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## HYGIENIC GUIDANCE VALUES FOR SURFACE MONITORING OF ANTINEOPLASTIC DRUGS IN SWEDISH HOSPITALS

Hedmer, Maria; Wohlfart, Gertrud

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# The Work Environment – Impact of Technological, Social and Climate Change

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Mikael Ottosson, Fredrik Rassner, Måns Svensson, and  
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## 1) Risk assessment for carbon nanotubes.

*M Albin\**, *M Bohgard\*\**, *M Hedmer\**, *P Gustavsson\*\*\**, *M Kanje\*\*\**, *J Rissler\*\**

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**Background and methods:** The use of carbon nanotubes (CNTs) has increased substantially in recent years, and a strong further increase is expected. We reviewed, based on a systematic search, exposure, toxicology and protective measures for the Swedish Work Environment Authority.

**Results:** Inhalation appears to be associated with the greatest potential risk, since CNTs, in bulk form, have a very low density and produce a lot of dust during handling. The measured levels have typically been 0.1 mg/m<sup>3</sup> or less, but higher concentrations have been reported.

CNTs may cause inflammation and fibrosis in the airways, lungs and pleura in laboratory animals. Some studies suggest that longer CNTs cause greater biological effects than shorter carbon ones. Several studies indicate a genotoxic effect, but data for assessing carcinogenicity are insufficient. The functionalization of carbon CNTs, i.e. attaching chemical groups to the tubes strongly affects the half-life period in the blood and may influence their biological effects.

Based on the effects on laboratory animals, the lowest dose observed to cause adverse effects on the respiratory airways (inflammation and slight granuloma) was 0.2 to 0.3 mg/kg bw, the lowest air concentration where this has been observed is 0.1 mg/m<sup>3</sup>. At higher levels, more severe pulmonary reactions were observed as well as cardiac effects. After exposure to doses of 0.06 mg/kg bw via tube-feeding, DNA damage occurred.

**Conclusions:** There is a need to standardize the measurement methodology for the quantification of occupational exposure to CNTs, and there are major gaps in knowledge regarding the health effects of CNTs. It is particularly important that long-term animal inhalation studies are conducted (including studies of functionalized CNTs). Human data is lacking.

Today, there is not enough knowledge about either exposure levels or the health effects when handling CNTs. A precautionary principle should therefore prevail in the manufacture, handling and use of CNTs, as well as in the processing of materials containing CNTs. In practice this means that established safety and protection devices should be used, together with personal protective equipment.



## 2) Endotoxins – A new criteria document from the Nordic Expert Group.

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<sup>1</sup> Swedish Work Environment Authority

<sup>2</sup> *Institute of Environmental Medicine, Karolinska Institutet, Sweden*

**Introduction:** This abstract is based on a joint criteria document prepared by The Nordic Expert Group for Criteria Documentation of Health Risks from Chemicals (NEG) and the Dutch Expert Committee on Occupational Safety (DECOS).

Endotoxins are biologically active components of Gram-negative bacteria that are present in most organic dusts. Occupational exposure occurs primarily in the agriculture industry and related sectors.

Endotoxin air levels are preferably measured by the *Limulus* amoebocyte lysate assay and are expressed as endotoxin units (EU)/m<sup>3</sup>.

**Results:** The lung appears to be the target organ after airborne exposure. Acute effects are dry cough and shortness of breath, decreased lung function, fever reactions and malaise, and sometimes dyspnoea, headache and joint aches occurring a few hours post-exposure. Chronic exposure may lead to chronic bronchitis and reduced lung function.

A study in healthy volunteers exposed for 6 hours indicated that 90 EU/m<sup>3</sup> is the highest level at which no acute across-shift change in FEV<sub>1</sub> occurs. It is calculated that 40 years of exposure to 90 EU/m<sup>3</sup> would result in an extra decline in FEV<sub>1</sub> of up to 120 ml, which is considered non-adverse.

**Conclusions:** No adverse health effects from endotoxins are expected after chronic occupational exposure at 90 EU/m<sup>3</sup>.

### **3) I am not a criminal; I am just not following the law.**

*Johanna Alkan Olsson*

*Cybernorms research group, Dep. of Sociology of Law*

The empirical data that is presented in this paper comes from an online survey in the global file sharing community. In April 2011 the logo of the global file sharing community The Pirate Bay was complemented with the picture of a magnifying glass and the site's name was changed into The Research Bay. Visitors who clicked on the "new" logo were transferred to an online survey. In the 72 hours that the study was running 75 000 file-sharers filled out a questionnaire hosted by our research group (Cybernorms). The online study shows that close to 95 percent of the file sharers who filled out the questionnaire were male and that 3 out of 4 live in either Europe or the US. The survey was conducted in English and contained both multiple choice and open questions. 1184 respondent answered they were living in Africa. By analysing the answers on the open question<sup>1</sup> given by these persons 1184 persons, this paper aims to shed light on how this group perceives the role of internet and the file sharing activities from an African perspectives.

Preliminary result shows that given comments refers to the role of internet in relation to development in general where the respondents in practice uses internet as a possibility to bridge what they perceive as gaps between developed and developing countries both in relation to technology and knowledge transfer, this relates to the downloading of books as well as programs to be used both for leisure as well as studies or work. Respondents perceive in this context internet as a tool to follow what is "going on" mostly referring to pop culture but also referring to the events in Northern Africa in spring 2011. Several respondents refer to what internet can do for marginal pop culture, which you cannot find in any shops in Africa. And as argued by on respondent, it is not Britney Spears that is the issue here.

Respondents are seeing the lack of good internet connections with high capacity as the major hindrance and the next big thing is better connections. The material also indicates that there is a professional hierarchy among the respondents. A few respondents are even saying that they are living on downloading material others are solving the internet capacity problem by off-line file sharing.

National regulation related to file sharing is not seen as a problem for now even if they exist but they fear that it could become a problem in the future where several respondents fear a restriction on internet and how it can be used in the close future. However what they fear is that the possible regulation that will enter into force will become too blunt and criminalise activities that also are beneficial for the African society.

<sup>1</sup> Please give us your own comments on the topic of file-sharing, especially how the situation in your home country looks like and what you think will be the next big thing when it comes to the Internet and file-sharing.

#### 4) Efficacy and suitability of ‘specific strength training’ or ‘general fitness training’ in professional symphony orchestra musicians - a randomized controlled pilot trial.

Andersen LN<sup>1</sup>, Juul-Kristensen B<sup>1</sup>, Mann S<sup>2</sup>, Bjerre K<sup>2</sup>, Marhauer J<sup>2</sup>, Andersen CH<sup>3</sup>, Paarup HM<sup>4</sup>, Søgaard K<sup>1</sup>

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**Introduction:** Among professional musicians playing-related disorders are frequent with a point prevalence of 39 to 87%, probably due to static contractions and repetitive movements during long rehearsals and concerts. Physical exercise may relieve pain, but could also potentially interfere with performance.

**Methods:** A total of 23 professional symphony orchestra musicians were randomly allocated to either 1) specific strength training group (SST, n=12) or 2) general fitness training group (GFT, n=11). The participants conducted 3 × 20 minutes training each week at the workplace for 9 weeks.

General pain was rated on a 100 mm visual analog scale (VAS) prior (PRE) and post (POST) intervention. Aerobic power was estimated in a submaximal bicycle test. Overall satisfaction with the intervention and the intervention’s impact on performance was rated on 5-point scales.

**Results:** PRE SST and GFT did not differ in age, height, BMI, grip strength, aerobic power and general pain. POST there was no significant difference between groups regarding reduction of pain (p=0.28); however, from PRE to POST, SST showed a significant reduction in pain ( $\Delta$ VAS=-14.9±22.7 mm (p=0.05)), while GFT decreased non-significantly ( $\Delta$ VAS=-6±10.4 mm (p=0.09)). POST GFT increased significantly (p<0.00) in aerobic power ( $\Delta$ =5.9±6.1 ml/kg/min) compared to the decrease in SST ( $\Delta$ =-1.8±3.2 ml/kg/min). Overall, 43% of the musicians in SST and 60 % in GFT were extremely or very satisfied with the intervention. A total of 57% in SST and 50% in GFT experienced a positive impact on playing the instrument. Overall, 29% experienced no impact while 18% experienced a slightly negative impact.

**Discussion and conclusion:** This study showed a clinically relevant lowering of general pain in SST, while GFT achieved an increase in aerobic power. The general evaluation of the training was positive and future interventions aiming at reducing musculoskeletal pain among musicians may consider physical exercise without negative impact on instrumental performance.

