

# Work-related musculoskeletal disorders and work instability of nursing professionals

Distúrbios osteomusculares relacionados ao trabalho e instabilidade no trabalho entre profissionais de enfermagem

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**ABSTRACT | Introduction:** Characteristics of nursing work in hospital units expose professionals to risk factors that may favor instability at work and the development of work-related osteomuscular disorders, which may cause them to become ill and consequently different levels of incapacity to work. **Objectives:** to analyze the association between work instability of nursing professionals and the occurrence of work-related musculoskeletal disorders. **Methods:** Descriptive, cross-sectional study with quantitative approach of the data, performed in a hospital in the city of Ribeirão Preto – São Paulo. We used the Nurse-Work Instability Scale and the Nordic Musculoskeletal Questionnaire, with nursing professionals workers of an adult and pediatric intensive care center and of internment units of orthopedic, neurosurgery and head/neck surgery. **Results:** 111 nursing professionals participated in the study, 25.2% presented low risk of instability, 44.1% medium risk and 30.6% high risk. Statistical associations were found between instability and the variables sectors of work ( $p = 0.004$ ) and work-related osteomuscular disorders in the regions: neck ( $p = 0.001$ ), shoulders ( $p = 0.000$ ), upper back ( $p = 0.007$ ), elbow ( $p = 0.005$ ), wrist ( $p = 0.002$ ), lower back ( $p = 0.046$ ), hip/thighs ( $p = 0.006$ ), knees ( $p = 0.021$ ), ankles and feet ( $p = 0.011$ ). **Conclusions:** There is an association between instability at work and the presence of osteomuscular disorders related to the work of nursing professionals. Interventions are needed for instability precedes disability and is intrinsically related to absenteeism and early retirement.

**Keywords |** cumulative trauma disorders; musculoskeletal disorders; occupational health; nursing staff; nursing.

**RESUMO | Introdução:** Características próprias do trabalho de enfermagem em unidades hospitalares expõem os profissionais a fatores de risco que favorecem a instabilidade no trabalho e o acometimento por distúrbios osteomusculares relacionados ao trabalho, podendo ocasionar adoecimento e, conseqüentemente, diferentes níveis de incapacidade para o trabalho. **Objetivos:** Analisar a associação entre instabilidade no trabalho e ocorrência de distúrbios osteomusculares relacionados ao trabalho em profissionais de enfermagem. **Métodos:** Estudo descritivo e transversal, com abordagem quantitativa de dados, realizado em um hospital da cidade de Ribeirão Preto, São Paulo. A Escala de Instabilidade no Trabalho – Enfermagem e o Questionário Nórdico Musculoesquelético foram aplicados em profissionais de enfermagem lotados nos Centros de Terapia Intensiva adulto e pediátrico e nas unidades de internação de ortopedia, neurocirurgia e cirurgia cabeça/pescoço. **Resultados:** Participaram do estudo 111 profissionais de enfermagem, dos quais 25,2% apresentaram baixo risco de instabilidade; 44,1%, médio risco; e 30,6%, alto risco. Foram encontradas associações estatísticas entre instabilidade e as variáveis setores de trabalho ( $p = 0,004$ ) e distúrbios osteomusculares relacionados ao trabalho nas regiões pescoço ( $p = 0,001$ ), ombros ( $p = 0,000$ ), partes superior ( $p = 0,007$ ) e inferior ( $p = 0,046$ ) das costas, cotovelo ( $p = 0,005$ ), punho ( $p = 0,002$ ), quadril/coxas ( $p = 0,006$ ) joelhos ( $p = 0,021$ ) e tornozelos e pés ( $p = 0,011$ ). **Conclusões:** Há associação entre instabilidade no trabalho e a presença de distúrbios osteomusculares relacionados ao trabalho em profissionais de enfermagem. Intervenções são necessárias, pois a instabilidade antecede a incapacidade e está intrinsecamente relacionada ao absenteísmo e à aposentadoria precoce.

**Palavras-chave |** distúrbios osteomusculares relacionados ao trabalho; doenças musculoesqueléticas; saúde do trabalhador; equipe de enfermagem; enfermagem.

