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Absenteeism and presenteeism costs from occupational accidents with WRMSDs in a Portuguese hospital

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Received: December 10th, 2015. Received in revised form: March 01rd, 2016. Accepted: March 07th, 2016.

Abstract
The morbidity associated with WRMSDs leads to productivity losses (absenteeism and presenteeism) in healthcare organizations, which induces a substantive impact (cost).. The present study aimed to evaluate the impact (cost) of WRMSDs for accidents involving nurses and nurses' aides in a small Portuguese hospital. It begins by identifying the workplace accidents (WA) that these occupational groups suffered between 2009 and 2013, which resulted in WRMSDs. Healthcare workers answered a questionnaire with WQL-8 and SPS-6 scales to determine the levels of presenteeism. This study adopted a human capital methodology in order to estimate the indirect costs of lost productivity from WRMSDs. Patient transfers are a major cause of WRMSDs, with most prevalent injuries being in the lumbar region. Between 2009 and 2013 there is a loss of productivity in this institution estimated of €222,015.98 from WA with WRMSDs that lead to absenteeism and presenteeism (€ 189,679.87 absenteeism and € 32,158.86 presenteeism).

Keywords: Ergonomics, Occupational accidents, Productivity losses, Hospitals, Nurses.

Costos de accidentes de trabajo con TMOL consecuencia de absentismo y presentismo en un hospital portugués

Resumen
La morbilidad por trastornos musculoesqueléticos de origen laboral (TMELs) conduce a una pérdida de productividad (absentismo y presentismo) en sistemas de asistencia sanitaria, con substanciales costos. El objetivo del estudio fue evaluar costos de TMELs consecuencia de accidentes en enfermeras y auxiliares de un hospital portugués. Se inició con la identificación de los accidentes de trabajo (AT) que estos grupos ocupacionales sufrieron entre 2009 y 2013. Estos trabajadores respondieron a un cuestionario con las escalas WQL-8 y SPS-6 para determinar los niveles de presentismo. En este estudio se adoptó una metodología de capital humano con el fin de estimar costos indirectos de pérdida de productividad por TMELs. Los traslados de pacientes fueran una importante causa de TMELs, incidiendo estas en la región lumbar. Entre 2009 y 2013 se produjo una pérdida de productividad estimada en 222.015,98€ por AT con TMELs derivando en pérdidas de 189.679,87€ (absentismo) y 32.158,86€ (presentismo).

Palabras clave: Ergonomía, accidentes de trabajo, Pérdidas de productividad, Hospitales, Enfermeras.

1. Introduction

Work-related musculoskeletal disorders (WRMSDs) are a major worldwide problem, principally for healthcare personal [1].

The international research in healthcare confirms the negative productivity impact caused by WRMSDs, in particular by high levels of absenteeism and presenteeism; there is also a decrease in the level of healthcare personals' quality of life. There are several studies that describe nurses and nurses' aides working conditions and their risk of developing musculoskeletal disorders whilst undertaking these tasks [2-7].

Recently in Portugal several authors have focused on WRMSDs [8,9] and also developed several studies in a hospital setting [10-15] that draw attention to working conditions and for the significant WRMSDs risk level for nurses and nurses' aids.

Beyond the effects on quality of life, WRMSDs can cause substantial costs for the society. Work accidents and

occupational diseases can have severe financial implications, in particular through absenteeism and presenteeism.

Absenteeism is a specific and inevitable cost [16] that the working world has to incur [17]. Cunha et al. [18] report that the simplest and most accepted definition of absenteeism refers to the unexpected absence of an employee at the workplace. The word "unexpected" excludes absences due to vacation, "bank holidays", clearances, special leave of absence (e.g. maternity), or other reasons that are known and / or programmed by the organization.

Empirical research has shown that absenteeism is affected by the employees' professional capacity and their motivation to work, as well as by internal and external factors at work [17]. In fact, absenteeism can be a result of multiple factors interaction, and this problem may have several consequences at the individual, organizational and also at a societal level.

The concept "presenteeism" is used when someone is present at work, but it is difficult to tell when (or how much) the person's illness or medical condition is hindering their performance [7,19].

In general, we can consider expressed productivity losses [20,21] and reduced on-the-job productivity as a result of health issues affecting the overall performance of companies with negative economic implications to be associated with presenteeism. There are two types of presenteeism: the first is associated with acute illness (temporary as a cold or a pregnancy) and the second is associated with chronic diseases (such as musculoskeletal disorders or mental health disorders).

Presenteeism affects productivity, not only in terms of amount of work, but also in terms of quality of work, [19] specifically in nurses' productivity. It may also affect patient safety. The decrease in productivity translates to the inability to perform routine tasks, [22] and may also result in high absence rates due to disease [23]. These phenomena are therefore not only important in terms of the organization's social responsibility, but also in terms of its competitiveness [7].