(1) Zaza C. Playing-related musculoskeletal disorders in musicians: A systematic review of incidence and prevalence. *Canadian Medical Association Journal* 1998;158:1019-1025.

## **5) The borders of informality: Investigating “emotional competence”**

*Jonas Andersson*

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Recent studies indicate that employees within the service sector do not necessarily experience submission but rather, emotional exhaustion from working in their respective areas. It has also become apparent that large areas within the labour market rely on precarious (i.e. short-term, insecure, and unprotected) work; even in areas where salaries might be substantial, labour is increasingly organized along an entrepreneurial (self-employed or consultancy) diagram, where it becomes central for the worker to maintain an attractive, employable outer façade. Hence, great value is being put on “branding” and marketing of the self, an aspect that is – moreover – found in so-called Social Networking Sites (SNS) on the Internet. Within relational marketing, workers are expected to develop efficient informal modes of communicating with customers, and invest in an equitable emotional attitude to co-workers and customers.

In my paper, I will investigate the scope for researching these phenomena empirically. I will sketch a theoretical model for how scales of formality and informality and degrees of emotional investment can be envisaged, and how they are reflexively assessed by practitioners within various fields of work. By utilizing Eva Illouz’s concept of “emotional capitalism,” Nikolas Rose’s notion of “the entrepreneurial self,” Erving Goffman’s theories on different social masks, and models of formal/informal communication within organizational theory, a useful heuristic will be drawn up, that can be utilized to better understand social networking both offline and online.

This theoretical framework will also constitute a starting point for a critical investigation of SNS such as Facebook, as a lot of – but far from all – the informal communication between individuals has begun to take place on such forums. The interesting aspect of online SNS is that they, by their limited material setup, only allow for a highly mediated social exchange, thus funneling informal (context-rich, face-to-face) modes of interaction into text-based (in this sense, highly formalized) modes.

Keywords: social networking, organizational communication, symbolic interactionism.

## 6) Complex chemical mixtures: risk assessment and target levels.

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**Introduction:** Exposure to complex chemical mixtures such as exhaust gases or plastic processing fumes is common at workplaces. Occupational exposure limit values of single substances or risk assessment methods developed for simple chemical mixtures are not applicable for complex mixtures. In order to facilitate the risk assessment and risk management of complex mixtures, background documentation for occupational exposure target levels of six commonly appearing complex mixtures was prepared. The proposed target levels were based on the health and comfort effects of the mixtures and on the best applicable technology for controlling the exposure.

**Methods:** Based on literature search, the health effects, dose-response and suitable exposure indicators of the mixtures were determined. Health-based exposure levels were determined on the basis of the dose-response data. The exposure levels achievable by the best applicable control technology were determined on the basis of exposure measurement data. The target levels were set on the basis of both the health-based and the technology-based levels, representing an achievable level where the health and comfort effects were assessed to be minimal.

**Results and conclusions:** Health- and technology-based target levels were set to diesel exhaust, polycyclic aromatic hydrocarbons (PAHs), welding fumes and processing fumes of polyolefins, polystyrene and polyvinyl chloride. The target levels and the background documentation may be applied e.g. in planning of new work sites or solutions for exposure control and in assessing health risks of occupational exposure to the mixtures. For diesel exhaust and PAHs, the abundant data enabled determination of dose-response relationship of the whole mixture and the achievable target levels. In the case of welding fumes, the health-based levels were determined on the basis of the dose-response data of the critical components, hexavalent chromium (stainless steel) and manganese (mild steel). The measured exposure levels at welding workplaces were generally considerably higher than the health-based levels, emphasising the need for development of exposure control techniques. Less data were available on the dose-response and achievable levels of the processing fumes of thermoplastics, making the uncertainty of the target levels higher.

## 7) Prevalence of burnout and associations with psychosocial work environment, physical strain and stress of conscience among Swedish female and male police personnel.

*Susann Bakteman Erlanson*

*Umeå University*

**Introduction:** The aim of this study was to investigate prevalence of burnout and relation to psychosocial work environment, physical strain and stress of conscience amongst female and male police personnel in Sweden.

**Methods:** A randomly selection design with a cross-sectional survey was used, and a questionnaire was sent out to 1554 patrolling police officers in all of Sweden. Eight hundred fifty six (55%) answered the questionnaire, 437(56 %) female vs.419 (53%) male. Instruments included in the questionnaire was as follows: *Maslach Burnout Inventory* (MBI), *Questionnaire for Psychological and Social Factors at work* (QPS<sub>Nordic</sub>), Karasek & Theorell demand-control-support, *Stress of Conscience Questionnaire* (SCQ), and Borg's Rating of perceived exertion (RPE). Three levels (high, average and low) of Emotional Exhaustion (EE) and Depersonalization (DP) (subscales in the MBI) were constructed. Min and max value for respective subscale was; EE min value 9, max value 63, vs. DP min value 5, max value 35.

**Results:** High levels for EE was reported by 30 % women, and 26% for men, corresponding proportion for DP was 52% for women vs. 60% for men. Mean values for EE for women were 24.3 vs. men 23.8; corresponding values for DP were for women 12.6 vs. men 14.1. A multiple logistic regressions showed that for women stress of conscience, high demand and organizational climate was significant associated with EE, for men it was Stress of conscience, decision and high demand. For DP only Stress of Conscience contributed statistically significant in our model respectively of gender.

**Conclusion:** Prevalence and mean values for EE and DP was higher in our study compared to other studies including police personnel in Norway and Netherlands. Our study showed significant associations with psychosocial risk factors and especially troubled conscience. Further research is needed finding interventions aiming to reduce levels of burnout among police personnel in Sweden.

## 8) Physical workload in female grocery store workers.

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*Division of Occupational and Environmental Medicine, University Hospital, SE-221 85 Lund, Sweden*

**Introduction:** Recommendations from Work Environment Authorities state: if the checkout work is repetitive and closely controlled, it must be organised so, that it does not normally exceed 4 hours/day and does not last for more than 2 hours at a time. Consequently, information about the physical workload in all work tasks is essential. The aim was to quantify the physical workload and the psychosocial factors in grocery store work.

**Methods** From 99 grocery stores 2045 employee (74% responds rate) answered a postal questionnaire. Direct technical measurements were applied on 27 women; “checkout work” (N=22), “filling up the shelves” (N=17), “manual attending customers with provisions” (N=5) and “supervision of self-scanning” (N=5).

**Results** There were large differences in workload between the tasks. “Check out work” is characterised by restricted work postures and movements, while “filling up the shelves” required high muscular loads for both the trapezius and the forearm extensors, highly elevated arms, as well as high velocities for head, arms and hands. Contrary “supervision of self-scanning” implied low loads in all aspects. As many as 80% reported low control and 40% a high work strain.

**Conclusion** The musculoskeletal disorders as well as the physical workload for “filling up the shelves” are comparable with force demanding repetitive industrial work. Introduction of new technology, e.g. customer selfscanning, provides new tasks with a low physical load. This, in combination with a balanced work rotation, can provide a more varied load among female cashiers.

## 9) Respiratory Health in Russian Trawler Workers and Merchant Seafarers.

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**Introduction:** A factory trawler is an ocean going trawler with on board facilities for processing and freezing of caught fish. Processing operations onboard resemble those of onshore fish processing plants, however accommodated to fit into narrow premises. The Russian factory trawler fleet includes older ships with simple, old fashioned working conditions as well as newer ships with modern high technology processing trains in well ventilated areas. In addition to the strains experienced by most seafarers, workers on factory trawlers are breathing in bioaerosols generated during the handling and processing of seafood onboard.

The aim of the present study was to characterize the respiratory health status of Russian factory trawler workers and compare it to Russian seafarers on merchant ships.

**Method:** Russian trawler fishermen (127) and merchant seafarers (118) were randomly enrolled during their regular medical health examinations. The study protocol comprised a questionnaire, lung function test and measurements of fractional nitric oxide concentrations (FENO) in exhaled air.

**Results:** Doctor-diagnosed asthma was reported only by trawler fishermen (prevalence 3.9 %). Excluding asthmatic subjects, trawler fishermen still had reduced spirometric parameters compared to merchant seafarers: FEV1 % of predicted values (adjusted <: -5.28, 95% CI: - 9.28-(-1.27), FVC % of predicted values (adjusted <: - 5.21, 95% CI: -9.25-(-1.17)). The trawler fishermen also reported respiratory symptoms more often than merchant seafarers, significant results were found for daily morning cough (OR: 2.64, 95% CI: 1.25-5.52). FENO levels were not significantly different between non-asthmatic trawler and merchant seamen.

