RISK FACTORS FOR CARPAL TUNNEL SYNDROME – FINDINGS FROM THE NIOSH UPPER EXTREMITY MUSCULOSKELETAL DISORDER CONSORTIUM

BA Evanoff*, E Eisen, F Gerr, S Burtt, K Hegemann, B Silverstein, A Garg, AM Dale, S Bao, C Harris-Adamson, J Kapellusch, L Merlino, D Rempel. Division of General Medical Science, Washington University School of Medicine, Saint Louis, MO, USA

Starting in 2000, six research groups from the USA were supported by NIOSH to perform large, prospective epidemiologic studies examining associations between workplace physical risk factors and upper limb musculoskeletal disorders. A total of 4321 workers at 55 employers/plants across a variety of hand-intensive industries were followed for up to six years. Individual workplace exposure data included direct observation and video analysis. Health data included self-report, physical examination, and nerve conduction measures; our case definition of carpal tunnel syndrome (CTS) required both typical symptoms and nerve conduction abnormalities. Those performing the physical examinations and the video analyses were blinded to exposure and medical condition, respectively. Pooled analyses of consortium data controlled for personal factors (age, body mass index, gender, co-morbid diseases) and non-overlapping physical exposures (force, posture, repetition) to study the association between work exposures and carpal tunnel syndrome. We found no independent effects of wrist posture or total repetition rate on the incidence of CTS. In contrast, strong dose-dependent associations were found between incident CTS and peak hand force (Borg CR10 ≥3), forceful repetition rate (>3 exertions per minute of ≥9N pinch force or 45N power grip), and the proportion of time spent in forceful exertion (>11%). We also found that the ACGIH Threshold Limit Value for Hand Activity (TLV for HAL) predicted CTS, and that that current ‘action limit’ is too high to adequately protect workers. Varying the formula of the TLV to emphasise force over repetition better predicted incident CTS. Study findings suggest that efforts to reduce workplace exposures should focus on jobs requiring high hand force and repeated or prolonged forceful exertions. Our study also suggests that the TLV for HAL and other less labour intensive assessment methods are valid and usable tools for workplace prevention.

RECENT CHANGES TO THE ACGIH HAND ACTIVITY LEVEL TLV

D Rempel*. Division of Occupational and Environmental Medicine, University of California, San Francisco, USA

The ACGIH Hand Activity Level (HAL) Threshold Limit Value (TLV) is a risk assessment tool designed to protect workers, who perform repetitive hand exertions for 4 or more hours per day, from distal upper extremity disorders. Recent large, longitudinal studies, provide strong evidence that repetitive forceful hand exertions increase risk for occupational wrist tendinosis and carpal tunnel syndrome.1,2,3 In the Harris-Adamson study,1 forceful hand exertions (e.g., >9N pinch or >45N power grip force) and the time performing forceful hand work increased risk. Based on these and psychophysics studies,4 hand exertions should be considered in risk assessment models if they are above 10% of posture specific strength. In addition, in these large studies, the prior HAL TLV action limit (0.56) was not sufficiently protective1 and, therefore, has been revised. The name of this TLV was changed to Hand Activity (HA) TLV. Other changes to the TLV will also be presented.

REFERENCES
4. Potvin JR. Predicting maximum acceptable efforts for repetitive tasks an equation based on duty cycle. Human Factors 2012;54(2):175–188.
score (with all exertions explicitly represented). This presentation describes the RSI and COSI algorithm. A brief complex task example compares the RSI to the 1995 SI and showcases the RSI’s much improved utility as a tool for the design and evaluation of complex tasks.

