environment and its physical, chemical, psychosocial, ergonomic, and biological aspects emerge as contributing factors to the emergence of physical disorders in the health of professionals ^{8 5}. The operating room, in turn, is characterized by being an aseptic environment that receives patients for surgical purposes, providing them with immediate preoperative, intraoperative, and postoperative care during post-anesthetic recovery ⁹. It is a constantly evolving environment, following advances in health care, efficiency, and productivity ¹⁰.

With a greater volume of professionals in the operating room, the nursing team works at all times in patient care ¹¹. The work in the operating room requires the presence of nurses to work in coordination and care, nursing technicians and nursing assistants. The administrative work is performed by the nurse of the surgical center, who also accumulates the care bias ^{12 13}.

In the preoperative phase, the team is responsible for preparing the surgical environment, checking the patient's data and providing him with information about the procedure, with caution regarding his psycho-emotional state. During the procedure, the team provides the instruments to be used by the surgeons and maintains the necessary conditions for the lowest possible risk of complications, such as support to the medical team, patient records, supplies, equipment arrangement, among others. In the postoperative period, it provides assistance until the stabilization of its vital signs ⁹. Each moment and function is performed by



different professionals who work synchronously, whose 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 and are part of the safe surgery protocol proposed by the World Health Organization. The questions range from the preoperative period, patient identification, anesthetic checking, to questions related to the team and procedure ¹⁵.

A member of the nursing team and the focus of this investigation, the room circulator whose function extends from the reception of the patient to the transport for post-anesthetic follow-up, including the preparation of the operating room. It is responsible for making available on site all the materials required for the procedure, assisting the medical team by providing and recording the consumption of supplies, organizing the disposal of materials, recording aspects related to the patient, intercurrents, quantities and times related to the procedure ⁹.

At the end of the surgery, the circulator is responsible for transporting the patient to the post-anesthetic recovery room, with the medical record and its records, informing the cleaning team about the end of the procedure and the need for asepsis. Once sterilized, she must organize the room and its supplies for the next surgical intervention. Such activity requires mastery of sterilization and manipulation of equipment, its functionalities, patient management, and care for other members of the team involved ^{9 16}.

Circulators are also responsible for placing the dispersive electrode (metal plate) in cases of procedures using an electric scalpel. In addition, it is his responsibility to correctly remove the electrode after the procedure, and check the skin and nearby regions, recording possible complications. It is up to this professional to choose the place where the electrode will be positioned, respecting care about its use such as ulcers, bone prominences, among others ¹⁰.

During work activity, many postures and movements can offer discomfort and musculoskeletal embarrassment when performed repetitively or biomechanically incorrectly. 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 tissues affected are: muscle, nervous, bone and joint tissue, being directly influenced by the conditions to which the individual is exposed. When they arise from work activity, they can also be defined as Work-



Related Musculoskeletal Disorders (WMSD), which is characterized by inflammatory or degenerative processes of tissues, causing pain, mobility alteration and functional limitation. Even after treatment and discharge, it is common for the loss or reduction of productive capacity due to the injury ^{14 18 19}. In the United States of America, the incidence of RSI/WMSD among nurses is approximately 72.5% ¹⁷.

Although little explored, several aspects related to the worker and his function influence the emergence of RSI/WMSD and help to characterize the subject and to understand the health-disease process in which he or she is inserted, such as age, gender, function, and time in the function ²⁰.

The musculoskeletal injuries most observed in this population are linked to spinal disorders, especially the lumbar spine. Some movements that may be linked to these injuries include transporting equipment and patients, long time in the orthostatic position, inadequate postures during routine activities ^{14 21 19 22}.

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

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

In the same way that physical conditions impact the psychic and cognitive, the opposite occurs, with the worsening of musculoskeletal disorders. Occupational injuries are common reasons for absenteeism and absence from work, resulting in the absence of this worker, overloading the rest of the team and making the scenario conducive to new injuries ^{20 11 23 19}.