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## INTRODUCTION

Work is an essentially human activity that suffers constant changes resulting from advances in its forms of organization, associated with the use of new technologies. These transformations and new types of work organization not only represent benefits but also constitute challenges to health care workers, resulting in new diseases.<sup>1,2</sup>

Nursing professionals perform their work activities in different places, but especially in hospital institutions, where in addition to an unhealthy environment they are exposed to various chemical, physical, mechanical, biological, psychosocial, and ergonomic risk factors that could lead to illness, physical and mental strain, and consequently to different degrees of work disability.<sup>3</sup>

Specifically considering the work of nursing teams at hospital units, the performance of their work activities requires the continuous execution of tasks that demand constant attention and physical and mental strain. These tasks also require that workers adopt inadequate postures, with frequent spinal rotations, repetitive movements, and heavy lifting, which predisposes them to cumulative injuries of musculoskeletal origin.<sup>1,4,5</sup> Therefore, the peculiarities of nursing work favor the appearance of work-related musculoskeletal disorders (WMSDs), being considered one of the main health problems among these professionals<sup>4</sup>; when compared to other health care professionals, nursing professionals represent the category the most susceptible to WMSDs.<sup>6</sup>

WMSDs, which comprehend problems related to muscles and associated structures with or without the presence of tissue degeneration and are characterized by the appearance of symptoms such as pain, paresthesia, fatigue, and a sensation of weight (concomitantly or not)<sup>1</sup>, have a multifactorial and multidimensional origin. They encompass physical, psychosocial, and organizational factors, both in the individual and the collective and social dimensions, which interact among themselves originating or potentiating the symptoms and repercussions of this syndrome.<sup>1,2-7</sup>

Lower back pain, followed by pain in the neck, shoulders/arms, wrists/hands, knees, and in the

ankles/feet, are the main complaints of nursing professionals.<sup>4,8</sup> Considering these aspects, WMSDs and their repercussions not only contribute to health problems among these workers but also increase the difficulties for fully executing their work activities, being an indicator of work instability.<sup>2,9</sup>

Work instability can be understood as a state in which the consequences of an incompatibility between the professional's functional and/or cognitive capacity and his or her work demands can represent a risk to employment if not resolved.<sup>9</sup> However, the concept of work instability, in addition to comprehending physical and psychosocial aspects, recognizes the relationship between the professional's individual ability to perform his or her work activities and the work environment.<sup>2</sup>

In this perspective, it is important to note that investigating work instability among nursing professionals is extremely important as it represents a usually transient state that precedes work disability and is potentially reversible<sup>2</sup>; if not resolved, it can lead to presenteeism, absenteeism, and early retirement. Presenteeism is defined as a condition in which the professional is present in the workplace, but due to health and/or work-related issues, executes his or her tasks inefficiently.<sup>10</sup> Although it is a common phenomenon among nursing professionals, presenteeism can cause mistakes and omissions, which indirectly leads to low productivity and is considered a precursor of absenteeism.<sup>11,12</sup>

It is known that interventions during the instability period can improve workers' quality of life and consequently reduce sickness absenteeism,<sup>2,9</sup> decreasing costs to the employing companies and social security.

Therefore, considering the presented evidence, this study aimed to analyze the association between the work instability of nursing professionals and the occurrence of WMSDs, also seeking to understand its relationship with individual characteristics of the workers such as sex, age, and occupational characteristics including work unit and professional category within nursing.

Thus, this study aimed to answer the following research questions: a) Do nursing professionals working at hospital units present indicators of work instability? and b) Is there an association between

the work instability of nursing professionals and the presence of indicators of WMSD?

## METHODS

This is a descriptive cross-sectional study with a quantitative approach, performed in a university hospital in the city of Ribeirão Preto, state of São Paulo, between August 2018 and January 2019. The study population comprised 160 nursing professionals (registered nurses, licensed practical nurses, and nursing assistants) working at adult and pediatric intensive care units (ICUs) and in neurosurgery, head and neck surgery, and orthopaedics hospitalization units. The selection of the units to be approached in the study was based on the high degree of dependence of their patients and the consequent physical and mental burden of their nursing professionals.

For investigating work instability, we used the Brazilian version of the Nurse Work Instability Scale (Nurse-WIS),<sup>9</sup> translated and adapted to the Brazilian context<sup>2</sup>; in addition to investigating the professional's age and sex, it includes 20 affirmative questions with true or false answers. This instrument ultimately seeks the classification, projection, and surveillance of work instability, focusing on musculoskeletal symptoms.<sup>9</sup> It classifies work instability according to scores: < 7 points indicate a low risk of job retention problems; 7–13 points indicate medium risk; ≥ 14 points indicate a high risk.

