

Self-reported work-related musculoskeletal disorders among health professionals at a hospital in Portugal

Distúrbios osteomusculares relacionados ao trabalho autorreferidos por profissionais de saúde de um hospital em Portugal

Carla Sílvia Fernandes¹, Germano Couto^{1,2},
Rogério Carvalho^{2,3}, Daniela Fernandes², Patricia Ferreira²

ABSTRACT | Background: Work-related musculoskeletal disorders (WMSDs) are responsible for morbidity among many health professionals. **Objective:** To establish the prevalence of self-reported WMSDs among health professionals. **Methods:** Descriptive and exploratory study with health professionals at a hospital in northern Portugal. Data were collected in December 2017 by means of an electronic questionnaire applied to the total target population (n=435). We applied instruments for sociodemographic characterization, perception of knowledge on ergonomics and manual mobilization of loads, the Patient Handling Burden Scale (PHBS) and the Nordic Musculoskeletal Questionnaire (NMQ) for self-reporting musculoskeletal symptoms. **Results:** The sample comprised 105 professionals, mainly nurses and nursing assistants, who exhibited high frequency of symptoms in several body areas, mainly the spine. **Conclusions:** WMSDs involving health professionals should be considered a problem for health institutions which do not implement interventions beyond traditional training programs, especially multifactorial programs of systemic nature.

Keywords | working conditions; occupational risks; occupational health; allied health personnel; musculoskeletal diseases.

RESUMO | Introdução: Os distúrbios osteomusculares relacionados com o trabalho (DORT) são responsáveis pela morbidade de muitos profissionais de saúde. **Objetivo:** Realizar um diagnóstico da prevalência de DORT autorreferidos por profissionais de saúde. **Métodos:** Foi realizado um estudo, descritivo e exploratório, envolvendo profissionais de saúde de uma instituição hospitalar no norte de Portugal. Os dados foram coletados ao longo do mês de dezembro de 2017, mediante aplicação de questionário eletrônico à população total (n=435). Foram utilizados instrumentos de caracterização sociodemográfica, percepção de conhecimentos sobre ergonomia e mobilização manual de cargas, avaliação da percepção de carga (Escala de Percepção de Carga de Manuseio do Paciente — EPCMP) e sintomas osteomusculares autorreferidos (Questionário Nórdico de Sintomas Osteomusculares — QNSO). **Resultados:** A amostra foi constituída de 105 profissionais, essencialmente enfermeiros e assistentes operacionais, apresentando uma ocorrência elevada de sintomas em diversas regiões corporais, maioritariamente na coluna vertebral. **Conclusões:** DORT em profissionais de saúde devem ser considerados um problema nas instituições de saúde que carecem de intervenções além dos tradicionais programas formativos, especialmente programas multifatoriais de natureza sistémica.

Palavras-chave | condições de trabalho; riscos ocupacionais; saúde do trabalhador; pessoal técnico de saúde; doenças musculoesqueléticas.

¹Superior School of Health, Universidade Fernando Pessoa - Porto, Portugal.

²Fernando Pessoa University Hospital, Universidade Fernando Pessoa - Porto, Portugal.

³School of Sciences and Technology, Universidade Fernando Pessoa - Porto, Portugal.

DOI: 10.5327/Z1679443520180230

INTRODUCTION

Activities involving manual handling of loads might result in a wide range of musculoskeletal disorders. Work-related musculoskeletal disorders (WMSDs) represent a significant burden for society at large, organizations and the workers themselves. The reason is that these conditions affect the working population, and contribute to increase absenteeism and decrease productivity and the quality of life of workers¹. Health professionals suffer musculoskeletal injuries more frequently than other professional groups². They constitute a vulnerable group, with 4 times higher risk than workers in the industrial sector^{3,4}.

In their review of 27 studies, Anderson and Oakman predicted that most health professionals will experience WMSDs throughout their careers. As risk factors they identified being young, having less years of experience and being exposed to high levels of manual and repetitive tasks⁵.

The tasks performed by health professionals involve exposure to a variety of risk factors that might contribute to the onset and development of WMSDs⁶. A recent review established causal relationship between the mechanical stress caused by tasks related with patient treatment and development of WMSDs⁷. Tasks requiring awkward joint positions or hand/finger force application or which pose strain to the spine, especially the lower back, are risk factors for development of WMSDs⁸⁻¹¹. Within the overall context of health care, and in the specific case of hospitals, handling patients is highly frequent and involves complex tasks with impact on and which cause overload to the musculoskeletal system^{6,12-14}. Other daily patient care tasks with impact on the physical overload are related to hygiene, treatment and feeding, among others^{7,15}. These tasks involve exposure to occupational risk factors due to high biomechanical and physiological demands that exceed the functional capacity of workers in organizations that do not afford adequate recovery and rest times^{6,8}.