In view of the negative conditions related to work activity, institutional actions reduce the incidence of musculoskeletal disorders and improve the quality of life, satisfaction and performance of workers, presenting themselves in most cases as the main form of prevention and reduction of work-related damage ^{24 11 18}.

Therefore, the objective of the present study was to correlate the appearance of musculoskeletal complaints with the postures and movements performed during the work activity of room circulators during the preparation of the operating room in a university hospital in southern Brazil.

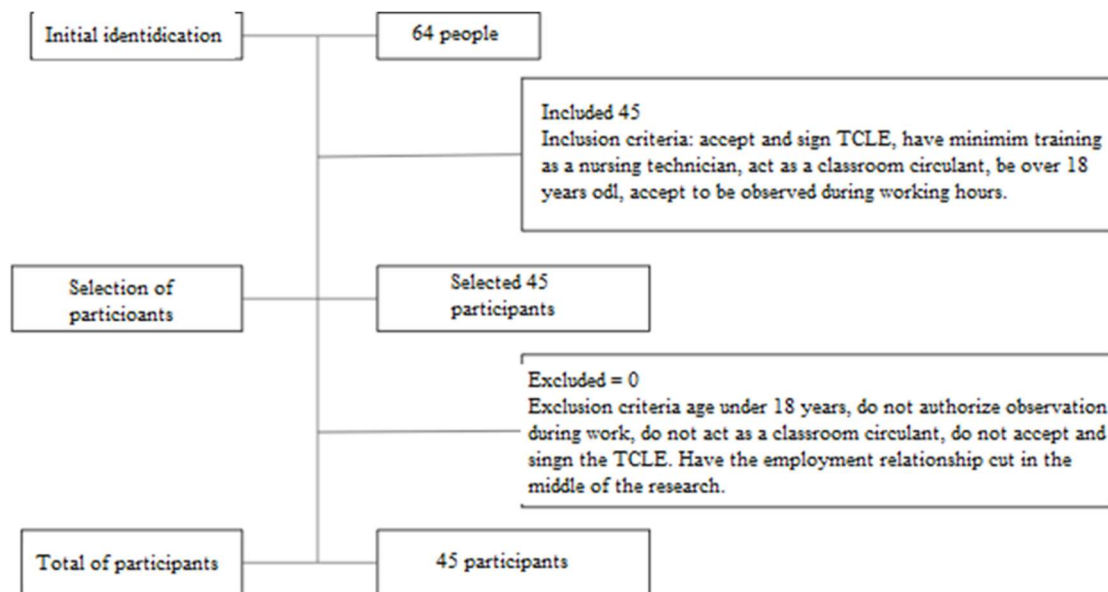


2. METHODOLOGY

The present study, characterized as qualitative and quanti, exploratory and descriptive, was approved by the Research Ethics Committee of the Institution, under the number: 2.168.920. Performed in the operating room of a university hospital in southern Brazil, between January and December 2018, where surgical procedures are performed. It serves patients of all ages, on an elective, urgent or emergency basis, covering various surgical disciplines, with an average of 590 surgeries/month.

The research procedures were divided into two stages: Stage 1 with the recruitment of participants and application of questionnaires and Stage 2 with the observation of the individuals and the work process, as described in the flowchart in figure 1.

Figure 1. Steps followed in the study for selection and inclusion/exclusion of participants.



In the first stage of the research, participants were recruited through an individual approach during the pauses between surgeries, explaining the project and the Informed Consent Form (ICF) to those who met the inclusion criteria of the study. After signing the ICF, the individuals answered 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, the participants were approached and observed during the preparation of the operating rooms from the end of the previous procedure to the beginning of the surgery, with verbal and photographic records.

The Nordic Questionnaire allows the mapping of symptoms and discomforts in the body, being a practical and self-administered instrument, it is usually used for research purposes, especially in the area of occupational health. It takes into account the time that the individual is symptomatic (from one week to one year) and the characteristic of the symptom, such as: pain, tingling and numbness. Uses as topographic options for symptoms: neck, shoulders, upper back, elbow, wrists and hands, lower back, hip and thigh, knees, ankles and feet. It has validation in the Brazilian version ²⁵.