In order to verify the relationship between work instability and WMSDs, we used the Nordic Musculoskeletal Questionnaire,<sup>13</sup> which contains a diagram of a back view of the human body divided into 9 anatomical regions: the neck, shoulders, the thoracic region, elbows, wrists/hands, the lower back region, hips/thighs, knees, and ankles/feet. This instrument evaluates each anatomical region separately, in the previous 12 months, regarding the presence of pain, limitations in daily activities, consultations by a physician or other health care professionals, and symptoms (pain, discomfort, numbness) in the previous 7 days.

The inclusion criteria adopted for this study were the same as those proposed by the study that

developed Nurse-WIS:<sup>9</sup> working in nursing for at least 1 year; having at least one episode of musculoskeletal pain in the previous 3 months that lasted for 2 hours or more. We chose having another profession besides nursing as an exclusion criterion.

Data collection was performed in the wards of the units selected for the study. After an explanation of the research and its objectives, the professionals were invited to participate in the study upon signing the informed consent form. Inclusion criteria were applied at data collection, when professionals were also asked about their professional category and then answered the questionnaires. The questionnaires were then numbered and stored in opaque envelopes, guaranteeing the secrecy of the information provided by participants.

After data collection, statistical analyses were performed using a significance level of  $\alpha = 0.05$ . Data were transferred to SPSS statistics software, version 25, and R i386 version 3.4.0; the chi-squared test was applied for expected frequencies of 5 or more and the Fisher's exact test was applied for expected frequencies of less than 5, considering the test of independence between the sex, professional category, age group, and work unit variables. Chi-squared and Fisher's exact tests were also applied for evaluating goodness-of-fit between symptoms related to WMSDs and the categories of work instability.

All ethical principles required by National Health Council Resolution no. 466/2012<sup>14</sup> were respected. The research proposal was approved by the Research Ethics Committee of the Ribeirão Preto Nursing School of Universidade de São Paulo, Brazil, CAAE: 84273518 0 0000 5393.

## RESULTS

Out of 160 professionals who worked in the selected units, 111 (69.3%) agreed to participate in the study. The reasons for not participating were: 16 (10%) professionals were not interested; 12 (7.5%) no longer worked at the selected units or institution when data were collected; 11 (6.8%) did not fulfill the inclusion criteria; 9 (5.6%) were on leaves of absence; and 1

(0.6%) did not answer the Nordic Musculoskeletal Questionnaire.

Out of the 111 (69.3%) participating professionals, 89 (80.2%) were women, of which 33 (29.7%) were registered nurses, 60 (54.1%) were licensed practical nurses, and 18 (16.2%) were nursing assistants. The mean age of professionals was 38.6 years (standard deviation = 7.9), with a minimum age of 25 years and a maximum age of 64 years. As for the number of professionals in each unit, 33 (29.7%) worked at the pediatric ICU, 27 (24.3%) worked at the adult ICU, 25 (22.5%) worked at the head and neck surgery unit, 16 (14.4%) worked at the orthopaedics unit, and 10 (9.0%) worked at the neurosurgery unit. Regarding the risk of work instability, 28 (25.2%) professionals were classified as low-risk, 49 (44.1%) were classified as medium-risk, and 34 (30.6%), as high-risk.

Table 1 shows results referring to the distribution of risk categories of work instability regarding the

participants' sex, professional category, age, and work unit.

According to these data, the work units were the only variable with an association ( $p = 0.004$ ) with risk categories of work instability. The pediatric ICU and head and neck surgery units stood out with the highest frequencies of those classified as high-risk. Additionally, when analyzing the main risk classifications for each unit, the pediatric ICU had a higher prevalence of workers at high risk of job retention problems (12 [36.4%]), the adult ICU had more workers classified as at low risk (11 [40.7%]) and medium risk (11 [40.7%]), the head and neck surgery unit had participants mostly classified as at high risk (10 [40%]), the orthopaedics unit had a higher prevalence of workers in the medium risk category (10 [62.5%]), and the neurosurgery unit had participants mostly classified as at medium risk (9 [90%]).