WMSDs affect different parts of the body, such as the shoulders, neck, elbows, hands, wrists, knees and spine⁵. These are chronic pain syndromes which occur during the performance of definite job tasks, for which reason are called “work-related”^{8,9,16}. WMSDs of the upper limbs often occur under certain working conditions, such as activities which involve repetitive tasks^{5,16}. However, the most frequent complaints with impact on work correspond to the

spine, particularly the low back area^{5,16,17}. Low back pain is a major occupational problem among health professionals. An expensive occupational health problem, it is one of the main causes of disability-related absenteeism directly and is influenced by work-related factors^{18,19}.

Given the need to prevent WMSDs and the immutability of the work situation, the focus falls on the implementation of training programs on patient handling techniques for health professionals^{6,20-22}. As Anderson and Oakman observed, the high prevalence rates found point to a need for more effective risk reduction interventions and contribute to reinforce the complex multifactorial nature of WMSD development⁵.

Considering the need to intervene at this level, and as the first step in the implementation of a multifactorial program to reduce WMSDs, establishing a diagnosis to analyze the prevalence of these lesions is crucial, and was the aim of the present study.

Anderson and Oakman stated that the self-reported prevalence of WMSD rates differs from injury reports, and stressed the relevance of consistent and valid data^{5,23}. This observation agrees with the aim of the present study, which was to investigate the occurrence of symptoms (mainly discomfort and pain) among all the professionals at a hospital in northern Portugal.

METHODS

The aim of the present descriptive and exploratory study was to investigate musculoskeletal symptoms reported by health professionals at a hospital in northern Portugal (Fernando Pessoa Teaching Hospital). Self-reported measures of musculoskeletal discomfort are widely used for diagnosis of musculoskeletal disorders^{1,3,4,6,7,9,11,12,22}.

The questionnaire applied to the participants was divided into four main sections:

- sociodemographic characteristics, e.g., sex, age, body weight, height and professional category;
- knowledge about ergonomics and manual handling of loads;
- resource assessment and environmental issues;
- self-reported musculoskeletal symptoms in nine body areas (neck, dorsal, lumbar, shoulders, elbows, wrists / hands, hips / thighs, knees and ankles / feet).

An adaptation of the Nordic Musculoskeletal Questionnaire (NMQ)²⁴ was used to investigate self-reported musculoskeletal symptoms. This version is widely used in Portugal and has been previously tested for reliability and validity²⁵. The main objective of NMQ is to develop a method of epidemiological study through a set of standardized questions to identify musculoskeletal complaints or symptoms among different professional groups^{6,9,12,22,25}. It has also been widely used to investigate presence of work-related musculoskeletal symptoms^{1,3,4,12,22,25}. The instrument includes a posterior view of a human figure divided into nine anatomical areas. It comprises questions on presence of musculoskeletal pain in the past 12 months and past 7 days, and functional disability in each of the nine areas²⁶.

To investigate the perception of load, we used the Patient Handling Burden Scale (PHBS). This is a self-report questionnaire developed by Graça et al. and validated for the Portuguese population²⁷. The questions, responded on a Likert scale, investigate effort in patient transfer, degree of pain felt and time spent in transfers.

To cover the total target population (n=435) a link to the study questionnaire was sent to all the professionals in the institution by e-mail. Sampling was non-probabilistic as it resulted from voluntary participation (n=105). The confidentiality of the data and participant anonymity were ensured all throughout data collection. The study was approved by the institutional board and ethics committee. Statistical analysis of the results was performed with Statistical Package for Social Sciences (SPSS 18®).

RESULTS

The sample comprised 105 health professionals, representing 24.1% of the total population. Most participants were female (80%), right-handed (96.2%) and aged 19 to 63 years old, mean 33.7. While most participants were nurses (38.1%) and nursing assistants (25.7%) the sample also included secretaries, physicians, physical therapists, psychologists and speech therapists (Table 1).

As to their educational level, the participants had attended graduate education (47.6%), secondary school (33.3%), master (13.3%) and doctoral (2.9%) programs. About 39% were single, 37.1% married, 11.4% lived with a partner, 8.6% were separated and 3.8% were divorced.