The IPAQ questionnaire allows you to assess the level of physical activities performed. To do so, it uses a calculation of the time spent weekly in moderate and vigorous daily activities, in addition to the time spent sitting with little energy expenditure. The subject can be classified as very active, active, irregularly active, or inactive ²⁶.

To be considered very active, you must perform at least 30 minutes on 5 days a week of vigorous activity or 20 minutes on 3 days of vigorous activity with moderate and/or 30-minute walking on 5 days a week. Active is an individual with at least 3 days (20 minutes daily) of vigorous activity, moderate activity or walking on 5 days a week (30 minutes) or any activity performed on 5 days a week lasting 150 minutes or more. Irregularly active individuals are classified into two groups, the first with activities on 5 days a week or with a combined duration of up to 150 minutes, the second group that did not meet any previous criteria. To be considered sedentary, the individual cannot perform 10 continuous minutes of physical activity at week ²⁶.

The work of the circulator was monitored during the preparation of the rooms of various surgeries, by different professionals, on different days and times, in order to understand the performance of the work, relationships between the subjects necessary for the good performance of this activity, identify the movements performed in a repetitive way, the interurrences, unforeseen events and verbalizations during this moment.

Displacements, postures (correlating with purpose) were also recorded. During the observations and records, questions were also carried out in order to understand the actions and intentions of the subject, in order to avoid embarrassment and discomfort, described in chronological order of the actions, in written form and in photographic records ^{27 2}.

Pearson's correlation coefficient was used to analyze the results of the correlation between the answers to the Nordic Questionnaire, age, gender and time in the job. This



instrument measures the degree of linear correlation between two variables, with values between -1 and 1.

By the values, we have that: values closer to 0, neutral correlation; values closer to 0.5, moderate correlation; values between 0.7 and 0.8, strong correlation; values closer to 1, very strong correlation. By the sign, we have that: negative sign means an "inverse" association, one variable increases and another variable decreases. Positive sign: association that "accompanies", one variable increases and another variable increases together.

3. FINDINGS

The characteristics of the sample indicate that 32 individuals (71%) are female, 13 (28%) are male. The work-related findings are shown in Table 1.

Table 1. Job Information

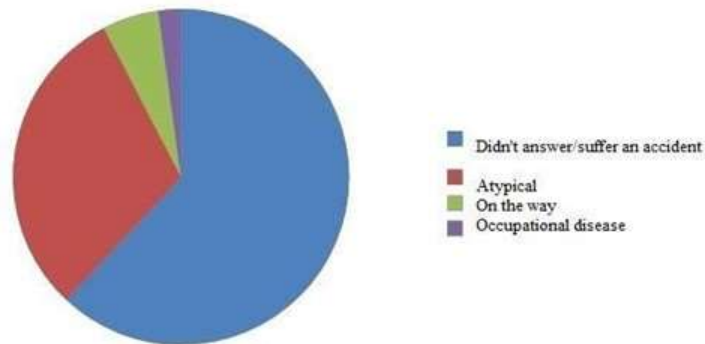
	Quantity	Percentage
Employment relationship		
CLT	23	51%
Foundation	3	7%
RJU (Single Legal Regime)	19	42%
Weekly Journey		
30 hours	20	44%
36 hours	23	51%
40 hours	1	2%
12 hours	1	2%
Function		
Nursing Technician	22	49%
Nurse	5	11%
Other function\ did not respond	6	13%
Time in Function		
Up to 10 years	18	39%
11 to 20 years	9	18%
21 to 30 years old	10	22%
31 to 40 years old	4	8%
41 to 50 years old	1	2%

For health-related aspects that are interfered with by work, 26% consider that their health has been affected due to their current work, 15% undergo some regular treatment for some sequelae acquired because of work. Regarding the use of Personal Protective Equipment (PPE), 51% consider it important, 31% do not. 42% of the subjects had already had a work



accident recognized by law, of which 26% needed to be on leave. The types of accidents are described in graph 1.