2. Material and methods

This study was conducted at a public hospital in Lisbon, and we aimed to determine the costs of the lost in productivity, from the employer's perspective, in terms of absenteeism and presenteeism.

All nurses and nurses' aides who suffered work accidents between 2009 and 2013 took part in the study (n = 188 possible participants who had suffered work accidents: 107 nurses and 81 nurses' aids). To take part in this study (inclusion criteria in the sample), the participants had to have a WRMSD as a result of a work accident.

Data collection was first performed in the "human resources department" in the hospital to identify the work accident cases and consequent WRMSDs. We then sent a questionnaire to each healthcare worker that included a socio demographic characterization and identified lost productivity by asking the following two questions (i) the number of days lost due to sick leave with work-related musculoskeletal disorders resulting from work accidents (absenteeism) and (ii) the level of presenteeism, which was assessed using the Work Limitations Questionnaire (reduced - 8 issues) - WLQ [24, 25] and Stanford Presenteeism Scale - SPS-6 [26] scales translated and validated for the Portuguese population [27]. The value of unpaid domestic work, by WRMSDs, was excluded.

The WLQ scale [24] consists of 25 items and assesses four dimensions: time management, ability to perform physical labor, concentration and interpersonal skills, and the ability to achieve goals through the participant's self-assessment. It uses a 5 point Likert scale, where 1 represents "all the time (100%)" and 5 "any time (0%)". We used the small version (WLQ-8) that was adapted by Ozminkowski et al. [25] and consists of 8 items (the original contains 25 items) and evaluates the same four dimensions.

The SPS-6 scale [26] consists of 6 items and assesses two dimensions: (i) work completed (TC), which refers to the amount of work that is carried out when the employee is suffering from the causes of presenteeism, and (ii) avoided distraction (DE) that corresponds to the capacity for concentration that people have when they have symptoms of presenteeism. This is assessed by participant self-assessment, using a Likert scale, where 1 is "strongly disagree" and 5 "strongly agree". According to Koopman et al. [26], the lowest number is associated more with origins of psychological conditions, whereas the latter is manifested by physical causes. Each respondent's total score was on a SPS-6 scale and was obtained after adding scores together in each of the six statements.

To calculate the cost of lost productivity (i.e., the indirect costs of WRMSDs for accidents at work), we opted for the human capital method as it is commonly used in these type of studies, when the potentially productive time lost is valued using the average wages of affected employees [28, 29].

To calculate of the cost of absenteeism (between 2009 and 2013), the following formula used was (1):

$$\text{lost days} \times (\text{Average hourly wage} \times n^{\underline{o}} \text{ hours of daily work}) \times 1.83 \quad (1)$$

The cost of presenteeism was evaluated according to the following formula (2):

$$(\text{Score WLQ}/100) \times \text{Useful working days per year} \times (\text{Average hourly wage} \times n^{\underline{o}} \text{ hours of daily work}) \quad (2)$$

Data analysis was carried out with IBM® SPSS® Statistics software (vs 22).

3. Results and discussion

The present study included 30 nurses and 20 nurses' aides that had a work accident resulting in a WRMSD between 2009 and 2013. A total sample with (n) 50 participants was obtained, in which 72% (n = 36) were female.

Regarding the work accidents that cause work-related musculoskeletal disorders, most were due to "patient transfer" (60%), followed by "health professionals fall" (12%), "patients positioning" (10%) and "patient aggression

Table 1.
Characterization for days lost.

Professional group	2009	2010	2011	2012	2013	Total
Nurses	20	96	32	515	105	768
Nurses' aides	0	93	364	218	106	781
Total	20	189	396	733	211	1.549

Source: The authors

Table 2.
Characterization by level of presentism (second level SPS-6).

Professional group	x̄ total SPS-6	x̄ completed work	x̄ avoided distraction
Nurses	1.95 (sd= 0.96)	1.87 (sd=1.07)	2.03 (sd=1.18)
Nurses' aides	2.28 (sd=0.70)	1.93 (sd=1.07)	2.63 (sd=1.28)

Source: The authors

towards health care worker" (6%). Smaller reasons were due to: "improper positioning of the healthcare professional" (4%), "equipment falling on the health care professional" (4%) and "road accidents whilst at work" (2%). Regarding the body region affected by work accidents, the "spine" (n = 9) had the largest modal value, followed by the "right foot" (n = 6), "right upper limb" (n = 5) and "right shoulder" (n = 5).

Regarding the number of days lost through sick leave due to WRMDs (absenteeism) there was a total loss of 1,549 days (for the 50 participants in the study (n = 50). 768 days were missed by nurses and 781 by nurses' aids) (Table 1). These result show an average loss of 6.20 days (sd = 1.47).

Considering that "patients transfer" was the main cause of work accidents in the present study, we chose to analyze its contribution to the number of days lost due to sick leave. This analysis found that there were 861 days lost due to patient transfer (220 days lost for nurses and 641 days for nurses' aids). This represents about 55.58% (14.20% relative to the nurses and 41.38% for nurses' aids) of all days lost.