The average time in the profession ranged from 0 to 34 years, mean 5.7 years. Most participants were allocated to inpatient services (40%). The working time was 40 hours per week for the vast majority of the sample (91.4%) and the largest proportion performed shift work, including night shift (42.9%). Among 45.7% of participants who reported practice physical exercise, frequency was once per week for 31.3%, twice per week for 33.3%, and 3 times per week for 29.2%; the most frequent modality was gymnastics, 17.1%. The body mass index fell within the normal range for the majority of the sample (69.5%).

Regarding the participants' opinion on the institutional resources to prevent WMSDs, 16.2% stated the environment was inadequate, 21.9% that they did not have the necessary resources, 21.9% that professional allocation was inadequate, and 24.7% that the institution did not provide adequate training for prevention of WMSDs. Relative to the participants' self-assessed knowledge and skills to prevent WMSDs, 16.2% stated the raining curriculum did not include ergonomics, 7.6% that they had no knowledge on how to handle people or loads, 34% that their lack of knowledge had already interfered with their handling of people or loads, and 31.5% lack of skills in this regard.

Analysis of the PHBS dimensions (Table 2) relative to perception of last transfer performed showed that 80% of the sample reported to have needed effort, 56.2% occurrence of pain, and 55.2% excessive time spent in this procedure.

Participants reported high frequency of WMSD symptoms, as shown in Table 3. For some body sites, the frequency of reported pain in the past 12 months was higher than 40%. The following sites stood out: lower back (76.2%), neck (59%), right shoulder (52.4%) and dorsal area (47.6%).

The frequency of symptoms in the past 7 days, probably more authentic due to their proximity with the report of complaints, was lower: lower back, 37.1%; neck, 24.8%; and right shoulder and dorsal area, 17.1%. Difficulties in activities of daily living (work-related, household chores, hobbies) were noteworthy, especially for symptoms on the lower back (29.5%), neck (18.1%), right shoulder (23.8%) and dorsal area (19.0%).

The results also showed association between prevalence of pain in different locations and individual characteristics, such as sex, work schedule, academic qualifications, physical exercise, time in the job and workload (Table 4).

Table 1. Participants' characteristics, Porto, 2018 (n=105).

Variables	N	%	Mean
Sex			
Male	21	20	
Female	84	80	
Age – years			33.8
Marital status			
Single	41	39.0	
Married	39	37.1	
Lives with partner	12	11.4	
Separated	9	8.6	
Divorced	4	3.8	
Academic degree:			
9 years of formal schooling	2	1.9	
12 years of formal schooling	35	33.3	
Graduate course	50	47.6	
Master	14	13.3	
Doctorate	3	2.9	
Habilitation	1	1	
Physical exercise			
No	57	54.3	
Yes	48	45.7	
BMI			
Thinness <17.0	0	0	
Normal 18.50-24.9	73	69.5	
Overweight 25.00-29.9	30	28.6	
Obesity=30.00	2	1.9	
Profession			
Nurse	40	38.1	
Health assistant	27	25.7	
Medical secretary	13	12.4	
Physician	9	8.6	
Other	8	7.6	
Physical therapist	3	2.9	
Speech therapist	3	2.9	
Psychologist	2	1.9	
Experience in the profession – years			5.7
Work area			
Inpatient service	40	38.1	
Outpatient service	22	21.0	
Emergency department	16	15.2	
Support services	16	15.2	
Others	11	10.5	
Work schedule			
Rotating (with night shifts)	45	42.9	
Rotating (without night shifts)	23	21.9	
Fixed	22	21.0	
Flexible	15	14.3	

DISCUSSION

High rates of work-related complaints among health professionals — nurses, physical therapists and physicians — are well documented in the literature^{4,5,9,15,19}. The global morbidity associated with WMSD involving the lower back is estimated as 0.8 million disability-adjusted life years (DALY) and represents the main cause of absenteeism. Health professionals are a group vulnerable to these conditions, particularly the ones whose work involves mobilizing patients on a daily basis^{6,15,19}. The vast majority of studies on health care delivery performed surveys using self-report questionnaires, especially the Nordic Musculoskeletal Questionnaire (NQM)^{5,6}, as it provides precise metrics for the purpose of comparison. According to Anderson and Oakman, surveys which consider consistent outcome measures are necessary to improve the possibility of meaningful comparisons between studies⁵.