**Table 1.** Personal and occupational characteristics of nursing professionals of a university hospital and their distribution into risk categories of work instability, Ribeirão Preto, 2019

Variables	Low risk (n = 28) n (%)	Medium risk (n = 49) n (%)	High risk (n = 34) n (%)	p-value
Sex				0.380*
Female	22 (78.6)	42 (85.7)	25 (73.5)	
Male	6 (21.4)	7 (14.3)	9 (26.5)	
Professional category				0.402*
Registered nurse	8 (28.6)	12 (24.5)	13 (38.2)	
Licensed practical nurse	15 (53.5)	31 (63.3)	14 (41.2)	
Certified nursing assistant	5 (17.9)	6 (12.2)	7 (20.6)	
Age group (years)				0.160†
25-29	6 (21.4)	4 (8.2)	2 (5.9)	
30-39	15 (53.6)	24 (49.0)	14 (41.2)	
40-49	6 (21.4)	19 (38.8)	13 (38.2)	
50 or older	1 (3.6)	2 (4.0)	5 (14.7)	
Units				0.004†
Pediatric ICU	10 (35.7)	11 (22.4)	12 (35.3)	
Adult ICU	11 (39.3)	11 (22.4)	5 (14.7)	
Head and neck surgery	7 (25.0)	8 (16.3)	10 (29.5)	
Orthopaedics	00	10 (20.4)	6 (17.6)	
Neurosurgery	00	9 (18.4)	1 (2.9)	

Bold indicates statistically significant values.

ICU = intensive care unit.

\* Pearson's chi-squared test.

† Fisher's exact test.

Regarding sex, professional category, and age group, the tests indicated independence between these variables and work instability; however, it is important to note that women were predominant in the medium risk category (42 [47.2%]) and men, in the high-risk category (9 [40.9%]). When considering professional categories, nursing assistants and registered nurses presented higher prevalence rates of a high risk of work instability, comprehending 7 (38.9%) and 13 (39.4%) professionals, respectively. Licensed practical nurses,

on the other hand, were mostly classified as at medium risk (32 [53.3%]).

The age group with the most high-risk scores comprised those aged 50 years or older (5 [62.5%]), whereas those with the most medium risk scores were the 30-39 (45.3%) and 40-49 years (50%) groups. Among professionals aged 25 to 29 years, the low-risk classification (50%) was predominant.

Table 2 shows the results obtained for the association between work instability and WMSD

**Table 2.** Musculoskeletal problems, by affected body part, among nursing professionals of a teaching hospital in Ribeirão Preto and their distributions into risk categories of work instability, 2019

