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MUSCULOSKELETAL DISORDERS IN PROVIDING HEALTHCARE AT PATIENTS' HOME: RISK ASSESSMENT AND CONSTRUCTION OF STATISTICAL MODELS FOR FORECASTING

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WRMSDs, Home-based care, ROC analysis

EXTENDED ABSTRACT

Work related musculoskeletal disorders (WRMSDs) have been described as the most important occupational health problem tormenting the nursing workers. In general, studies conducted on this subject have been carried out in the hospital context. There is little information regarding the WRMSDs in providing home-based care. In Portugal, there is no knowledge of any study about this theme.

The main objectives of this work are the characterization and evaluation of musculoskeletal complaints in nurses who work at the Health Centers of the northern Portugal and that provide home-based care; verify if provide home-based care, by itself, represents a risk factor for WRMSDs; identify the main risk factors present in the homecare context; development of statistical models to predict the risk in the homecare context.

The principal methodology used was a questionnaire developed in electronic format which was based on the "Standardized Nordic Questionnaire" for the analysis of musculoskeletal symptoms (Kourinka et al. 1987). Several questions were added in order to collect more information to enable the application of statistical techniques to identify the largest possible number of WRMSDs risk factors and evaluate its impact on the diagnosis of such lesions. The questionnaire was available on a website to be filled in by nurses belonging to Health Centers from the North Region of Portugal. The questionnaire is divided into four parts. Part A covers demographic aspects and aspects relating to the profession, including an issue that allows us to distinguish between nurses who work only in the

Health Center and those who provide home-based care. Part B includes the identification and characterization of complaints and musculoskeletal symptoms self-reported by nurses. Part C, which can only be filled by nurses who provide home-based care, asks how many hours per week are dedicated to home-based care. Then, from a list of nursing activities, asks the nurse to select the activity performed most often during the provision of home-based care. In view of this activity, the nurses are asked to answer a series of questions that are actually an adaptation of the technique REBA (Hignet and McAtamney 2000) for musculoskeletal risk assessment. Part D, contains questions relating to aspects still unexplored in the previous parts: some physical and psychosocial factors. In addition to the questionnaire, we also applied the technique of postural analysis REBA (Hignet and McAtamney 2000) that allows to assess the risk in an objective way. Some nurses were followed on their visits to patients where information and video footage were collected for subsequent analysis. To estimate the risk of WRMSDs present in the practice of home-based care, we used univariate models of binary logistic regression.

We received 133 complete responses (response rate of 5%). The questionnaires have been treated statistically by Statistical Package for Social Sciences (SPSS or PAWS Statistics 19.0[®]). About 87% of nurses are female and about 13% are male. About 88.7% of respondents provide home health care. The body areas with most complaints are the cervical (74.4%), the lumbar (63.9%), the dorsal (50.4%) and the shoulders (48.9%). All results presented below relate to the group of nurses who provide home care. About 33.9% of nurses say they never have help from colleagues and 39.8% said they rarely have help. About the height of the bed where the treatment of patients was performed, 82.2% consider it low, 16.9% consider it appropriate



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and 0.8% considers it high. Ninety-two point four percent of nurses reported that usually they need to move the patient to treat him and 97.5% reported that in general there are no patients lifting/transferring devices. To measure the association between the factors “provide home care” and “to have complaints at any body area” we carried out models of binary logistic regression to evaluate the odds ratio and respective confidence intervals. We detect statistically significant association only for the lumbar region (OR=4.21 ($p<0.05$), 95% Confidence Interval [1.4; 13.2]). The nurses who provide home care have circa fourfold chance of having musculoskeletal complaints in the lumbar region than their colleagues. Then, we investigate what factors related to the home environment, were associated with complaints in the lumbar region. From the variables selected using the univariate binary logistic regression models, were introduced in the prediction model those who could contribute to the dependent variable (complaint in the lumbar region). We used stepwise forward selection method. This process resulted in eight variables that have a contribution to the risk of having complaints in the lumbar region. The contribution may be positive or negative depending on the sign of the estimated coefficients. The forecast model can be seen in Equation (1):

$$\text{logit} = 2.719 + 1.584 * X_1 - 2.222 * X_2 - 1.237 * X_3 + 2.093 * X_4 + 1.187 * X_5 - 3.404 * X_6 - 4.047 * X_7 - 2.056 * X_8 \quad (1)$$

X_1 -complaints in the hands / wrists; X_2 -complaints in thighs; X_3 -posture of the forearm; X_4 -repetitive movements; X_5 -posture of the arm; X_6 - the arm, or its weight is supported; X_7 -devices aids for lifting/transferring patients; X_8 -job satisfaction.

The model performance was evaluated by ROC analysis yielding a value for the area under the ROC curve of 0.889 ($p<0.05$), which reveals a high discriminating power. This model is able to correctly predict the complaints in the lumbar region in 88.9% of cases. In relation to the risk analysis performed by REBA technique (Hignet and McAtamney 2000), the indications are medium risk of WRMSDs. Medium risk means that the workplace should be intervened but without urgency.

Given that the number of responses received so far does not allow an inference about the population,

however we can characterize this sample according to some important aspects, namely:

- The body zones with the greater number of complaints are the spine and the shoulders.
- About 82.2% of nurses consider the height of the bed low. This is an important aspect because previous studies already revealed as a factor in the emergence of awkward postures and also of musculoskeletal complaints (de Looze et al. 1994).
- We find a statistically significant association between “musculoskeletal complaints in the lumbar region” and “provide home care”, (OR=4.21 ($p<0.05$), 95% Confidence Interval [1.4; 13.2]). The nurses who provide home care have circa fourfold chance of having musculoskeletal complaints in the lumbar region than their colleagues.
- The statistical model obtained for risk forecasting has a very good discriminating power.

As future work, we will continue to follow some nurses during their visits to patients to collect local data and video footage of their activity for subsequent analysis through application of the REBA procedure (Hignet and McAtamney 2000). We will build more statistical models to predict the risk associated to complaints in the lumbar region, for this group of nurses.

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