Among the main results of our study, we call the attention to the fact that the sample mainly comprised nurses and nursing assistants. As widely shown in the literature, nurses are a frequent target of this type of research^{3,6,12,13,19}. Health professionals, such as nurses, are exposed to substantial work overload, as their tasks involve physically demanding effort and exposure to a several psychosocial hazards^{5,18,19}. The prevalence of injury is higher at hospitals compared to other healthcare settings¹⁸. Currently, health professionals deliver care in facilities characterized by high technological, instrumental and physical complexity, and are exposed to continuous time pressure and to tension associated with the delivery of high-quality care⁶.

The participants in the present study were essentially female (80%) which agrees with the results of other studies^{5,14,17,19}. Their average age was 33.8 year old, which

Table 2. Assessment of Patient Handling Burden Scale (PHBS) dimensions, Porto, 2018 (n=105).

PHBS dimensions assessment	N	%
Without effort	21	20
With effort	84	80
Without pain	46	43.8
With pain	59	56.2
No excessive time	47	44.8
Excessive time	58	55.2

let us infer that the average population was within the risk age range, i.e., 30 and 55 years old²⁶.

In their review article, Anderson and Oakman suggest that the prevalence of self-reported WMSD might be exposed to low memory bias. However, in all 27 included studies the rates of self-reported complaints differed from the ones of injury reports. This finding points to inconsistency of the data, which thus might not reflect the true magnitude of the problem⁵.

Occurrence of symptoms was frequent in several body sites, mainly in the spine and lower back, thus agreeing with the results of other studies^{9,12,17,19,26}. As is known, activities

Table 3. Musculoskeletal symptoms – Nordic Musculoskeletal Questionnaire (NMQ), Porto, 2018 (n=105).

Location	% Yes – Pain in the past 12 months	% Yes – Avoided normal activities in the past 12 months	% Yes – Problems in the past 7 days
Neck	59.0	18.1	24.8
Right Shoulder	52.4	23.8	17.1
Left shoulder	31.4	15.2	11.4
Right elbow	13.3	2.9	2.9
Left elbow	2.9	2.9	3.8
Left forearm	11.4	4.8	3.8
Right forearm	19.0	4.8	6.7
Right wrist	40.0	14.3	11.4
Left wrist	20.0	8.6	20.0
Dorsal region	47.6	19.0	17.1
Lower back	76.2	29.5	37.1
Hips and thighs	29.5	7.6	13.3
Knees	24.8	4.8	13.3
Ankles	22.9	11.4	10.5

related to patient handling and transport place considerable demands to the spine and require inappropriate postures⁶. Analysis of occurrence of pain per professional category showed that low back complaints were reported by 75% of nurses, 92% of nursing assistants and 76.6% of secretaries.

Table 4. Predictors of musculoskeletal symptoms, Porto, 2018 (n=105).

Predictors	N with pain	Correlation coefficient	p-value
Sex			
Male	16	0.229*	0.019
Female	81		
Work schedule			
Flexible	13	0.420**	0.000008
Fixed	18		
Rotating (without night shifts)	23		
Rotating (with night shifts)	43		
Academic degree			
9 years of formal schooling	2	-0.261**	0.007
12 years of formal schooling	34		
Graduate course	48		
Master	10		
Doctorate	2		
Habilitation	1		
Exercise practice			
No	54	-0.224*	0.021
Yes	43		
Time in the job		-0.218*	0.026
Working time (hours)			
20	4	0.203*	0.038
35	3		
40	89		

*Correlation significant at the 0.05 level (bilateral); **correlation significant at the 0.01 level (bilateral).

The physicians' complaints most frequently involved the neck (66.6%).

Poor body mechanics and lack of training on load handling techniques are considered to be the main causes of the high prevalence of low back pain¹⁸, which justifies the need for interventions at this level. The relevance of such interventions is supported by the participants' assessment of the institutional resources, namely the training provided, as well as of their knowledge and skills. Analysis of the PHBS results indicated that transfers always involve physical overload.

The collected data meet the main aim of the present study and enable the implementation of the first stage of a multifactorial program to reduce WMSDs through diagnosis of the prevalence of these lesions among the study population.