**Conclusions:** The results of the present study showed that trawler fishermen exhibited impaired lung function and were more likely to have asthma as compared to merchant seafarers. Trawler fishermen also tended to report more respiratory symptoms than merchant seafarers, although significant difference between the groups was found only for daily morning cough.



## 10) Scientific basis for the diagnostic criteria for Chronic Solvent induced Encephalopathy (CSE) – a systematic review of the literature.

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**Introduction:** The procedures for diagnosing Chronic Solvent-Encephalopathy (CSE) were proposed in the 1980s in two consensus meetings resulting in two central documents often referred to as the WHO 1985 document (1) and the Raleigh document (2). After twenty-five years, there is a need to look critically at the scientific basis that was established for the diagnostic criteria for CSE.

**Method :** Neurobehavioral test methods have played a central role in the diagnostic process of CSE. A systematic literature review of the effects of occupational exposure to organic solvents on the nervous system was published in 2009 (3). The review included 253 studies, whereof 150 had applied neurobehavioral methods. A systematic search for literature that was published between 2008 and 2010 was conducted.

The present study is a critical review of the identified studies, using strict inclusion criteria for further evaluation. We included studies with quantitative or semi-quantitative assessment of exposure. Other criteria were related to population size, subject selection methods, pre-stated exclusion/inclusion criteria for study participants, a high response rate and control or adjustment for important confounders or modifiers of performance.

**Results and Conclusions:** Of the total number of identified studies, most with CSE were excluded, and we were left with 35 studies which met our inclusion criteria for further examination. These studies of solvent-exposed workers were categorized with respect to description / characterization of exposure, selection of neuro-psychological methods and classification of neurobehavioral deficits. The studies provided very limited documentation on dose-response relationship. The neurobehavioral domains most frequently affected were speed of information processing, attention and working memory and motor skills.

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## **11) It's quiet! What are they talking about? Auto-ethnographic Reflections on Silence and Mediated Interactions in a Digital Workplace Environment.**

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*Good Old, Malmö, Sweden*

The last few years have witnessed an increased development of applications and services aimed at organisational communication and interaction. Instant messaging, enterprise social networks and web-based systems for time tracking are often assumed to facilitate organisational communicative practices. While providing a vast array of possibilities, applications and services of this kind also provoke changes at the level of social interaction and communication in the physical workplace environment. Taking its point of departure in an auto-ethnographic account of processes involved in the author's becoming part of a digital workplace environment, this paper critically considers core characteristics of organisational communicative technologies as well as their social and material implications.

In overall terms, this paper suggests that technologies of this kind allows for a layering of the workplace environment that facilitates the establishment of serendipitous relationships and interactions as well as providing a blurring of the boundaries of corporate positions and hierarchies while simultaneously giving rise to a complex set of surveillance techniques and power relations.

## **12) Visualization of maritime safety culture – development and evaluation of an interactive learning tool.**

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A Swedish maritime safety project focusing on building up competence in the area of human and organizational factors and safety culture, yielded new knowledge for increased safety at sea. Safety culture in an organization concerns having an awareness of risks and the knowledge, ability, and willingness to prevent them. The Swedish shipping industry realize that positive attitudes to safety and a good safety culture are needed in all activities in the sector, and that understanding about these issues needs to be rooted early in a seaman's education. It was therefore considered that the experiences and the knowledge gained in the research project should be disseminated on different levels in the maritime sector to gain a long term positive effect on safety. Therefore, an educational material was decided to be developed with the purpose of educating students at upper secondary maritime schools in the area of safety culture and safety management.

The aim of the current study was to design an interactive prototype to visualize knowledge about maritime safety culture based on cognitive theories and practical examples.

A preliminary prototype was developed using a participatory design process involving researchers and the potential users from a maritime school in Sweden. A pilot study was performed where the prototype was tested in an educational setting.

The usage of the prototype supported education, communication and learnability among students. The results also showed very positive responses from students, as well as teachers, in using the prototype. The approach to visualize the concept of maritime safety culture with interactive illustrations and animations resulted in clear presentations of important situations and scenarios, fruitful discussions and positive attitudes among the users of the prototype.

It is very likely that the current approach to design and visualize dilemmas and safety situations could function also in other sectors such as transport, medical, and manufacturing industry.

Keywords: education, maritime safety, visualization.

### **13) Compensation of work-related disease in Denmark.**

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In Denmark medical doctors have since the early 1980'es had legal obligation to notify any case of suspected work-related disorder regardless of diagnostic category. While the number of notified cases has been rather stable in the range of 14-18.000 per year, the disease profile has changed dramatically past 30 years. The classical occupational diseases dominated in the 80'es, musculo-skeletal disorders became prevalent in the 90'es and past 10 years we have witnessed a marked increase in notification of stress-related disorders that now are making 20-25% of all notified cases. Several specific musculoskeletal diseases including hip- and knee- osteoarthritis are now acknowledged and compensated based upon the 'reversed burden of proof' principle. With respect to psychiatric disease only post traumatic stress disorder (PTSD) is compensated according to this principle while major depression and ischaemic heart disease occasionally is compensated based on a tangible review. Recognition of breast cancer following many years of work at night has currently provoked discussion in scientific journals and Danish news media.

The rapidly changing labour-market and considerable political pressure to recognize and compensate work-related disorders creates an increasing demand for updated documentation of causal links between specified exposures and diseases. Not less important are options to document causes in the individual case. A critical reevaluation of the entire occupational disease concept as seen from an individual and from a society point of view seems needed considering the high prevalence of multifactorial disorders. Nordic or even international collaboration is highly warranted from both a scientific and cost-effectiveness point of view. Development of the Cochrane review system to include the level of evidence for occupational and work related diseases might a platform for such collaboration.

#### 14) Trend of maritime deaths in the Danish merchant fleet 1986-2009.

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*Center of Maritime Health and Safety, University of Southern Denmark*

**Introduction:** A previous study has demonstrated a high rate of deaths related to Danish seafaring during 1986-93. This study aims to examine and analyze the subsequent development until 2009.

**Method:** A register of 356 fatalities was developed from data supplied from the Danish Maritime Authority, insurance information and other sources. The overall and mode-specific death rates were calculated for three eight-years observation periods. The rates for work-related fatal accidents were compared with the comparable rates for the land-based trades.

**Results:** The rate of all categories of deaths that relate to the maritime environment decreased significantly from 1986 to 2009 – in particular during the last eight-year period (Accidents 1986-1993: 66.6, 2002-2009: 27.0, disease on board 38.7 – 20.0, disease ashore 10.8 – 6.1, suicides 14.4 – 7.8 per 100.000 person years). This positive development may be due to a number of interventions, e.g. increased safety, intensified preventive measures and improved options for diagnosis and treatment on board, or to technological and organizational changes, e.g. newer, larger and fewer vessels in the Danish merchant fleet, changed composition of the work-force, and reduced shore leaves. In spite of the remarkable improvement, seafarers remain more than six times more likely to die from work-related accidents (including shipwrecks) than workers ashore.

**Conclusion:** The persisting excess risk of death in the Danish merchant fleet warrants further preventive actions.

## 15) Exposure to vibration within the mining industry.

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<sup>3</sup>University Hospital of Northern Sweden, Department of Occupational and Environmental Medicine, SE-901 85 Umeå, Sweden

**Introduction:** Exposure to vibration from powered hand-held tools (i.e., hand transmitted vibration) and mobile equipment (i.e., whole-body vibration) is common in the mining industry. Several studies have pointed out that miners and stoneworkers have higher prevalence and incidence of vibration-related symptoms compared with other worker groups exposed to vibrations. The probability and severity of vibration-related symptoms are influenced by the characteristics of the vibration exposure, the type of machinery and work processes used, the biodynamic and ergonomic factors, various individual characteristics and the environmental conditions. The aim with this contribution has been to describe the exposure situation today within the mining industry.

**Method:** A literature study has been conducted for gathering results presented in scientific articles about the exposure situation within the mining industry.

**Results:** Although it has been more than 100 years since the problem with vibration was identified in the mining industry, recent conducted measurements show that existing magnitudes of vibration and exposure times still place the workers at risk for injuries since both the action and the limit value in the European Directive on mechanical directive are often exceeded. Although it is well known that temperature affects the association between vibration exposure and the development of symptoms, the influence of cold climate has rarely been taken into account in the current risk assessment of exposure to vibration.

**Conclusion:** In the mining industry in the Nordic countries, vibration exposure and vibration in combination with cold is a significant health risk. Therefore, the mining industry is challenged to improve occupational health for its employees. Such attention, however, is also an opportunity for the industry since improved standards resulting in fewer injuries due to vibration exposure is believed to increase productivity.

## 16) How does Lean Healthcare affect employees working condition and wellbeing?

*Johanna Clausen Ekefjård*

*Department of Occupational and Environmental Medicine, Lund University*

**Introduction:** Lean Healthcare (LHC) is a production practice that aims to minimize the expenditure of resources for any goal other than the creation of value for the end customer. A big university hospital in southern Sweden has since a couple of years worked with the implementation of LHC. The aim of this study was to examine in what way LHC affects the working conditions and wellbeing of the employees in a hospital ward. Apart from cutting costs and improving effectiveness, how does LHC affect the psychosocial climate?

**Methods:** The employees (n=39) answered a questionnaire on two occasions; prior to the implementation of LHC (May 2010), and after a one-year thorough implementation period (May 2011). The questionnaire comprised a number of standardized self-rating inventories, such as QPS Nordic and Utrecht Work Engagement Scale (UWES). The replies from the 24 participants that had answered the questionnaire on both occasions were analyzed with repeated measures ANOVA.

**Results:** Quantitative work demands (QPS Nordic) decreased after the implementation of LHC ( $p=0.046$ ). Participants reported that they worked less overtime, had a decreased pace of work and that workload was more equally distributed after the implementation of LHC. Other effects were fewer disruptive conflicts between colleagues ( $p= 0.036$ ). In UWES the participants reported they were more proud over the work carried out, they were happier when going to work and were more engrossed in the work tasks ( $p= 0.025$ ). There were no indications that these positive effects had been gained at the expense of poorer conditions in any other psychosocial aspect covered by the questionnaires.

**Conclusions:** This one-year follow-up of an implementation of LHC in a hospital ward demonstrated a generally favorable impact on the psychosocial climate. However, it remains unclear whether the positive effects are persistent over time. To address this issue, a two-year follow-up is scheduled for May 2012.

**17) Looking for a job? Better clean your Facebook album. About net based identity, integrity and interaction on a traditional labor market.**

*Marcin de Kaminski,*

*Dep for Sociology of Law and Cyb norms Research group, Lund University*

Recent events have revealed new challenges for employers - and employees - regarding the use of social media. Employees in various positions have found themselves in serious trouble when their employers have discovered, or in some cases been informed about, highly personal pictures posted on Facebook. It has been regarded as serious loyalty issues by an unified employer community. At the same time, there seems to be a generational divide between the adult community in general and the traditional labor market in particular and the attitude towards image and text publishing in the net cultures where young people today tend to grow up.

Through observations of online communities focused on both image publishing and interpersonal dialogue along with interviews with young people active in these communities a picture of a youth culture that often has adopted a more forgiving attitude toward social slips and mistakes emerges. The understanding of the social norms, habits and attitudes towards net based interaction, identity forming and interpersonal relations within a generation of digital natives shows an upcoming clash between the currently accepted rules of the labour market of today and its inhabitants of tomorrow.



## 18) Working parents - working conditions, workplace climate and responsibilities in the home.

*Frida Eek, Anna Axmon*

*Department of Occupational and Environmental Medicine, Lund University*

In recent decades, an increasing share of Swedish women have joined the labour market and now Sweden is one of the countries in Europe with the highest percentage of women in paid employment. Combining a parental role with an active working life are experienced by many women and men as stressful, and it is important to examine what the men and women themselves as well as their employers can do to facilitate the combination of family and career.

The purpose of the present study was to highlight the presence of different working conditions and benefits that are likely to be important for the parent's ability to combine their roles as parents with an active working life. We further aim to present the experience of the workplace climate in terms of attitudes to parental leave and parenthood. Further, the study aims to highlight different aspects of how responsibility for children and home are divided between men and women, and what factors the men and woman consider to determine how this part of the division is made. The result consists of survey responses regarding work, household duties and child care from about 1,500 working fathers and mothers.

**Results:** Many parents report that they have access to different factors and benefits, such as being able to leave work when urgent, as they also experience facilitates the combination of professional life and family life. The men more often reported access to various factors that indicate a more flexible work situation than the women. What most parents attribute the greatest importance to cope with the combination is an understanding from their bosses and colleagues, which the majority also feel that they have. It is worth noting that approximately every tenth man feels that his colleagues attitude towards parenthood and parental leave are more positive when it comes to women. More women than men feel that their career and wage growth has been adversely affected by having had a baby. The majority does not believe that their (or partner) work situation has affected the timing of having children, although one in five women say that the timing to some extent were affected by the work situation.

It is clear that the women still take the biggest responsibility for housework and the daily child care, and also for care for children when they are ill. This is evident both in couples where the woman works part-time and in couples where both work full time. The women are also more concerned about possible negative effects due to absence from work due to ill children. Women also more often report a lack of time for recovery in various forms.

The most common factor that determines who stays home when the child is sick is said to be whom at the moment has the least acute things to do at work. The reasons why men did not take a larger share of parental leave that was stated were the importance of children being breastfed for a longer time, that it was better suited for the partner to be away from their jobs, and economic reasons.

**Conclusion:** Although many parents have access to factors and conditions that they themselves are experiencing facilitates the combination of work and family life, sufficient time for recovery is still lacking for many, especially the women. This can perhaps be partly explained by the fact that the women take the greatest responsibility for the daily house hold work and child care.

## **19) Understanding maritime safety culture and its possible implications for practice.**

*Åsa Ek, Marcus Runefors, Jonas Borell*

*Ergonomics and Aerosol Technology, Faculty of Engineering, Lund University*

In many industrial sectors it is recognized that the safety culture affects the safety performance, the safety work and improvement processes for safety. However, safety culture studies in the maritime sector are rare as well as research on organizational factors in maritime ergonomics. In order to maintain and improve safety within the maritime sector more knowledge is needed about safety culture and its expression in artifacts, attitudes and behaviours. The current approach to safety culture is focused on good organizational learning and is based on nine safety culture aspects which were investigated using questionnaires on board six Swedish passenger ships in international traffic (four ropax vessels and two high speed crafts). The aim of the study is to investigate the relationships between the nine safety culture aspects, using cluster analysis. Found cluster solutions or groupings of the safety culture aspects can give more knowledge about the maritime safety culture concept and serve as a base for safety culture and safety improvements. Although determining the number of clusters is a subjective process, the result showed similar cluster solutions across vessels. Often the aspects Safety-related behaviours/Risk perception/Attitudes towards safety constitute one cluster and the aspects Working situation/Communication another. Reporting and Learning often ends up in two separate clusters/aspects. This is also the case for Flexibility and Justness. Furthermore, having a somewhat differing safety organization, ropax vessels and high speed crafts could have different characteristics regarding the safety culture. However, very similar cluster solutions were found for four of the six vessels including the two high speed crafts. The found results yield potential for better understanding of safety culture aspects. For example, the Reporting of incidents and the Learning from collected information were not especially closely related as they often belong to different clusters. In practice, and in many sectors, the learning from incident reports is often weak or lacking.

## **20) How to handle hearing and subjective hearing problems among students at Academy of Music in Malmö.**

*Karin Engquist*

*MD at Student Health Care, University of Lund*

2001 Kähäri published results of studies focusing experienced hearing problems among music students. Comparing to earlier results of studies of the public, experiencing tinnitus and other subjective hearing problems, the prevalence had increased from 15 % among the public up to 43 % among students with electric instruments and 19 % among classic instrumentalists. At the Artist-Musikerhälsan in Malmö (Engquist, Dahmén 2004) found an unpublished study among 136 orchestra musicians in Sweden that 32 % experienced tinnitus and 60 % hyperacusis.

Actually, the results above was one of the reasons starting the educational programme of the ear and hearing at the Academy of Music in Malmö. The first year students both listen to lessons including the theoretical knowledge, hearing test and the opportunity of consulting our audionom when getting problems.

## **21) “Artist- och Musikerhälsan” in Malmö – an multidiscipline team for all types of artists with workrelated problems.**

*Karin Engquist, MD and teamleader at Artist- Musikerhälsan, Malmö*

The team is working as a private clinic. We have a particular expertise concerning the everyday working lives of musicians and artists, and can also help those who come from completely different backgrounds. We have a wide network both in south of Sweden and in other parts of Sweden. With the wide-ranging abilities in our team they can receive analysis of the problem, advice including ergonomics, training and treatment with the aim to alleviate the problems and increase the quality of the everyday life.

From studies carried through during 1996-1997 there was one published article (2004) including pain prevalence of professional orchestra musicians and actors and one unpublished study comparing music student and medicine students. For 1/5 the pain focus for the professionals was neck and shoulders, just like for the actors and for the music students. But when asking about how the pain influenced the “playing capacity” the actors had no problems but the musicians were more strongly affected. For the actors the problem influencing their professional capacity was pain in the throat.

The time for the debut of anxiety was different in the groups. In the group of music students 23% had problems already in the teenage period comparing to just 12 % of the medicine students. Among professional musicians 41 % experienced stage fright in daily performance comparing to 30 % of actors and 45 % of the music students. Ninety % of the professional musicians, 83% of the music students and 61 % of the actors experienced stage fright in auditions.

At the clinic in Malmö and especially our occupational health services cases with pain represent 50 % and 20 % was consulting because of psychological problems, 15 % had hearing problems and 15 % came for rehabilitation.

As a doctor for the music students the reason for consulting the Student Health Care indicating more clear stress influencing the health in different ways, 30 % consulting because of pain and about 60 % presenting more of different stress symptoms influencing the study capacity.

## **22) From Digital Technology to (and back to) Network Cultures.**

*Magnus Eriksson*

*The Interactive Institute, GAME*

This paper argues for a new research direction for internet studies. Internet's penetration in society locally and globally has reached such maturity that the mandatory sense-making studies of new phenomena with old glasses no longer yield viable results.

The question asked is: What does internet research mean when it is impossible to study for example politics, urbanity and work life without touching upon the internet and impossible to fully study internet phenomena without touching upon these and many other topics? Internet research risks becoming a self-referential study of phenomena on the internet or a reactive defence of the internet against uninformed politicians and protectionist lobbyists.

This paper suggests studying network cultures instead of focusing of the internet and digital technologies themselves. The term network cultures has the benefit of including more social phenomena than the ones mediated through digital technologies, at the same time as it excludes certain digital expressions that only transplant old communication forms to a new technology. Instead of studying for example the digitalisation of work life, it is suggested to study how network cultures become productive, whether it takes the form of what we call work or other, novel forms of expression. Network cultures also signal the opportunity to organise knowledge production differently. You cannot study network cultures without also becoming one yourself...

Network cultures has a natural affinity with the prototype, experimentation, the temporary and precarious relations – for good or worse — and grows without central planning on the margin of — and sometimes right through the middle of — institutionalised organisations; in the digital information exchange as well as in the periphery of the worlds megacities and nowadays also in their central squares.

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## 24) Participative developments evaluated by objective measurements.

Mikael Forsman<sup>1,2</sup>, Eva Bernmark<sup>1</sup>, Birgitta Nilsson<sup>3</sup>, Sandra Pousette<sup>3</sup>, Svend Erik Mathiassen<sup>2</sup>

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**Introduction:** Rationalizations generally have a negative effect on health and known risk factors. These effects may be reduced by attention to modifiers as worker participation and resonant management style. The purpose of this study was to apply and evaluate a participative approach in food industry cases where packages were extensively and repetitively manually handling.

**Methods:** At selected production lines at three food companies where packages were manually handled by female workers:

- Production data and descriptions of manual activity were collected.
- Group discussions around packaging characteristics and suggestions for improvements.
- Packaging producers, bakers and shop replenishers were also consulted.
- Prototypes, and simulated production were evaluated and compared to the existing production system through- Direct measurements of working postures and muscle activity of the upper body, together with ratings of physical load using questionnaires.
- Collection of general productivity data.

**Results:** Measured and rated ergonomic exposures showed that workload was significantly lower for the prototypes. In one company (N=9), muscular activity (90<sup>th</sup> percentile, p90) decreased by 10.1%. In the second company (N=4) postures were less inclined during work, and muscular activity, p90, declined by 43.6%. In the third company (N=8), wrist velocity, p90, decreased by 7%. In the two latter companies, the number of handling operations included in the packaging operations was greatly reduced with the prototype package. None of the solutions had negative effects on productivity.

**Discussion:** The investigated occupational group has a high prevalence of musculoskeletal disorders, and their work is manual and repetitive. The impact on disorders of the here measured load reductions is difficult to assess, but we believe that in "critical" situations like this, even small improvements may have an effect.

Workloads during manual handling of packages can be reduced by applying participative development to modify the packages. This study also shows that the participative approach may not only decrease load, but it may also improve productivity.

## 25) Are there still undiagnosed cases of occupational chronic solvent encephalopathy?

*Furu Heidi, Sainio Markku, Hyvärinen Hanna Kaisa, Akila Ritva, Bäck Beatrice, Uuksulainen Sanni and Kaukiainen Ari*

**Introduction:** Every fifth employee in Finland is still exposed to solvents in their working environment and every tenth experiences inconvenience. Regular health controls provided by the occupational health system (OHS) are obligatory for solvent-exposed, so in theory all employees with occupational chronic solvent encephalopathy (CSE) should be found. In recent years 5-10 cases are annually diagnosed. Since the number of exposed workers is high, CSE-detection demanding, and our previous findings suggest underdiagnosing in painters (Kaukiainen et al. 2009), we studied whether new cases can be found by screening exposed workers in work tasks where CSE appears.

**Method:** A postal survey was sent to 3 613 employees in trades with significant solvent use and where CSE occurs (painting/ floor, printing press and metal industry and boat construction) (Keski-Säntti 2010). Contact information was gathered from union registers and a large OHS unit. We received 1 730 responses. Possible neurotoxic symptoms were screened with Euroquest, and life-time solvent exposure with detailed questions on working history.

For clinical examination, 127 respondents with both adequate exposure and suitable symptoms of CSE were invited. Thirty-two were not willing to participate and 12 didn't show up, leaving 83 examined patients. Only methods applicable for OHS were used: thorough interview and medical examination by a medical specialist in OH, general blood tests, and the CERAD neuropsychological screening battery.

**Results:** This directed screening resulted in 33 cases with a suspicion of CSE. They were sent to further investigations for occupational disease which confirmed that 21/33 had suspected CSE and were taken to follow-up. Eight cases are still under investigation, and only four were not considered CSE-related.

**Conclusions:** This considerable amount of probable CSE cases indicates that CSE shouldn't pass into oblivion. There seem to be more employees with solvent-related cognitive symptoms and CSE than OHS presently recognises and therefore practices and methods need to be up-dated.

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Kaukiainen A, Akila R, Martikainen R, Sainio M. Symptom screening in detection of occupational solvent-related encephalopathy. *Int.Arch.Occup.Environ.Health* 2009 Feb;82(3):343-355.



## 26) Ventilated evaporative cooling as a preventive measure when confronted with a hot climate.

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**Introduction:** Climate change and heat waves pose a threat to workforce, the general public, particularly vulnerable groups such as elderly people and people with chronic diseases. Protective measures are needed to cope with hot environments and to mitigate adverse impacts on society. The objective of this study was to investigate the effectiveness of personal cooling with ventilation clothes in a hot environment.

**Methods:** A heated thermal manikin with 17 zones was used for the measurement. The manikin surface temperature was controlled constant at 34 °C in a climatic chamber ( $T_a=34$  °C, RH=60%,  $V_a=0.4$  m/s). A wet and tight fit cotton coverall was worn on the manikin to simulate sweating skin. A short sleeve jacket made of polyester and equipped with two small fans driven by batteries (AA x 4) for ventilation was worn on top of the “skin”. Cotton pants were also used in combination of the ventilation jacket. Three conditions were measured: 1) sweating skin, 2) sweating skin, ventilation jacket (fan-off) and pants, 3) sweating skin, ventilation jacket (fan-on: high) and pants. Heat losses of the manikin were recorded at a 10-second interval. Chest, back, stomach and buttock were included in the calculation for the torso heat loss (cooling effect).

**Results:** The torso heat losses in the three test combinations were 131.9, 62.6 and 149.7 W/m<sup>2</sup>. When the clothes were worn, the torso heat loss was reduced about 50%. However, when the ventilation fans were switched on, the evaporative cooling rate increased 139% and was higher than that of the “nude” sweating manikin.

**Conclusions:** The findings indicate that the personal ventilated evaporative cooling increased evaporation capacity in the hot environment with moderate humidity and air velocity compared with “nude” and clothed manikin. The method can be used as a personal preventive strategy when confronted with hot climates.

## 27) Consequences of Self-rostering – an intervention study (the PRIO-project).

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**Objective:** Influence on own working schedule has been associated with better health and well being. One of the potential mechanisms is that self-rostering provides a better fit between working hours and personal needs and preferences e.g. family obligations, sleep and recovery. However, this is not always reproduced in intervention studies. A reason could be that the employees do not change their working hours although they have the opportunity or they choose working hours, which do not favour health. The aim of the present study was to test if introduction of self-rostering improved work-life balance, sleep and need for recovery (NFR) among employees. Further we wanted to test if the actual working hours were changed.

**Methods:** The present study was a prospective, quasi-experimental intervention study with a 12 months follow-up. The intervention consisted of introduction of self-rostering, which implied: The employees were able to make wishes about days and times of the day they wanted to work and days where they did not want to work to on a running basis via an IT-software. The preferences of the employees were matched with the required resources. At some workplaces, employees were invited to solve discrepancies between preferences and need for resources by voluntarily altering their preferences. Final adjustments were made by the leaders, and the schedule was issued at four weeks' notice. We identified three subgroups of interventions based on the choice of IT-software: A) A comprehensive intervention encompassing IT-system and organizational changes B) An IT-system with the same possibilities for self-rostering as A, but with few demands to organizational changes C) A less comprehensive IT-system, and the main focus was on optimising resources to the needs of the workplace. A reference group without intervention was also included. A total of 1065 participants (response rate = 79%) were included at baseline and 1074 at follow-up (response rate = 73%).

The *Work-family conflict* index was assessed as the mean of two items: (i) "Do you feel that your work drains so much of your energy that it has a negative effect on your private life?", (ii) "Do you feel that your work takes so much of your time that it has a negative effect on your private life?".

*Sleep quality* (single item), *disturbed sleep index* (DSI, 5 items) and *awakening index* (AWI, 3 items) were derived from the Karolinska Sleep Diary. The range was 1-5 with higher values representing better sleep. NFR was assessed by use of a scale with 9 items (range: 0-100), with higher values representing more need for recovery. For all participants data on *actual working hours* were collected for a 4-weeks period at baseline and follow-up from the salaries office. Based on these data we assessed working-hour-variability, number of shifts  $\leq 4$  hours, and number of shifts  $\geq 9$  hours. Statistical models tested the interaction between group and time. Models for sleep were adjusted for gender and age.

**Results:** An overall decrease in work-family conflicts was found in the total intervention group. This covered over a specific decrease in work-family conflicts in intervention groups 1) and 2), whereas there was an increase in intervention group 3). DSI, but not overall sleep quality and AWI, increased among participants in the intervention group after introduction of self-rostering ( $p=0.015$ ). Likewise, NFR decreased in the intervention group. Corresponding changes were not observed in the reference group. Working-hour-variability ( $p = 0.009$ ), number of shifts  $\leq 4$  hours ( $p < 0.001$ ), and number of shifts  $\geq 9$  hours ( $p < 0.001$ ) increased among participants in intervention group A, but not intervention group B, after introduction of self-rostering.

**Conclusion:** Implementation of self-rostering had an overall positive effect on the balance between work and private life. Furthermore, sleep was less disturbed and the need for recovery decreased after introduction of self-rostering. In one intervention group, but not the other, the variability of working hours increased. The effects appeared to depend on the implementation process.

## **28) Digital Taylorism create more McJobs.**

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There has been a significant increase in Sweden among blue colour workers and professional employees working in McJobs. That is not the expected in a society aiming to be knowledge based. With McJobs is understood low skill, short learning and always repeating the same work elements. The return to line assembling in the industry is one example. McJobs is, however, most rising in the private service sector. A similar change has started in the public service sector.

Data in this study is from the Work Force Studies done by Statistics Sweden. Descriptions of some typical blue-colour work are based on interviews with workers representatives.

To be able to raise payment and quality in work, the McJobs has to be replaced with jobs gaining increasing value adding. Swedish trade unions have experience in shaping “the good work”. Crucial when striving for quality in work, is to have a common understanding between the trade union and the employer of the development of the company.

## 29) Experiences from studies on nervous system health effects in workers exposed to N-methylolacrylamide and acrylamide during tunnel construction: Was the ban on the applied grout an efficient occupational health intervention?

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**Introduction:** In tunnel construction, grouts based on N-methylolacrylamide (NMA), containing both NMA and acrylamide, were used in tunnel construction in Norway from the 1980ies, until 1997. Workers in two tunnel construction projects, in Hallandsåsen in Sweden, and Romeriksporten close to Oslo, reported possible nervous system symptoms related to this exposure. The NMA grouts were thus banned and substituted with other grouting products.

**Methods:** Studies were performed, both in Sweden and Norway, to investigate exposure-related symptoms and signs from the nervous system. The aims of the studies were to study aspects of nervous system function in workers exposed to the NMA-based grout during tunnel construction. In Norway, two groups of recently and previously exposed workers, respectively, were compared with a control group who had never been exposed to NMA and acrylamide. Peripheral nerves were examined, in addition to visual system function.

**Results:** Reversible effects in nerve conduction were observed (1). Reduced visual sensitivity (3) and foveal cone function, in addition to prolonged VER latency to the onset of the occipital potential (2), was observed in the previously NMA-exposed group. The observations in the previously NMA and acrylamide exposed group, may reflect an adverse, persistent effect of exposure to NMA-based grouts (4).

**Discussion and conclusions:** The effects, although slight, and of limited clinical importance, have contributed to the toxicological understanding important for the continuous preventive work to reduce negative health effects from work-related chemical exposure. However, the ban on the grout for future use in tunnel construction may not have been the appropriate response from an occupational health perspective: Other grouts substituted the acrylamide based grouts, with other adverse health effects, primarily related to lung function. Furthermore, in the original Norwegian project, time pressure and tight economical frames largely determined the choice of production methods, while the occupational health perspective was not sufficiently considered. The result was extensive leakage of water into the tunnel, and higher exposure to the NMA-based grout as an ultimate consequence for the workers. Thus, as an alternative to a ban on the substance, the positive impact for workers' health, of an intensified focus on how the substance is used, on guidelines and data-sheets, and on work procedures for injecting the grout, could have been higher than the positive effect of the ban. These considerations will be addressed further in the presentation.

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### 30) Health effects in healthy volunteers in controlled experimental exposure to diesel exhaust and traffic noise.

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Key-words: diesel exhaust, lung function, acute effects

**Introduction:** Exposure to diesel exhaust (DE) and traffic noise is common. Previous studies found an inflammatory response in healthy volunteers, but no effect on lung function after one hour diesel exposure (particle mass concentration 350  $\mu\text{g}/\text{m}^3$  and  $\text{NO}_2$  concentration of 0.62 ppm).

**Methods:** Eighteen healthy volunteers were exposed in a stainless steel chamber four times, each 3 hours: 1) zero exposure, 2) high DE (300  $\mu\text{g}/\text{m}^3$  and  $\text{NO}_2$  1.4 ppm) and low traffic noise, 3) low DE and high traffic noise 75 dB(A) and 4) high DE and high traffic noise.

Immediately before and after exposure we performed medical examination, spirometry, rhinometry and blood sampling (repeated next morning). Symptom scores and peak expiratory flow (PEF) and ECG measurements were assessed before, 15 min, 75 min and 135 min into exposure and after. Generalized Estimating Equation (GEE) model was used to analyze collected data.

**Results:** Self-rated irritation of the eyes and throat was higher during DE than non-diesel exposure (non-DE), with a statistically significant difference after 75 (eyes) and 135 min (eyes, throat). Signs of irritation in the upper airways were significantly more common after DE (OR=3.2) and tended to be so also for the eyes (OR=3.1,  $p=0.06$ ). PEF increased during non-diesel exposure, but decreased during DE, with a statistically significant difference after 75 (+4.08 vs -9.58 l/s), and 135 min (+8.11 l/s vs -3.5 l/s). Leukocyte concentrations were higher after exposure to DE than non-DE, and a tendency ( $p=0.07$ ) toward increased interleukin-6 concentrations was observed.

**Discussion:** We found adverse acute effects with regard to symptoms, signs, PEF, and inflammatory markers in healthy volunteers exposed 3 hours to diesel (300  $\mu\text{g}/\text{m}^3$  and  $\text{NO}_2$  1.4 ppm). TLV(8hours) of  $\text{NO}_2$  is 1 ppm. These effects were first seen after 75 min of exposure. Preliminary results show correlations between heart rate variability and sound pressure.

### 31) From 'ethical consumption' to ethical prosumption? The environmental impact of everyday life, social media, and doing domestic work as home work.

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Advice on decreasing ones personal environmental impact abounds online. Much, especially in so called social media, is published and produced by people in the course of their everyday and often domestic lives. In particular, blogs are used to tell about personal experiences with acting more environmentally friendly and to share related links, advice, thoughts or ideas. People talk about what they do, what they do not do, occasionally also how they fail, who they follow, what they read, watch or listen to, what they buy and what they dispose of. One of the most salient features of these accounts is the strong focus on consumption, not seldom self-confidently combining a critical attitude towards dominant forms of consumption with the publishing of adverts, product reviews or links to online shops with an ecological profile.

Uniting an interest in the informational value of material practices with new civic habits enabled by the web (e.g. Papacharissi, 2010; Barkadjeva, 2009), this presentation attempts an investigation of how environmentally relevant everyday life practices are shaped in social media as part of a move from 'ethical consumption' (e.g. Lewis & Potter, 2011) to *ethical prosumption* and asks how this can be understood against the background of blogs as a part of marketing (e.g. Walker Rettberg, 2008). This is situated at the blurred boundaries between private and public, between work and leisure-time, where personal needs are entangled in public displays and labour is an integral part of family life.

The presentation draws on material from a selection of currently active Swedish environmental, everyday-life blogs and other social media applications integrated into these blogs.

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## 32) Self-rostering and psychosocial working environment – an intervention study.

Åse Marie Hansen<sup>1,2</sup>, Anne Helene Garde<sup>1</sup>, Karen Albertsen<sup>1</sup>, Annie Høgh<sup>2</sup>, Henrik Lund<sup>3</sup>, Helge Hvid<sup>3</sup>

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**Background:** Flexible working hour interventions that increase worker control and choice over working hours (such as self-scheduling or gradual/partial retirement) are likely to have a positive effect on health outcomes. To our knowledge no studies so far investigated the consequences on the psychosocial working environment of introducing of influence on own working hours (self-rostering).

**The aim of the presents study** was to shed light on positive as well as negative consequences of self-rostering for the psychosocial working environment among shift workers.

**Methods:** The present study was a prospective, quasi-experimental intervention study with a 12 months follow-up. Workplaces planning to introduce self-rostering were recruited through public advertising, meetings and by personal contacts. A total of 1068 participants were eligible for inclusion at baseline and 1070 at follow-up. Of these 764 women and 76 men returned the questionnaire at baseline (response rate = 78.9%) and 713 women and 72 men participated at follow-up (response rate = 73.1%). They were allocated to either an intervention or a reference group.

**Intervention:** Three different kinds of self-rostering were implemented: Intervention A) where the participants were encouraged to rethink their habits and attitudes around the organizing of working hours towards organizing the working hours around their private life rather than their private life around the working hours; intervention B) where the computer took over the previous paper wish list for working hours; and intervention C) where the main focus was on optimizing resources to the needs of the workplace and a reference group without an intervention.

Five domains of the *psychosocial working environment* were measured (demands at work, work organization and job content, interpersonal relationship and leadership, work individual interface, and values at work) together with person related negative behaviour and work related negative behaviour. All analyses were stratified by gender.

**Results:** The initial linear regression model showed that at follow-up the intervention groups perceived more social support from colleagues compared to baseline. The effect was highly dependent on the specific intervention implemented and gender. Among women at the workplaces implementing intervention A introduction of self-rostering was associated with positive effects in terms of decreased work pace and increased influence, and negative effects in terms of decreased reward, social community and support from colleagues. Men perceived more person related and work related negative behaviour at follow-up. Among women at the workplaces implementing intervention B, the positive effects were decreased quantitative demands, work pace, together with increased influence, reward, social community, support from colleagues and support from supervisors. A negative effect was decreased possibilities for development. Men at intervention B perceived more mutual trust, but also more person related negative behaviour at follow-up. Among women at the workplace implementing intervention C the positive effect was that social community increased and the negative effects were increased work pace, decreased influence, possibilities, and recognition. Men perceived less person and work related negative behaviour. In the same period the reference group perceived decreased influence and support from colleagues.

**Conclusion:** The results showed only few overall consequences of self-rostering on the psychosocial working environment. However, the effect was highly dependent on the specific intervention implemented, with the most positive results among women in the group implementing intervention B, where the employees received more influence on own working hours compared to baseline, but were less encouraged to rethink how working hours were planned than in intervention A. Among men the most positive result were observed in intervention C, where the main focus was on optimizing resources to the needs of the workplace.

### 33) Commuting and health outcomes in a cross-sectional population survey in southern Sweden.

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**Background:** The need for a mobile workforce inevitably means that the length of the total work day (work and travel time) will increase, but apart from perceived stress and the benefits of physically active commuting, the health effects of commuting have been surprisingly little studied.

**Method:** We used data from population based public health surveys 2004 and 2008 in Scania, Sweden (56% response rate). The final study population was 21,111 persons aged 18-65, working >30 h/week. Commutation time (one-way) and mode was reported. Outcomes were sleep deprivation, everyday stress, low vitality, psychological health, and subjective general health. These outcomes reflect present wellbeing, and are also well-known risk factors for future health. Covariates indicating socioeconomic situation, workplace characteristics, job strain and urban/rural living were included in multivariate analyses. Subjects walking or cycling <30 min (active transportation) were the reference category.

**Results:** With increasing duration of travel there were monotonous relations between duration of public transport commuting and the outcomes. For the >60 min category the odds ratios (OR) ranging from 1.2-1.6. However, short public transport communication (<30 min) did not differ from active transportation. For car commuting, the relationships were curved or flat, with increasing complaints vs active transportation already at <30 min, and increasing in the 30—60 min (OR ranging from 1.2-1.4), and then decreasing in the > 60 min category. transportation.

**Conclusion:** Negative side-effects of commutation on health need to be considered, when mobility of the workforce is enforced. Studies identifying populations groups with increased susceptibility are warranted, especially for an ageing workforce.



### 34) Hygienic guidance values for surface monitoring of antineoplastic drugs in Swedish Hospitals.

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**Introduction:** Antineoplastic drugs are frequently used in anticancer therapy. Health care workers can be occupationally exposed to antineoplastic drugs classified as carcinogenic, mutagenic or teratogenic. Surface monitoring is a common way to assess occupational exposure to antineoplastic drugs. Two frequently used antineoplastic drugs, cyclophosphamide (CP) and ifosfamide (IF), were used as markers for surface contamination. Since no occupational limits for antineoplastic drugs in work environments exist guidance values (GV) could be used instead. The aim was to provide hygienic GVs for surface monitoring of CP and IF in Swedish hospitals.

**Method:** In total, 17 wards specialized in oncology, surgery and hematology located at 6 hospitals were surveyed by wipe sampling. Wipe samples were collected with wetted wipe tissues (0.03 M NaOH). Surface areas of 400 cm<sup>2</sup>, defined by a plastic frame, were sampled on floor and work areas. Handles had well-defined areas. Analysis was performed by liquid chromatography with tandem mass spectrometry. Based on the surface load data 90th percentile values were calculated floors (N=165), work areas (N=99) and handles (N=65).

**Results:** Contamination of CP and IF was found on 80% and 73% of the sampled surfaces. The surface loads of CP and IF ranged between <0.05-10800 pg/cm<sup>2</sup> and <0.13-95000 pg/cm<sup>2</sup>. The highest surface loads were detected on the floors in patient lavatories. Hygienic GVs are presented in Table 1.

**Conclusions:** Hygienic GVs for surface monitoring of antineoplastic drugs can help to control and reduce the occupational exposure to antineoplastic drugs in hospitals.

**Table 1.** GVs for different types of surfaces in hospitals

Location	GV (pg/cm <sup>2</sup> )	
	CP	IF
Floor	460	490
Work area	2.8	18
Handle <sup>a</sup>	10	1.2

<sup>a</sup>ng/sample

### 35) Unemployment and long-term effects on absence from work – a register-based study of native Swedish and immigrant young adults.

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**Objectives:** This study examined the relationship between long term unemployment ( $\geq 100$  days) during a recession among young men and women, both immigrants and native Swedes, and future unemployment, sickness absence, disability pension and death.

**Methods:** A register based cohort study with data from national databases. The study population comprised all foreign born individuals 20 to 24 years 1992 (N=32.808) and a random sample of Swedish born individuals of the same age (n=186.352). The cohort was followed 1993-2007. The results were adjusted for age, income and geographical origin and analyzed separately for men and women and educational background in three classes.

**Results:** Unemployed individuals at baseline (1992) had a higher risk (measured as OR) of future long term unemployment, sickness absence and disability pension during follow-up compared to those not unemployed. The length of the unemployment period 1992 was associated with the length of future unemployment periods and sickness absence periods. Unemployed also run an elevated risk of death compared to those not unemployed but the numbers were low in this young cohort. The higher the education level for the unemployed the lower the risk of future unemployment. There were no consistent differences between men and women or immigrants and native Swedes for the studied outcomes.

**Conclusions:** Unemployment in young ages led to increased OR for absence from work due to unemployment, sickness and disability pension during a 15 year follow up period. To enroll young persons in working life seems to be very important both for the individual and the society.

### **36) The visual environment in an Operating Theatre at a Hospital.**

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The requirements for the visual environment in an operating theatre are high. The purpose of this study is to evaluate and improve the visual environment in operating theatres.

The evaluation of the visual environment showed that 30 percent of the surgeons had eyestrain, and those with eyestrain had three times as much musculoskeletal strain than those without eyestrain. The measurements of the illuminance and luminance show a low uniformity level on the operating table. The operating lamps gave an average of 100.000 lux, while the surrounding areas' illuminance were much lower, that gave darker areas in operating cavities larger than the operating lamps light beam. The luminance contrast within the visual field was 140:1. Unfortunately, there are no international, nor Swedish, lighting recommendations for the operating area.

An improvement of the visual environment in the operating theatre may enhance the surgeons' productivity and reduce strain with positive effects on patient safety. The luminance contrast within the visual field is important to optimize. The next part of the study will be performed in the beginning of 2012, and will consist of testing how the visual environment in the operating theatre should be designed and formulate lighting recommendations for the operating area.

### 37) Extreme weather events and their implications for occupations.

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**Introduction:** Presumed effects of global warming are increased frequencies of extreme weather events such as cold spells in the winter and heat waves in the summer season. Extreme cold and heat affect conditions for outdoor work. In order to avoid adverse effects on health and performance conditions of work need to be monitored and controlled. Internationally recognized methods (ISO-standards) are available for assessment of the thermal environment.

**Methods:** Based on actual measurements of the thermal climate and estimation of work intensity and work clothing the thermal stress can be quantified. Heat stress can be assessed by WBGT (Wet Bulb Globe Temperature; ISO 7243) and PHS (Predicted heat Strain; ISO 7933). Both methods measure relevant climatic factors and provide recommendations for limit values in terms of time when heat stress becomes imminent and unacceptable. IREQ (ISO 11079) predicts required protection (by clothing) in a cold environment. When clothing cannot provide it a time limit is calculated for safe exposure.

**Results and discussion:** Limit values can be applied to assess the physiological strain and possible limitations in for example work time. Methods can also be used for simulations and predictions of the impact of possible weather scenarios. Useful information can be gained for precautionary planning and subsequent organization of work under the expected conditions. Methods allow calculations of the effects on performance and can be used for an estimation of possible productivity losses.

### 38) Telomere length is associated with chromosomal aberrations in peripheral blood.

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**Background:** The frequency of chromosomal aberrations (CAs) in peripheral blood is a predictive risk marker for cancer. Factors that predict CAs are largely unknown. The constitutional telomere length (TL) may be such a factor.

**Materials and methods:** Healthy Norwegian males (N=364) were studied for CAs 1980–1999. Phytohaemagglutinin-stimulated lymphocyte cultures from heparinized whole blood were used for CA scoring. DNA was extracted from the same slides as for the cytogenetic analysis and TL was determined by quantitative PCR method. Genotyping was made for deletions in *GSTM1* and *GSTT1*, SNPs in *GSTP1*, *NAT1*, *NAT2*, *EPHX1*, *MTR* and *MTHFR*. Information on individuals with malignant tumors (N=49) diagnosed from the date of CA testing until the end of 2008 was obtained from national cancer registries and a nested case control study was performed.

**Results:** Shorter TL was associated with a higher CAs frequency ( $\beta=-0.76$ ,  $P=0.022$ , adjusted for age) by ordinal regression analysis. The association was more significant between TL and chromosome-type aberration ( $\beta=-1.00$ ,  $P=0.006$ ). No association between TL and CAs versus cancer risk was found in the nested case-control analysis. There was no clear genetic effect modification on the association between TL and CAs.

**Conclusions:** The study suggests that individual TL may be a predisposition factor for CAs in peripheral blood, especially chromosome type aberrations. However, we could not conclude which one is better marker for cancer risk, TL or CAs

### **39) Society and worklife in transition: learning from history when considering the implications of a digital society.**

*Håkan Hydén,*

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One of the most important aspects of the emergence of the information society can be found in the implications for work-life and labour. This field will be affected by the decline of the economy on a macro level and by those organizational implications, which follow on the transformation from wage labour to network based economic cooperation. However, It is likely too early to have a firm opinion and a comprehensive knowledge about these things. Therefore the epistemological focus has to transcend the empirical data and be based on a more intuitive scientific approach looking at trends and comparisons with earlier periods in history of the same kind as the one we face in the beginning of the 21st century.

#### **40) Workplace measurements and studies of physiological responses of welding fume exposure.**

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Nano sized particles, often enriched in health relevant species, for example metals, occur at high concentrations in many industrial work places. Important sources are thermal processes as welding, which is associated with for example an increased prevalence of bronchitis and other respiratory illnesses.

Three different industrial welding work shops were examined in detail using a wide range of aerosol characterization techniques. At each workshop samples were taken both of the background and of the plume. From the in-plume measurements the signature of welding fume was determined and by using detailed notes of activities the signature size distributions of other processes were identified from the background measurements.

MAG welding fume with the same characteristics as in the workshops was generated and supplied to a 21.6 m<sup>3</sup> exposure chamber. The aerosol flow was diluted with clean air prior to entering the exposure chamber. A series of chamber exposure experiments were conducted, where thirty healthy male test subjects, normally working in mechanical workshops, were exposed to welding fume in the chamber for six hours. Concentrations were in the range of what was found in the real environments. Particle sizes ranged from a few to several hundreds of nanometers. The exposures were conducted according to a double blind protocol. Prior to the provocations, test subjects underwent a physical examination Medical and work history was registered. Before and after exposure, samples were taken for analysis of biological markers (oxidative stress and inflammation). Lung function and nasal patency were measured by spirometry and acoustic rhinometry. Several ten minute series of ECG were regularly registered during the exposure event. Effects on cardiac autonomic control were studied by heart rate variability spectral analysis

Welding fume induced a significant change of the variability in low frequency (LF) spectral band ( $p < 0,05$ ) while no effects were seen in the high frequency (HF) spectral band. The opposite phenomena was seen during clean air, with a significant change of the variability in the HF spectral band ( $p < 0,001$ ). Exposure to nano-sized particles from welding fume seem to have an impact on heart rate variability, mediated by different aspects of autonomic cardiovascular control.

## 41) Work and health among native and foreign-born residents in Sweden 1990-2008: a register-based study on hospitalization due to common potentially work-related disorders, disability pension and mortality.

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**Background:** Foreign born persons in the Swedish work-force are common, but the knowledge of their health in general and related to work is limited. The aim of this study is to explore whether foreign born inhabitants in Sweden have a different health status concerning hospitalization due to lung- ischemic heart- psychiatric- and musculoskeletal disorders, disability pension and mortality than the native population, and if it varies in relation to sex, geographical origin and position on the labour market.

**Method:** This register based study covers all foreign born persons who have immigrated to Sweden since 1960 and were between 28-47 years old 1990, in total 312 349 individuals. The comparison group comprised a random sample of 926 805 native Swedes. The immigrants were divided in four groups based on geographic origin. The study persons were followed from 1991 to 2008 in national registers at Statistics Sweden and The National Board of Health and Welfare for the studied outcomes. Hazard ratios for men and women from different geographic origin and with different positions at the labour market were analysed separately for the six outcomes adjusted for age, education level, income and years since first immigration.

**Results:** Almost all immigrant groups have an increased risk of disability pension compared to native Swedes. Persons from the Nordic countries have increased risks for all investigated disorders and mortality. For the other immigrants most groups have equal or lower risks of disorders and mortality than the Swedes. The least hazard ratios are found in the EU 15+and North American group. All groups display notable variations when taking labour market position into account. A common feature is that the groups *outside* the labour market run lesser risks for hospitalization for all investigated disorders, disability pension and death than the working population especially blue collar workers, regardless of geographic origin.

**Conclusions:** Immigrants except from the Nordic countries have a lower risk for hospitalization and mortality but higher risk for receiving disability pension compared to native Swedes. Labour market position is of importance. Further studies on the health of working immigrants are needed to further explain the differences found.



## 42) Occupational exposure to aromatic amines among hairdressers.

*Gabriella Johansson*

*Lunds Universitet*

**Introduction:** