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### PREVENTION OF WORK-RELATED MUSCULOSKELETAL DISORDERS (MSDs) IN UPPER EXTREMITIES

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**Introduction** Musculoskeletal disorders occupy the first place among occupational and work-related diseases in Estonia, Europe and many other countries in the world. The field has been widely studied, however, due to the specificities of work environment as well as cultural environment, development mechanisms of diseases are somewhat different. The aim of the research was to elaborate the conceptual model for prevention of work-related musculoskeletal disorders which enable the possibility to the occupational health doctors to elaborate prevention and rehabilitation activities from badly organised workplace ergonomics.

**Methods** 505 people (office and garment industry workers) participated in the study. The comparison group consisted of patients with occupational diseases. For a questionnaire survey, the study participants filled out the Nordic Questionnaire for Analysis of Musculoskeletal Symptoms and Work Ability Index (WAI) questionnaire; pain assessment took place with the Pain Visual Analogue Scale. Muscle stiffness and frequency were measured myotonometrically. The Student's *t*-test was used. The statistical significance of the *t*-test was  $p=0.005$ . Univariate analysis, correlation, analysis, parametric and nonparametric tests were applied in SPSS. The Shapiro-Wilk test, Pearson's Chi-Square test, Likelihood Ratio, Fisher's Exact test and the Linear-by-Linear association test were used in the process of elaborating the model.

**Results** Most painful body regions (in neck, shoulders, elbows, wrists and back) correlated to pain duration (four stages), pain severity, age of workers and three stages of MSDs in preventive and rehabilitative medical activities. The novelty: the right hand of office workers is more painful than the left one; garment workers' both hands are painful to the same extent.

**Conclusion** The current research contributes to the elaboration of the conceptual model which enables the occupational health doctors to workout the basis for prevention of MSDs and rehabilitation from MSDs caused by the poorly organised workplace ergonomics.

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### INFLUENCE OF BED HEIGHT ON MUSCULAR ACTIVITY OF DORSAL ERECTOR MUSCLES DURING STANDARD NURSING TASKS

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**Introduction** A higher frequency of back complaints in the lower back area can be observed among nursing staff than among workers in other professions. The use of adjustable beds in nursing practice has been suggested as a means of influencing working postures and reducing muscular demand and load on nursing personnel. The purpose of this study is to objectively assess the impact of different bed positions on muscle activity during nursing tasks.

**Methods** Seven nurses in a geriatric nursing home performed a standardised morning care routine for an immobile patient. Muscular activity of left and right erector spinae muscle was

measured using surface electromyography. Each participant conducted four measurements with the bed at two different heights (recommended height of the bed according to the anthropometric characteristics of the employee and recommended height lowered by 10 cm), once with raised and once with lowered side rails. Measurements were recorded for four consecutive days, from 6.00–8.00 am, each nurse taking care of the same immobile patient. Statistical analysis was performed on the basis of non-parametric Wilcoxon matched pairs test. The value  $p<0.05$  was considered as statistically significant.

**Results** Analysis of the data demonstrated that refraining the basic ergonomic principles (bed height lowered by 10 cm) significantly increases the activity of erector spinae muscles ( $p=0.016$ ), while utilising side rail of the bed does not represent a lower muscle activity ( $p=0.125-0.97$ ).

**Discussion** A small difference in bed height resulted in a significant change of back muscles activity. Therefore, height adjustable beds and ergonomic training for employees should be an essential part of back pain prevention in nursing personnel. Working in pairs may represent an unexpected ergonomic puzzle if two health care workers have different bed height demands according to nursing care recommendations and standards

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### INTEGRATION OF MUSCULOSKELETAL DISORDERS PREVENTION INTO SAFETY MANAGEMENT SYSTEM IN NURSING HOMES: A RECIPROCAL HEALTH CARE MODEL

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**Introduction** Healthcare workers are at a high risk of developing musculoskeletal disorders (MSD). The objective was to develop an innovative Reciprocal Health Care Model for MSD prevention in nursing homes.

**Methods** Two questionnaires measuring health complaints, safety attitudes, job satisfaction and stress, risk awareness and working conditions were administered anonymously to employees and employers in 15 nursing homes. Altogether 233 (NOSACQ-50) and 69 (KIVA questionnaires) participants fulfilled the questionnaires. A qualitative approach includes focus group interviews with 69 employees. Electromyography (eMotion EMG) was used as the method for determination of the nursing workers' thumb muscle's (*m. abductor pollicis brevis*) fatigue.

**Result** The study examines behavioural-cultural aspects of MSD (e.g. hazard recognition, risk assessment and safe performance of jobs) among healthcare workers and reveals key issues in MSD prevention programs. The results show the linear dependences between the level of fatigue of the thumb muscles at the beginning and at the end of an 8 hour workday; between the EMG signals from the muscles in the resting state and after a 5 min strained state. A statistical analysis of the questionnaires shows many organisations with positive safety attitudes. However, qualitative data indicate some important safety flaws and drawing attention to contextual variables in the development of safety management systems in order to improve the MSD prevention.

**Conclusions** The paper presents an innovative conceptual model for the improvement of safety climate with focuses on