In view of the need to prevent WMSDs, research focused on the implementation of training programs on patient handling techniques for health professionals⁶. However, in the systematic review performed by Clemes et al. to evaluate evidence on the effectiveness of different approaches to manual load-handling training, the authors did not identify any evidence supporting the effectiveness of manual manipulation training based on techniques and education alone¹⁵. In addition, considerable evidence supports the idea that the principles learned during training are not applied in the workplace. Neves & Serranheira also mentioned this fact and stressed the effectiveness of systemic multifactorial programs as

opposed to exclusive training in patient handling techniques in terms of risk of WMSDs among health professionals⁶. The present study is the first stage of a project to be developed at a hospital unit and the subject of future publications.

CONCLUSIONS

The sample exhibited high prevalence of WMSDs. The self-reported symptoms involved different body sites and were most frequent on the spine, the lower back in particular. This study provides additional data to the growing evidence for the exposure of health professionals to a variety of risk factors associated with high prevalence of work-related symptoms. Manual mobilization of loads might lead to a wide variety of musculoskeletal disorders, which represent a significant burden to organizations and the professionals themselves. Therefore, strategies to improve the working conditions to prevent their occurrence should be implemented. Accurate knowledge about injuries and establishing preventative measures are crucial for the development of healthier organizations conceived in terms of the people who work at them.

Further research is needed to establish the epidemiology of WMSDs, and also to lend further support to the need to develop occupational preventive and control programs. Multifactorial programs of systemic nature are recommended instead of the exclusive focus on training programs.

REFERENCES

1. McDermott H, Haslam C, Clemes S, Williams C, Haslam R. Investigation of manual handling training practices in organisations and beliefs regarding effectiveness. *Int J Ind Ergon*. 2012;42(2):206-11. <https://doi.org/10.1016/j.ergon.2012.01.003>.
2. International Council of Nurse. Positive practice environments: Quality workplaces = quality patient care. Information and Action Tool Kit developed by Andrea Baumann for ICN [Internet]. Geneva: International Council of Nurse; 2007 [cited 11 Jan. 2018]. Available at: <http://www.icn.ch/indkit2007.pdf>
3. Thinkhamrop W, Sawaengdee K, Tangcharoensathien V, Theerawit T, Laohasirivong W, Saengsuwan J, et al. Burden of musculoskeletal disorders among registered nurses: evidence from the Thai nurse cohort study. *BMC Nursing*. 2017;16:68. <https://doi.org/10.1186/s12912-017-0263-x>
4. Wang S, Liu L, Lu M, Koo M. Comparisons of Musculoskeletal Disorders among Ten Different Medical Professions in Taiwan: A Nationwide, Population-Based Study. *PLoS One*. 2015;10(4):1-9. <https://doi.org/10.1371/journal.pone.0123750>
5. Anderson S, Oakman J. Allied Health Professionals and Work-Related Musculoskeletal Disorders: A Systematic Review. *Saf Health Work*. 2016;7(4):259-67. <https://dx.doi.org/10.1016%2Fj.shaw.2016.04.001>
6. Neves M, Serranheira F. A formação de profissionais de saúde para a prevenção de lesões musculoesqueléticas ligadas ao trabalho a nível da coluna lombar: uma revisão sistemática. *Rev Port Saú Púb*. 2014;32(1):89-105.
7. Yassi A, Lockhart K. Work-relatedness of low back pain in nursing personnel: a systematic review. *Int J Occup Environ Health*. 2013;19(3):223-44. <https://dx.doi.org/10.1179/2049396713Y.0000000027>