Variables	Total (n)	Low risk n (%)	Medium risk n (%)	High risk n (%)	p-value
Neck					
Symptoms (last 12 months)	54	5 (9.3)	31 (57.4)	18 (33.3)	<b>0.001*</b>
Activity limitation (last 12 months)	14	0 (0.0)	7 (50.0)	7 (50.0)	<b>0.032<sup>†</sup></b>
Medical appointments (last 12 months)	14	1 (7.1)	9 (64.3)	4 (28.6)	0.172 <sup>†</sup>
Symptoms (last 7 days)	23	1 (4.3)	10 (43.5)	12 (52.2)	<b>0.006<sup>†</sup></b>
Shoulders					
Symptoms (last 12 months)	60	6 (10.0)	32 (53.3)	22 (36.7)	<b>0.000*</b>
Activity limitation (last 12 months)	19	1 (5.3)	8 (42.1)	10 (52.6)	<b>0.025<sup>†</sup></b>
Medical appointments (last 12 months)	19	1 (5.9)	10 (58.8)	6 (35.3)	0.117 <sup>†</sup>
Symptoms (last 7 days)	21	2 (9.5)	10 (47.6)	9 (42.9)	0.134 <sup>†</sup>
Upper back					
Symptoms (last 12 months)	61	9 (14.8)	34 (55.7)	18 (29.4)	<b>0.007*</b>
Activity limitation (last 12 months)	17	2 (11.8)	6 (35.3)	9 (62.9)	0.097 <sup>†</sup>
Medical appointments (last 12 months)	14	2 (14.3)	9 (64.3)	3 (21.4)	0.333 <sup>†</sup>
Symptoms (last 7 days)	27	3 (11.1)	11 (40.7)	13 (48.1)	<b>0.044<sup>†</sup></b>
Elbows					
Symptoms (last 12 months)	15	0 (0.0)	6 (40.0)	9 (60.0)	<b>0.005<sup>†</sup></b>
Activity limitation (last 12 months)	6	0 (0.0)	2 (33.3)	4 (66.7)	0.114 <sup>†</sup>
Medical appointments (last 12 months)	5	0 (0.0)	3 (60.0)	2 (40.0)	0.520 <sup>†</sup>
Symptoms (last 7 days)	6	0 (0.0)	3 (50.0)	3 (50.0)	0.322 <sup>†</sup>
Wrists					
Symptoms (last 12 months)	42	4 (9.5)	19 (45.2)	19 (45.2)	<b>0.002<sup>†</sup></b>
Activity limitation (last 12 months)	19	0 (0.0)	7 (36.8)	12 (63.2)	<b>0.000<sup>†</sup></b>
Medical appointments (last 12 months)	14	0 (0.0)	6 (42.9)	8 (57.1)	<b>0.013<sup>†</sup></b>
Symptoms (last 7 days)	23	1 (4.3)	9 (39.1)	13 (56.5)	<b>0.002<sup>†</sup></b>
Lower back					
Symptoms (last 12 months)	67	13 (19.4)	28 (41.8)	26 (38.8)	<b>0.046*</b>
Activity limitation (last 12 months)	32	4 (12.5)	12 (37.5)	16 (50.0)	<b>0.013<sup>†</sup></b>
Medical appointments (last 12 months)	28	4 (14.3)	12 (42.9)	12 (42.9)	0.178 <sup>†</sup>
Symptoms (last 7 days)	35	3 (8.6)	13 (37.1)	19 (54.3)	<b>0.000<sup>†</sup></b>

Continued on next page



**Table 2.** Continued

Variables	Total (n)	Low risk n (%)	Medium risk n (%)	High risk n (%)	p-value
Hips/thighs					
Symptoms (last 12 months)	34	3 (8.8)	15 (44.1)	16 (47.1)	<b>0.006<sup>†</sup></b>
Activity limitation (last 12 months)	12	0 (0.0)	2 (16.7)	10 (83.3)	<b>0.000<sup>†</sup></b>
Medical appointments (last 12 months)	9	0 (0.0)	4 (44.4)	5 (55.6)	0.110 <sup>†</sup>
Symptoms (last 7 days)	11	0 (0.0)	2 (18.2)	9 (81.8)	<b>0.000<sup>†</sup></b>
Knees					
Symptoms (last 12 months)	53	10 (18.9)	20 (37.7)	23 (43.4)	<b>0.021*</b>
Activity limitation (last 12 months)	27	3 (11.1)	8 (29.6)	16 (59.3)	<b>0.001<sup>†</sup></b>
Medical appointments (last 12 months)	18	4 (22.2)	4 (22.2)	10 (55.6)	<b>0.035<sup>†</sup></b>
Symptoms (last 7 days)	24	1 (4.2)	9 (37.5)	14 (58.3)	<b>0.001<sup>†</sup></b>
Ankles and feet					
Symptoms (last 12 months)	55	10 (18.2)	21 (38.2)	24 (43.6)	<b>0.011*</b>
Activity limitation (last 12 months)	25	2 (8.0)	7 (28.0)	16 (64.0)	<b>0.000<sup>†</sup></b>
Medical appointments (last 12 months)	22	5 (22.7)	6 (27.3)	11 (50.0)	0.074*
Symptoms (last 7 days)	25	4 (16.0)	7 (28.8)	14 (56.0)	<b>0.011<sup>†</sup></b>

Bold indicates statistically significant values.

\* Pearson's chi-squared test.

<sup>†</sup> Fisher's exact test.

symptoms according to anatomical regions among nursing professionals according to the distribution of scores into risk categories of work instability.

The results obtained by the Nordic Musculoskeletal Questionnaire indicated that the anatomical regions most affected by WMSDs in the previous 12 months were the lower back (67 [60.4%]), followed by the upper back (61 [54.9%]), shoulders (60 [53.1%]), ankles and feet (55 [49.5%]), neck (54 [48.6%]), and knees (53 [47.7%]). As for limitations in work or daily activities, the lower back (32 [28.8%]) and the knees (27 [24.3%]) were the main affected regions. The lower back presented more expressive numbers regarding the requirement of medical consultations (28 [25.2%]) and symptoms experienced in the previous 7 days (35 [31.5%]) due to WMSDs.