Graph 1 Modalities of work accidents

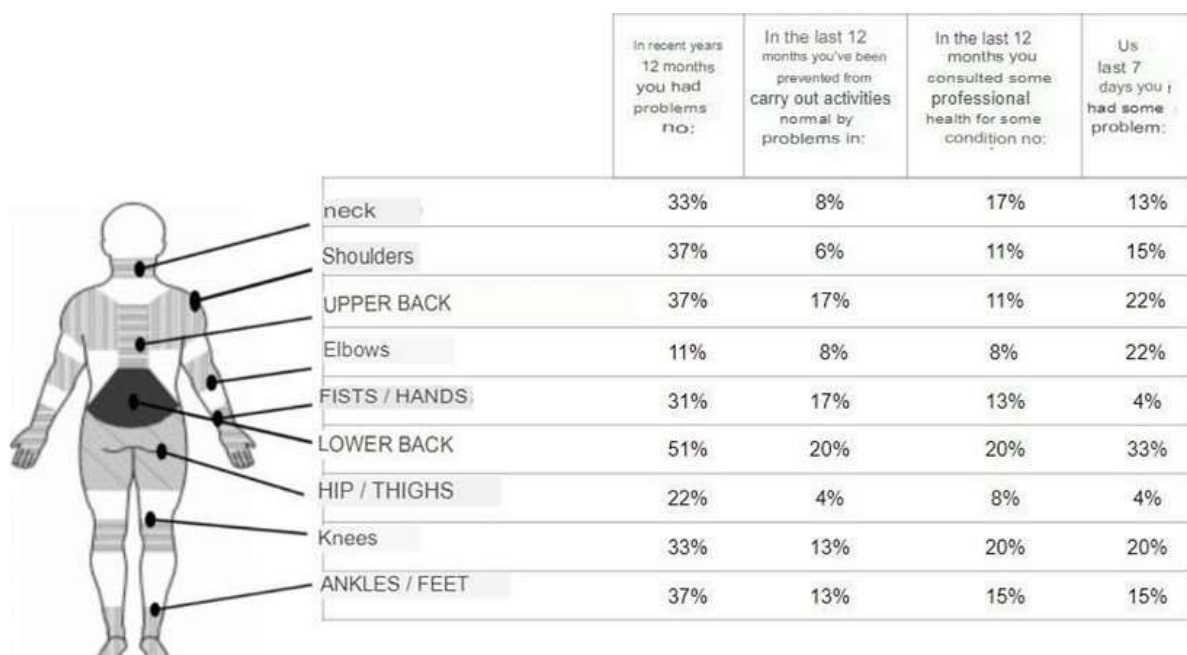


Source: The authors

Regarding the results presented by the IPAQ questionnaire, they showed that 13% of the research participants are sedentary, 28% irregularly active, 8% regularly active, active represent 35% and very active 13%.

The results obtained in the Nordic questionnaire alone are shown in Figure 2.

Figure 2. Nordic Questionnaire Results.





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

Table 2. Correlation between Nordic questionnaire and population characteristics.

Local	Correlation	Result	Conclusion
Neck	Age	0.1040806	Low correlation
Neck	Sex	-0.06933752	Low and negative (no correlation with gender)
Neck	Time in Function	0.2205528	Low correlation
Head	Age	0.01580395	Low correlation
Head	Sex	0.02679967	Low correlation
Head	Time in Function	-0.05213035	Low and negative (no correlation with time)
Shoulder	Age	0.142603	Low correlation
Shoulder	Sex	-0.02620712	Low and negative (no correlation with gender)
Shoulder	Time in Function	0.06142399	Low correlation
Upper back	Age	0.02352727	Low correlation
Upper back	Sex	-0.02620712	Low correlation
Upper back	Time in Function	-0.1968782	Low correlation
Elbow	Age	-0.1135011	Low correlation
Elbow	Sex	-0.1454839	Low correlation
Elbow	Time in Function	-0.3085091	Low correlation
Wrist and hands	Age	0.07165124	Low correlation
Wrist and hands	Sex	0.03989657	Low correlation
Wrist and hands	Time in Function	-0.02035574	Low correlation
Lower back	Age	0.07165124	Low correlation
Lower back	Sex	-0.04902903	Low correlation
Lower back	Time in Function	-0.02035574	Low correlation
Hip/Thighs	Age	0.1448333	Low correlation
Hip/Thighs	Sex	0.03989657	Low correlation
Hip/Thighs	Time in Function	-0.02035574	Low correlation
Knees	Age	-0.06134187	Low correlation
Knees	Sex	-0.03846154	Low correlation
Knees	Time in Function	-0.0922921	Low correlation
Ankles and feet	Age	-0.06134187	Low correlation
Ankles and feet	Sex	0.1057692	Low correlation
Ankles and feet	Time in Function	-0.02035574	Low correlation

