Methods of evaluating low back injury overload caused by unfavorable working conditions among nursing professionals.

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Abstract

The work of nurses has physical and mental demands inherent in the characteristics peculiar to this type of work; the evaluation of these demands in the stress responses determines the requirements imposed to the working conditions as well as identifies the specifications and prevalence of specific lesions. In this context, the objective of this study is to make a systematic review about the methods used, their characteristics identifying whether these methods can characterize and assess the work overload related to low back injuries, present in unfavorable working conditions. A systematic review of the literature was performed based on the search for terms such as: occupational overload assessment, work overload, evaluation of occupational low back pain, ergonomics evaluation methods, evaluation of work organization. After reading the articles, twelve studies were selected as representatives of the problem, since they contain evaluation methods of physical and / or mental overload caused by occupational exercise. The analysis of the methods shows that the physical demand of work is the most evaluated characteristic. Two factors (individual characteristics of the worker and biomechanical labor risks), and two cofactors (stress inherent in the work and work organization) were identified as essential for turning the assessment method capable of identifying work overload, however eight of these methods only consider the biomechanical risks in their evaluation, not taking into account the organization of work. Thus, it is possible to conclude that for a complete assessment of the existence of overload in the work of nurses it is required a combination of these methods in a systematic way as an ergonomic evaluation program of unfavorable working conditions.

Keywords: assessment, overhead ocupacional, lumbar overhead, nursing

1 Introduction

Studies show that nurses are exposed to unfavorable working conditions [(1-10)]. Besides, researches show activities related to patient care as the most painful ones [(4, 5, 8 - 10)], such as, the positioning of the patient in bed and his transference from bed to chair.

Some peculiarities are inherent in the work of nursing professionals [(1-10)] as follows: the characteristics of jobs' post, postures taken as well as physical strength, repetitive gestures and movements performed during the occupational exercise of this group of professionals. For ergonomics, the conditions of work are represented by a set of interdependent factors, which acts directly or indirectly on the quality of life of people and on the results of the work itself where the man, the activity and the environment are the elements of the work situation [(3, 10, 11)]. In this context, ergonomic factors are those ones that will directly affect the relation activity versus worker [(10)]. For nursing professionals these risks are lifting load (patient), poor access to materials, imposing unfavorable postures in biomechanical point of view, excessive working demand, psychosocial factors, etc.

In the work of nursing professionals, in addition to physical factors there are also psychosocial factors inherent in the stress as a result of the nature of this job, such as, poor working conditions in terms of human and material resources, the double work shift, conflicts in the relationship among team members, family and patients, control of emotion, perception of the devaluation of their work by others [(12,13)]. These psychosocial factors can also cause a decrease in concentration, therefore increasing the chances of accidents at work [(4, 12, 13)]. In this context of overload, whether physical and / or mental, that the

ergonomics acts through the characterization of the demands of working conditions imposed on workers, and the identification of specifications and prevalence of specific lesions, which can be correlated to certain factors intrinsic to the characteristics of each job, always aiming a better adaptation of work organization for workers.

The evaluation of demands or environmental motivations on the responses of stress, whether physical or mental, has dominated the investigations of occupational stress [(14)]. Regarding the back injury disorders, the scientific literature shows several methods [(15,19,20,22-30)] to evaluate the associated overload as well as its relation to the work situation. However, an important element in any prevention program based on ergonomics in health institutions would also need the identification of the risks and the presentation of methods to minimize them afterwards (16). Consequently, these data and knowledge can support and guide the planning and implementation of preventive measures of work accidents and occupational diseases [(16)].

Considering the labor demand of nursing professionals, the goal of this study is to make a systematic review about the methods used, their characteristics identifying whether these methods can characterize and assess the work overload related to low back injuries, present in unfavorable working conditions. For this study, a work overload means every task that can affect the ability of the worker to perform his work according to its requirements (related to the individual and to the company), his health conditions, and his physical and mental capacities [(16, 17, 18)].

2 Methodological Procedures

A systematic literature review was accomplished based on the concepts developed by Sampaio and Mancini, 2007 [(31)]. The review was based on the search for terms as follows: occupational overload assessment, work overload, evaluation of occupational low back pain, ergonomics evaluation methods, evaluation of work organization, found on data bases such as Google Scholar, Scielo Brazil and Pubmed. From this search carried out by two researchers, 41 studies were classified as original articles and bibliographic reviewed. After reading the articles, twelve studies were selected as representatives of the problem, since they present evaluation methods of physical and / or mental overload caused by occupational exercise. The study included information about year and place of the creation of the method as well as its main characteristics. For this study, the methods analyzed were the ones that had already been used to evaluate the work of nurses, according to the literature.