When analyzing the association between WMSDs and work instability, we found significant statistical associations mainly for symptoms of the following regions in the previous 12 months: neck ( $p = 0.001$ ), shoulders ( $p = 0.000$ ), upper back ( $p = 0.007$ ), elbows ( $p = 0.005$ ), wrists ( $p = 0.002$ ), lower back ( $p = 0.046$ ), hips/thighs ( $p = 0.006$ ), knees ( $p = 0.021$ ), and ankles

and feet ( $p = 0.011$ ). We also found associations for limitations in daily activities in the previous 12 months due to problems in the neck ( $p = 0.032$ ), shoulders ( $p = 0.025$ ), wrists ( $p = 0.000$ ), lower back ( $p = 0.013$ ), hips ( $p = 0.000$ ), knees ( $p = 0.001$ ), and ankles and feet ( $p = 0.000$ ); for consultations with health care professionals in the previous 12 months due to problems in the wrists ( $p = 0.013$ ) and knees ( $p = 0.035$ ), and symptoms experienced in the previous 7 days in the neck ( $p = 0.006$ ), upper back ( $p = 0.044^*$ ), wrists ( $p = 0.002$ ), lower back ( $p = 0.000$ ), hips ( $p = 0.000$ ), knees ( $p = 0.001$ ), and ankles and feet ( $p = 0.011$ ).

## DISCUSSION

This study demonstrated some associations between the degree of work instability and WMSD symptoms among nursing professionals working at a hospital, in addition to an association between the units where nursing professionals worked and risk categories of work instability, which could subsidize the

understanding of the risk of presenteeism, absenteeism, and job abandonment among these professionals according to each hospital unit.

By analyzing the distribution of participants into work instability categories by work unit, we highlight that medium and high instability scores, when taken together, surpass 59% in all the studied units. This result can be associated with a high degree of dependence of the patients, organizational aspects of work, and daily activities that expose workers to risk factors.<sup>3</sup> With this, as the risk of instability increases, work ability and work satisfaction, as well as health-related quality of life, decrease and compromise the quality of the assistance provided to patients.

Most nursing professionals participating in this study were female, which corroborates the workforce characteristics of this professional category identified by other studies.<sup>4,15-17</sup> In this study, we noticed that sex and work instability categories were independent, and a higher frequency of women were classified as being at medium risk while male professionals were classified as at high risk of work instability.

By characterizing the studied population into work instability categories, we identified a higher concentration of professionals in the medium risk category (44.1%), which is similar to what was seen (41.2%) by a study performed with nursing teams at care facilities for older adults in Germany.<sup>16</sup> The second largest prevalence of instability in this study was found in the group at high risk of instability (30.6%); this number is in between those found by 2 studies performed in Germany regarding instability, musculoskeletal disorders, and nursing professionals (23.7%<sup>16</sup> and 39.4%<sup>17</sup>).

When analyzing the relationship between age and work instability, the scientific literature<sup>16</sup> provides evidence that older individuals are at higher risk when compared to younger ones. Moreover, a study performed in Germany<sup>17</sup> with nursing professionals aged 40 years or older found a higher prevalence of workers classified as at high risk of work instability in comparison with the present study.

Despite this evidence, no statistically significant associations were found between age group distributions and risk categories of work instability.

One of the possible explanations for the lack of an association between age and instability may be related to the poor representation of the younger population in this study (10.7% were aged 20-29 years). Nevertheless, our data indicated that professionals aged between 25 and 29 years presented higher rates of low-risk classifications whereas those aged 50 years or older had a higher prevalence of high-risk classifications.

It is important to note that age is also associated with absenteeism. A study<sup>18</sup> performed at a university hospital in inland São Paulo analyzed 994 medical certificates of nursing professionals and noticed that 65% of them went on leaves of absence during the year, and the mean number of absent days was higher among those aged between 50 and 59 years. Another study<sup>16</sup> verified that workers aged 36-45 years (odds-ratio [OR]: 2.9) and 46-55 (OR: 2.5) were 3 times more likely to present a high risk of instability than professionals aged less than 35 years; meanwhile, in the group aged around 55 years (OR: 6.7), the chances were around 7 times higher when compared to younger individuals. In this sense, investigations with more age-homogeneous groups could be performed for better understanding age and work instability among nursing professionals.

As for professional categories, due to the organization of the work process, nursing assistants and licensed practical nurses are usually responsible for work activities that are more linked to direct care, sometimes being more physically demanding.<sup>19</sup> Therefore, we verified that licensed practical nurses predominantly presented a medium-risk classification of work instability, whereas nursing assistants and registered nurses presented more expressive numbers in the high-risk category. Regarding WMSDs, we identified that the most affected regions in the previous 12 months were the neck (54 [48.2%]), shoulders (60 [53.5%]), upper back (61 [54.4%]), lower back (67 [59.8%]), and the ankles and feet (55 [48.6%]), whereas the most affected region in the previous 7 days was the lower back (35 [31.2%]). The results observed in this study corroborate findings reported by other studies.<sup>4,17-20</sup> Moreover, we found statistical associations between WMSDs and work instability, both when considering the upper limbs and the lower limbs.

Our rates of WMSDs in the previous 12 months were higher than those reported by a study<sup>21</sup> performed with 1,179 registered nurses of 15 hospital institutions in the city of Hai Phong, in Vietnam: in this study, the most affected regions were the neck (44.1%), shoulders (29.7%), upper back (32.7%), and lower back (44.4%). Another study<sup>22</sup> performed in China with 6,674 registered nurses also reported that the most affected anatomical regions in the previous 12 months were the lower back (62.71%), the neck, (59.77%), shoulders (49.66%), and the upper back (39.50%).

These findings demonstrate a high prevalence of WMSDs among nursing professionals, mainly considering the lower back, due to the performance of physically demanding activities such as giving bed baths, transporting patients and intravenous (IV) equipment. Unergonomic furniture and gurneys with manual adjustments that make professionals adopt inadequate positions with frequent spinal rotations are also factors that contribute to this problem, in addition to repetitive movements when executing their tasks.<sup>1-23</sup>

We highlight that, annually, due to job market requirements of high productivity along with understaffed nursing teams, job burnout and the banalization of physical and mental distress represent factors that contribute to underreporting and health problems caused by this syndrome.<sup>24</sup> Moreover, a German study<sup>20</sup> performed with 273 registered nurses noticed that a high work demand significantly increased the risk of WMSDs.

This way, WMSDs are considered a public health problem due to their magnitude and repercussions to the health of nursing professionals. Not only they predispose individuals to instability, but they are also responsible for different degrees of work disability, in addition to presenteeism and absenteeism.<sup>2</sup>

The consequences of this syndrome have an impact on the quality of life of these professionals and reflect negatively in their productivity. Presenteeism associated with musculoskeletal pain results in inefficiency when performing work activities, mistakes,

and omissions,<sup>10</sup> compromising the quality of the health care provided to patients. The complications of WMSDs are also related to absenteeism among nursing professionals and cause temporary and permanent work disabilities, resulting in job changes and early retirement.<sup>2,18</sup> Therefore, interventions are needed in view of these conditions, and the early detection of signs of work instability could aid in the development of strategies that aim to preserve occupational health, especially considering nursing professionals, resulting in reductions in absenteeism and early retirement rates.

## CONCLUSIONS

Nursing professionals who work at hospital units present indicators of work instability. Associations between work instability and WMSDs were identified, as well as a moderate dependence between work units and categories of work instability. These findings could contribute, in the future, to the understanding of the risk of presenteeism, absenteeism, and job abandonment among nursing professionals, especially considering the unit where the individual works. Moreover, we highlight that once work instability is identified, interventions are needed as this state precedes disability, which is intrinsically related to absenteeism and early retirement. The findings of this study contribute to the scientific community and professionals acting on occupational health and could underpin strategic actions of health promotion and disease prevention to be adopted at hospital environments.

### Author contributions

EJST was responsible for the study conceptualization, investigation, formal analysis and data curation, funding acquisition, and writing – original draft. RSP was responsible for the formal analysis and data curation, writing – original draft, and writing – review & editing. MHPM was responsible for the conceptualization, formal analysis and data curation, funding acquisition, writing – original draft, and writing – review & editing. All authors have read and approved the final version submitted and take public responsibility for all aspects of the work.



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