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

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10.1136/oemed-2018-ICOHabstracts.757

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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10.1136/oemed-2018-ICOHabstracts.758

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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10.1136/oemed-2018-ICOHabstracts.759

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 administrated 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

MSD prevention, which enables to integrate MSD prevention programs into safety management system in nursing homes. The essential aspects are the established MSD prevention programs have to be a fully integrated into general and safety management system in the organisation and the magnitude of complexity of MSD risk factors (including behavioural-cultural aspects of MSD), like most culturally-based things, must be recognised, acknowledged and be managed.

1314 RISK ASSESSMENT FOR BACK PAIN AND LUMBAR DEGENERATIVE DISEASE IN KOREAN FIREFIGHTERS

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10.1136/oemed-2018-ICOHabstracts.760

Introduction The work of firefighters inflicts a burden on the lumbar spine and may even provoke low back pain. Although ageing could cause degenerative changes in lumbar spine, there have been only few studies about lumbar degenerative changes in firefighters by age. Therefore, we have investigated the risk of lumbar degenerative changes in firefighters by age, while comparing with hospital office workers (HOWs) as our control group.

Methods We selected 490 professional firefighters using random sampling method by gender, age, and job. Then, we surveyed risk factors, job and clinical status, and conducted MRI and physical examinations, which was carried out by radiology specialists. Back pain was classified by NIOSH classification. The degenerative changes of lumbar spine were diagnosed as one of degenerative changes such as, intervertebral disc herniation or degeneration, central canal stenosis, and neural canal stenosis. The odds ratio of age-related lumbar degenerative changes in firefighters and control groups with 20 s years old (reference group) was evaluated using the logistic regression analysis.

Results The odds ratio of lumbar degenerative changes was significantly high only in 50 s among HOWs but in all age groups among firefighters. The central canal stenosis was significantly high prevalence in all age group, and disc herniation and degeneration were significantly high after 40 s among firefighters.

Conclusion The lumbar degenerative changes in firefighters occur at early age. It may be due to occupational factors of firefighter. In essence, further studies are needed to prevent these degenerative changes.

This research was supported by the Field-oriented Support of Fire Fighting Technology Research and Development Program funded by National Fire Agency ('MPSS-소방안전-2017-87').

1262 WORK-DISABLING MUSCULOSKELETAL PAIN IN CHILEAN COPPER MINERS: A CROSS-SECTIONAL STUDY

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10.1136/oemed-2018-ICOHabstracts.761

Introduction mining workers are known to be exposed to ergonomic and psychosocial risks, which are related to musculoskeletal disorders. The aim of this study was to determine the prevalence of work disabling low-back pain during the last year among Chilean copper miners, and its relation to ergonomic and psychosocial factors.

Methods a cross-sectional study was conducted during year 2014 in Los Andes, Chile, with 343 miners (response rate 99.7%), classified according to tasks into operative (n=253) and administrative workers (n=79). The adapted survey of Working Conditions and Health in Latin America, Nordic questionnaire of musculoskeletal pain and ISTAS-21 questionnaire of psychosocial risk were applied. The main outcome was disabling neck and/or back pain in the last 12 months (pain that did not allow performing work normally). Descriptive, bivariate (χ^2 test) and logistic regression (multivariate) analyses controlling for potential confounding factors were performed.

Results from all male workers considered, 94% had complete secondary/higher education. Prevalence of disabling neck and/or back pain in the last year was significantly higher in operative than administrative workers (14.9%; $p=0.01$), and no difference was observed between workers from the main company and subcontractors. In bivariate analysis, a statistically significant association was found between the presence of pain and low/medium job security (17.8%; $p=0.04$) and high strain jobs (29.3%; $p<0.001$). No statistically significant association was found between high ergonomic risk and musculoskeletal pain. In logistic regression analysis, workers in high strain jobs (OR 3.13; 95% CI: 1.20 to 8.18) were at increased odds of disabling back pain, compared to low strain jobs.

Discussion high strain jobs might be related to disabling back pain in Chilean miners. Psychosocial factors could have even a greater importance than ergonomic factors in the development of musculoskeletal pain in Chilean miners. Psychosocial risks surveillance could be as important as ergonomic workplace evaluation in the prevention of disabling musculoskeletal pain.

327 DESCRIPTION OF A SPINAL GROUP PERFORMED BY A VEHICLE ASSEMBLER IN BRAZIL

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10.1136/oemed-2018-ICOHabstracts.762

Introduction Low back pain is considered to be the second most frequent cause of morbidity and disability, leading only to headache. It affects 70%–80% of the adult population at some point in life, especially those who are working in the labour market. By affecting the economically active population, it interferes with family income and company productivity. This is because it brings suffering to patients and their families, and entails costs resulting from falling productivity, unpaid days, medical and legal expenses, insurance payments and disability benefits.

Methods Ergonomic evaluation by the Michigan Biomechanical Model and Analysis of the results obtained in the spinal group formed by a multiprofessional team, created by an automobile industry to treat their workers with spine pathologies in the last 2 years.

Result The ergonomic evaluation confirmed the presence of significant biomechanical overload for the lumbar spine and