3 Results

After the selection of the articles, those methods that could evaluate in a distinct way the physical and / or mental overload related to unfavorable working conditions had been analyzed. Table 1 shows the evaluative components measured in each method. These components were separated into five categories: physical demand of work, mental demand of work, general health condition, functional capacity and presence of risk factors. This classification allows a better understanding about the characteristics of each method as well as the comparison among them.

According to Table 1, the physical demand of work is the most evaluated characteristic by the methods. Only one of them considers mental demand of work in its analysis, demonstrating, this way, the difficulty of keeping together these two types of overload in a single analysis. This situation indicates that the existing methods in the literature tend to evaluate just the physical demands of work, neglecting individual factors which may indicate a predisposition to the development of some diseases. This predisposition determined by genetic characteristics and lifestyle of the worker, when associated with biomechanical factors and organizational factors may contribute to the development of occupational injuries.

Table 1 - Components evaluated by the methods

		Componentes Avaliados				
Referência	Método	Demanda Física de Trabalho	Demanda Mental de Trabalho	Estado Geral de Saúde	Capacidade Funcinal	Presença de Fatores de Risco
15	Niosh	*				*
19	ICT - índice de capacidade para o trabalho	*	*	*	*	
20	NAS - Nursing Activities Score	*				
22	BORG - escala psicofísica de Borg	*				
23	HSE - Upper limb disorders in the workplace					*
24	Checklist de OSHA	*				*
25-27	OCRA - Occupational Repetitive Actions	*				
28	RULA - Rappid Upper Limb Assessment	*				
29	OWAS - Ovako working posture analysins system	*				*
30	REBA - rapid entire body assessment	*				*
31	SI - Strain Index	*			*	*
33, 34	SRQ20 - Self-Report Questionnaire		*	*		

Table 2 shows the number of methods created following a chronological sequence per decade, as well as their origins. Regarding the origin, Finland, the United States of America and the United Kingdom present two methods each, however in distinct decades in all three cases. This table also shows that no country has developed evaluation methods of working conditions in a single period.

Table 2 – Number of methods created in relation to time

Referência	Autor	Ano	Origem	1970's	1980's	1990's	a partir de 2000
29	karhu; kansi; kuorinka	1977	Finlândia	1			
33,34	Hardind et al	1980			2		
15	National Institute of Occupational Safety and Health (NIOSH)	1985	EUA				
19	Tuomi.K et al	1992	Finlândia				
28	Mc Atamney; Corlett	1993	UK				
31	Moore; Garg	1995					
25-27	Occhipinti. E	1996	Itália			6	
20	Miranda et al	1999	Holanda				
24	Occupacional Safety and health Association (OSHA)	1999	EUA				
30	Hignett; Mc Atamney	2000					
23	Graves. R et al	2002	UK				2

The use of methods to measure the work overload can help to prevent the development of musculoskeletal injuries in nurses. However, musculoskeletal overload may be associated to three main factors: professional, organizational and personal [15]. The musculoskeletal problems are related to individual factors (stress, sex, age, medical history, etc...), to business (organization of work such as duration of cycles, breaks, schedule structure, social atmosphere; and to biomechanical factors such as repeatability, effort, posture, etc..) [35]. These risk factors are not independent, presenting interaction among them [36]. Other authors also support the importance of evaluating organizational factors to illustrate the work overload [37.38-40].

Based on literature [15, 35, 36], it was possible to identify two factors (individual characteristics of the worker and biomechanical risks of labor), and two cofactors (stress inherent in the work and work organization) as essential for turning the assessment method capable of identifying the work overload. The stress inherent in the work can be physical or mental, that is, it represents a biomechanical or emotional overload capable of changing the individual's ability to work. On the other hand, the characteristics genetically inherited or determined by personal habits of life are called personal characteristics. In health institutions, the work of their professionals is highly specialized, complex and difficult to be measured, where autonomy is necessary to run it, creating an environment favorable to conflict, being essential a process of constant negotiation [39]. The cofactor organization of work appears in this context, that is, in structuring the necessary organization to accomplish the work, as shown in Figure 1.