Sleeping at unusual times	Work shift	-0.4197635	It showed a moderate and negative correlation. People who have a daytime shift do not feel bothered by sleep, which was expected. Because they had many categories, they ended up concentrating only in one category and therefore the correlation was greater.
Intense work pace	Shift	0.09469792	Very strong correlation, with the day shift being the most intense.

4. DISCUSSION

From the analysis of the results, it is highlighted that most of the research population is female, as in the studies by Santos (2017)^{19 5 28}. Corroborating the same study, the time in the job exceeds 10 years in the majority of the population, although the weekly working hours found in the majority are less than 40 hours per week, differing from the study that found an average weekly working day of 42 hours per week, as well as Prieto (2015)²⁸.

In the present study, a percentage of 26% was found, representing the participants who had their lives affected by work and 15% needed to undergo some treatment for sequelae of dysfunctions acquired at work. In view of the presented, it shows that 42% have already had a work accident, and 26% had to stay on leave. In the study by Santos et al, 2017, there was a prevalence of the population (65%) that required leave, of which 42% were due to musculoskeletal disorders.

The results presented by the IPAQ questionnaire corroborate the study by Santos (2017)¹⁹ in which most individuals present themselves as active. Therefore, these aspects are important to be observed, since physical activities condition the musculoskeletal system, and can reduce the incidence of pain and pain.

In the study by Santos (2017)¹⁹, the highest percentage of pain, tingling, or numbness in the last 12 months was in the lower back, coinciding with the present study. The predominant complaints regarding the impediment to perform normal activities in the last 12 months were more present in the ankle and foot region, unlike the population studied in the present study, which had a higher percentage in the lower back region. Regarding the need for care by a health professional, the body region with the highest affirmative answers was the lower back, as in this study, and in this study, the affirmative response was 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 backs. In the population studied, the predominance of responses was from the lower back only.

The explanation used for the expressive presence of pain complaints in the lower back pointed out by Santos (2017)¹⁹ is due to the postures and movements adopted during



professional activities that include carrying and lifting loads, in addition to the high time in the standing position, the same is confirmed by Lima et al, 2018⁵ and Prieto (2015)²⁸.

These characteristics were observed during the observational analysis, in which it was observed that only to search for the materials necessary for the surgical procedure, the same route was made about 5 times. For the preparation of the operating room, antalgic postures were common, as well as squats using trunk flexion with the knees extended in most cases.

Although studies such as the one by Santos (2017)¹⁹ point to causes such as most of the female population having pain due to the double shift that most of them perform, in this study the sex/gender of the individual did not present great significance for the appearance of pain.

The factor that presented a high correlation was the intensity of the work with the shift. This is explained by the characteristic of the service provided. As surgeries performed on weekdays are scheduled in advance following a constant flow, professionals on day shifts have greater occupational demand. Those scheduled for weekends have lower demand, despite the discomfort due to the procedures being suddenly notified, without enough time for the professional to plan.

In relation to the organization of work, it proposes the adequacy of the norms and mode of production, rhythm and time of work, and the content of the tasks to the capacities and needs of the worker. It should be noted that in professionals with constant use of physical force, especially with muscle overload of the neck, upper and lower limbs, and back, remuneration should be offered that considers these physical factors involved, offering rest breaks. With these measures, the standard regulates various forms of labor activity, in order to contribute to the maintenance of workers' health and maintaining their safety.

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

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