Regarding presenteeism and taking into account the overall score of the SPS-6 scale (5-point Likert scale) and mean scores from its two dimensions, we found that both the nurses' aides and the nurses had higher "avoided distraction" mean scores (2.03; 2.63, respectively) compared with the "completed work" (1.87 to 1.93), and nurses' aids had higher levels of presenteeism than nurses in both dimensions (Table 2).

Regarding the presenteeism percentage, and taking into account the outcome of WQL scale, there was an average loss of 19.56% productivity per working day (trimmed mean at 95% of 17.19%). In terms of professional category, nurses had a lower level of presenteeism (14.48%) compared with the operating assistants (27.19%).

To calculate the lost productivity cost (i.e., the costs of WRMSDs due to accidents at work), we decided to adopt the formulas proposed by Mitchell and Bates [30].

The average hourly wage was 12.54€ for nurses and 6.62€ for nurses' aides, according to in the figures from 2013 (Finances Ministry).

In 2013 the costs extrapolation (Table 4) amount to € 6,431.77 (€ 3,229.57for nurses and € 3,202.20for nurses' aides). For five years (2009-2013), extrapolation estimated

Table 3.
Calculation of the cost of absenteeism (2009-2013).

Nurses	=	768	x	(12.54€	x	7)	X	1.83	=	23,411.28€
Nurses' aides	=	781	x	(6.62€	x	7)	X	1.83	=	66,268.59€
Total									=	89,679.87€

Source: The authors

Table 4.
Calculation of the cost of presenteeism (2013).

Nurses	= (14.48% / 100)	x	254	x	(12.54€	x	7) =	3,229.57€
Nurses' aides	= (27.19% / 100)	x	254	x	(6.62€	x	7) =	3,202.20€
Total							=	6,431.77€

Source: The authors

the total amount of costs at around €16,147.85 for the nurses' and € 16,011.00for nurses' aides (Table 3).

The total cost of lost productivity for work-related musculoskeletal disorders due to work accidents during the period 2009-2013 was estimated to be € 221,838.73, taken from adding the total cost of absenteeism (€189,679.87) and the total from presenteeism (€32,158.86).

4. Conclusions

The most important cause of WRMSDs for nurses and nurses' aides were patient transfers, and this injury had a prevalent symptom in the lumbar region (18%), and were predominantly on the right side for shoulders (10%), wrists (8%) and hands (4%), .

The loss of productivity in this institution, for instance in 2013, was (i) €16,866.92 for nurses' absenteeism and €8,989.03 for nurses' aides, and (ii) €3,229.57 for nurses' presenteeism, and €3,202.20 for nurses' aides. The total amount in loss of productivity in 2013 was €64,575.44.

The total estimated cost for 2009-2013 was €222,015.98, which came from absenteeism (€189,679.87) and presenteeism (€32,158.86). The Institution should take these results into consideration for the future occupational management strategies in order to resolve the problem.

In relation to absenteeism in these two professional groups, it was possible to estimate costs by comparing our results with the results from the Ministry of Health's social balance data sheet.

Costs resulting from work accidents from absenteeism due to WRMSDs may be estimated at around 10% of hospital total costs (€1,887,464.05, absenteeism due to occupational accidents or occupational diseases). This is a high value considering the size of the institution, and, thus, justifies the need for preventive measures and the management of this occupational health issue.

Regarding presenteeism and taking into account the overall score of the SPS-6, the dimension "avoid distraction" is the most visible for both nurses' aides and nurses. There is also a decrease in productivity, an increased likelihood of errors occurring, and lapses due to employees performing their duties with less ability to concentrate. Absenteeism and presenteeism lead to increased costs for the institutions and worse health outputs. It is assumed therefore that institutions should periodically undertake a

healthcare personal work health status assessment (particularly in hospitals), which will contribute to prevent and manage this occupational health problem.

The absenteeism and different causes of presenteeism (personal, organizational and social) analysis, the study of the impact of the productivity loss in health institutions, and the establishment of human resources policies to implement solutions should be addressed by further studies in this hospital. This will raise awareness in Occupational Health that should be shared with top hospital managers in order to contribute to a policy that prevents work accidents and work-related musculoskeletal disorders.

Work productivity in hospitals is not well understood and nurses' productivity results should be measured according to a hospital policy that includes (i) costs of absenteeism and presenteeism costs, and (ii) the relation between nurses (and nurses' aides) demands as well as the human resources needed to undertake the healthcare work. If this relation were better understood, managers may implement healthcare personal policies that would avoid an increase in injuries, hospital disease complications, longer hospitalizations, and patient mortality from healthcare outputs. Absenteeism and presenteeism should also be an indicator for patient care if we want to promote patient safety and worker safety in hospitals and other healthcare institutions.

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