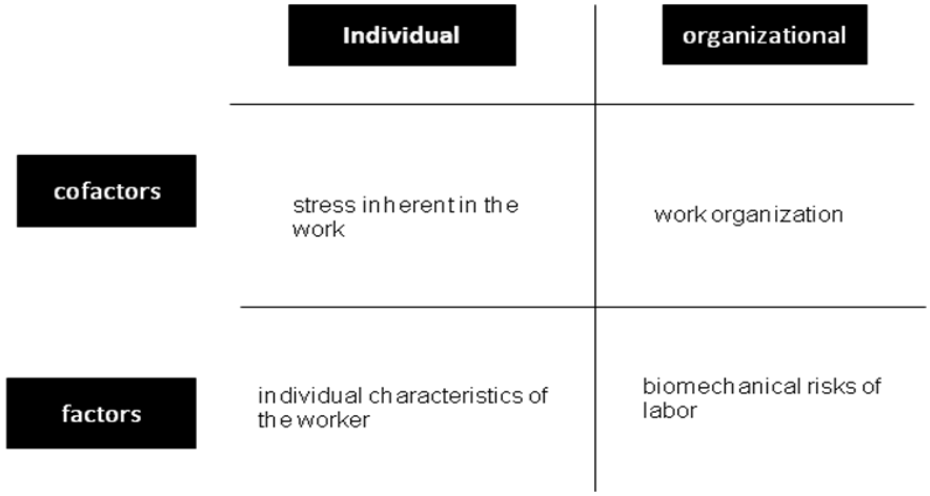

Figure 1 – Factors and cofactors related to individuals and to the company, according to literature [15,35,36]

The 12 methods of evaluation analyzed in this study were applied in a context that does not take into account the characteristics of work organization as shown in Table 3; eight of these methods only consider the biomechanical risks in their evaluation. Though, the scale of Borg [23] assesses biomechanical risks from the individual's perception of effort.

Table 3- Factors and cofactors included in each method

		Fatores		Co-fatores	
Autores	Método	Riscos biomecânicos do trabalho	caracteristicas individuais do	Organização do Trabalho	Estresse inerente ao trabalho
National Institute of Occupational Safety and Health (NIOSH)	NIOSH	x			
Tuomi.K et al	ICT	x	x		X
Miranda et al	NAS	x			
Borg	BORG	x			
Graves. R et al	HSE	x			
Occupacional Safety and health Association (OSHA)	OSHA	x			
Occhipinti. E	OCRA	x			
Mc Atamney; Corlett	RULA	x			
karhu; kansi; kuorinka	OWAS	x			
Hignett; Mc Atamney	REBA	x			
Moore; Garg	SI	x	x		
Harding et al	SRQ20				X

4 Discussion

As demonstrated in the results of this paper, the methods have distinct analyzes about physical and mental work overload (Table 1). Since the activity of nurses presents unfavorable situations in terms of both physical point of view (characteristics of job' posts and positions taken, as well as physical strengths, repetitive gestures and movements adopted) (10), and mental point of view (poor working conditions in terms of human and material resources, the double shift of work, conflict in the relationship among team members, family and patients, the control of emotion, perception of the devaluation of their work by others) [12.13], the evaluation of these two variables is important, given that musculoskeletal overload may be associated with three main factors: professional, organizational and personal [15].

A study by Malchaire carried out in 2001 (15) classifies 19 evaluation methods on low back injury overload related to work, but differently from what was developed in this study, the author does not compare the characteristics of the methods, but he makes a description of each method. He does not contextualize the methods with the work of nursing professionals though. The evaluation of work organization factor is crucial for identifying the work overload of the nursing professionals, along with other factors that are

also related to the company (biomechanical risks), to factors and co-factors related to workers respectively (individual characteristics of the worker and stress inherent in the work) [15, 35, 36], according to the result in Figure 1.

The diseases related to work are multifactorial, i.e., biomechanical factors of the work should be evaluated along with the individual characteristics of the worker and with the organizational matters of the company at issue [35], supporting the idea presented in this paper in Figure 1. Agreeing with this idea, a study from 2001, states that evaluating only biomechanical factors of the work is not sufficient to characterize them as the cause of musculoskeletal overload injuries, especially in the spinal column [40]. For the authors, it is essential to know the psychological and organizational characteristics.

Corroborating figure 1, the evaluation of the role of the demands and motivations in the work environment in the stress responses helps to characterize occupational overload. For the same author, from the systematization of these aspects, whether physical or psychological factors help to characterize the occupational overload [41].

Table 3 shown in this paper presents factors and co-factors included in each method by the identification in the literature of which features should be analyzed to characterize work overload. According to literature [15, 35, 36], the work ability index (WAI) [19] is the most complete method. Although like the other methods reviewed in this study, WAI can not characterize the organization for work, in disagreement with APTEL 1993 [35], who states that the organization of work along with other factors and cofactors shown in figure 1 , when evaluated in group, are effective to establish the existence and characteristics of labor overload.

5 Conclusions

According to the results of this study, the evaluated methods when used alone can not identify overload related to work, because the context in which they were applied did not consider all the factors identified in the literature and shown in Table 3 in this paper. This way, it is possible to conclude that for a complete assessment of the existence of overload in the work of nurses it is required a combination of these methods in a systematic way as an ergonomic evaluation program of unfavorable working conditions.

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