8. Serranheira F, Sousa-Uva M, Sousa-Uva A. Hospital nurses tasks and work-related musculoskeletal disorders symptoms: a detailed analysis. *Work*. 2015;51(3):401-9. <https://dx.doi.org/10.3233/WOR-141939>
9. Serranheira TC, Cotrim T, Rodrigues V, Nunes C, Sousa-Uva A. Lesões musculoesqueléticas ligadas ao trabalho em enfermeiros portugueses: «ossos do ofício» ou doenças relacionadas com o trabalho? *Rev Port Saú Púb*. 2012;30(2):193-203. <https://dx.doi.org/10.1016/j.rpsp.2012.10.001>
10. Yasobant S, Rajkumar P. Work-related musculoskeletal disorders among health care professionals: a cross-sectional assessment of risk factors in a tertiary hospital, India. *Ind J Occup Environ Med*. 2014;18(2):75-81. <https://dx.doi.org/10.4103/0019-5278.146896>
11. Yasobant S, Rajkumar P. Health of the healthcare professionals: a risk assessment study on work-related musculoskeletal disorders in a tertiary hospital, Chennai, India. *Int J Med Public Health*. 2015;5(2):189-95. <https://dx.doi.org/10.4103/2230-8598.153836>
12. Carneiro P, Braga AC, Barroso M. Work-related musculoskeletal disorders in home care nurses: Study of the main risk factors. *Int J Ind Ergon*. 2017;61:22-8. <https://dx.doi.org/10.1016/j.ergon.2017.05.002>
13. Long M, Bogossian F, Johnston V. The Prevalence of Work-Related Neck, Shoulder, and Upper Back Musculoskeletal Disorders Among Midwives, Nurses, and Physicians. *Workplace Health Safety*. 2013;61(5):223-9. <https://doi.org/10.1177/216507991306100506>
14. Abedini R, Choobineh A, Hasanzadeh J. Patient manual handling risk assessment among hospital nurses. *Work*. 2015;50(4):669-75. <https://doi.org/10.3233/WOR-141826>
15. Clemes S, Haslam C, Haslam R. What constitutes effective manual handling training? A systematic review. *Occupational Medicine*. 2010;60(2):101-7. <https://doi.org/10.1093/occmed/kqp127>
16. Cheng HYK, Wong MT, Yu YC, Ju YY. Work-related musculoskeletal disorders and ergonomic risk factors in special education teachers and teacher's aides. *BMC Public Health*. 2016;16(1):137. <https://doi.org/10.1186/s12889-016-2777-7>
17. Davis K, Kotowski S. Prevalence of Musculoskeletal Disorders for Nurses in Hospitals, Long-Term Care Facilities, and Home Health Care. *Human Factors*. 2015;57(5):754-92. <https://doi.org/10.1177/0018720815581933>
18. Shojaei S, Tavafian S, Jamshidi A, Wagner J. A Multidisciplinary Workplace Intervention for Chronic Low Back Pain among Nursing Assistants in Iran. *Asian Spine Journal*. 2017;11(3):419-26. <http://doi.org/10.4184/asj.2017.11.3.419>
19. Azizpour Y, Delpisheh A, Montazeri Z, Sayehmiri K. Prevalence of low back pain in Iranian nurses: a systematic review and meta-analysis. *BMC Nursing*. 2017;16:50. <http://doi.org/10.1186/s12912-017-0243-1>
20. DeGrosky M. Improving After Action Review (AAR) practice. In: *International Wildland Fire Safeti Summit Missoula, Montana*. Montana; 2005.
21. Nelson A, Matz M, Chen F, Siddharthan K, Lloyd J, Fragala G. Development and evaluation of a multifaceted ergonomics program to prevent injuries associated with patient handling tasks. *Int J Nursing Studies*. 2006;43(6):717-33. <http://doi.org/10.1016/j.ijnurstu.2005.09.004>
22. Serranheira F, Sousa A, Sousa P. Ergonomia hospitalar e segurança do doente: mais convergências que divergências. *Rev Port Saú Púb*. 2010;10(2):1-21.
23. Shimabukuro VG, Alexandre NM, Coluci MZ, Rosecrance JC, Gallani MCJB. Validity and reliability of a job factors questionnaire related to the work tasks of physical therapists. *Int J Occup Saf Ergon*. 2012;18(1):15-26. <http://doi.org/10.1080/10803548.2012.11076911>
24. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Jørgensen K, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Applied Ergonomics*. 1987;18(3):233-7. [https://doi.org/10.1016/0003-6870\(87\)90010-X](https://doi.org/10.1016/0003-6870(87)90010-X)
25. Serranheira F, Uva A, Lopes F. Lesões músculo-esqueléticas e trabalho: alguns métodos de avaliação do risco. Lisboa: Sociedade Portuguesa de Medicina do Trabalho; 2008.
26. Célia RCRS, Alexandre C. Distúrbios osteomuscular e qualidade de vida em trabalhadores envolvidos com transporte de pacientes. *Rev Bras Enferm*. 2003;56(5):494-8. <http://dx.doi.org/10.1590/S0034-71672003000500005>
27. Graça M, Alvarelhão J, Oliveira A, Almeida R, Martín I. Relação entre percepção de carga e risco de manuseio em idosos dependentes. *Psic Saúde Doenças*. 2013;14(1):53-63.

Correspondence address: Carla Sílvia Fernandes - Rua do Cidral, 28 - CEP: 4490-562 - Póvoa de Varzim, Portugal - E-mail: carlasilviaf@gmail.com