1631e UPDATE ON GERMAN RISK ASSESSMENT TOOLS FOR UPPER LIMB MSDS

B Weber*, U Hoehne-Hückstädt, D Ditchen, I Hermanns, R Ellegast. Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA), Sankt Augustin, Germany

In Germany, several tools for the risk assessment of physical workload are available for different applications. Besides different screening methods, there are technical systems that can be used in the field and/or laboratory. The focus of the work of the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA) is located on the risk assessment of physical workload using technical measurements (CUELA1). By providing assessment procedures for different body regions, an important gap in the prevention of work-related MSDs is to be closed here. Regarding risk assessment for upper limb MSDs, the IFA develops procedures for evaluating workload on the wrist, elbow and shoulder. To newly develop an assessment procedure for the elbow load a systematic review was carried out. For instance, the activities for assessing the shoulder load are also part of the PERSOSH joint research project ‘PEROSH recommendations for procedures to measure occupational physical activity and workload’ having one focus on the assessment of upper arm elevation at work with technical systems.2 Within the framework of a joint project of the Federal Institute for Occupational Safety and Health (BAuA) and the German Social Accident Insurance (DGUV) (MEGAPHYS – multilevel risk assessment of physical workload) it is intended to use the IFA assessment procedures for about 120 workplaces where the physical workload was measured by CUELA. The workload data is for example to be correlated with subjectively perceived strain and complaint data from questionnaires, interviews and physical examinations collected from about 1000 employees.

REFERENCES

805 MUSCULOSKELETAL COMPLAINTS AMONG OFFICE WORKERS: COMPLEMENTARY ROLE OF PHYSICAL, PSYCHOSOCIAL AND ENVIRONMENTAL JOB DEMANDS AND RESOURCES

1,2Liesbeth Daenen*, 1,2Tinne Vander Elst, 1Veerle Hermans, 1Chris Verbeek, 1David Verwimp, 1Jode Godderis. Knowledge, Information and Research Centre, Group IDEWE (External Service for Prevention and Protection at Work), Louvain, Belgium; 2Department of Rehabilitation Sciences and Physiotherapy, Human Physiology and Anatomy (KIMA), Faculty of Physical Education and Physiotherapy, Vrije Universiteit Brussel, Brussels, Belgium; Research Group Work, Organisational and Personnel Psychology, Faculty of Psychology and Educational Science, KU Leuven, Louvain, Belgium; 3Environment and Health, Faculty of Medicine, KU Leuven, Louvain, Belgium

10.1136/oemed-2018-ICOHabstracts.742

Introduction Work-related musculoskeletal disorders (WMDs) are the most important causes of work disability and long-term absenteeism among office workers. A wide range of risk factors of physical, psychosocial and environmental nature has been identified, but the question remains as to which degree these factors contribute to WMDs and which explanatory mechanism underlies this relationship. Therefore, an integrated model corresponding to the scientific literature and the Job Demands-Resources model was used to examine (1) the effects of both job demands (e.g. workload, prolonged sitting, glare/reflection) and job resources (e.g. social support, accurate workplace settings) on WMDs and (2) the mediating role of emotional exhaustion and cognitive stress complaints in the relationship between these job demands/resources and WMDs in office workers.

Methods Thousand office workers from several Belgian companies participated in the study. They were asked to fill out a structured online questionnaire including socio-demographic characteristics, job-specific factors and job demands/resources covering four work-related domains (i.e. work experience, workstation, work environment and movement). Path analysis by means of Mplus 7.4 was conducted to test the hypotheses.

Results Most commonly reported complaints were located in the back (48%) and neck (34%). Multiple direct effects were found between measured job demands/resources and WMDs, but only lower levels of social support predicted self-reported pain at all body regions (p<0.05). Regarding the indirect effects, emotional exhaustion was the most important mediator as it mediated the relationships between workload, noise, social support, autonomy, and WMDs (k2 values from 0.02 to 0.07).

Discussion The results indicate that (1) physical, environmental as well as psychosocial job demands/resources are related to WMDs and (2) emotional exhaustion is an important explanation. These association and mediation patterns suggest opportunities for intervention strategies in order to stimulate accurate workplace settings, improve work experience (with special attention to social support) and prevent emotional exhaustion.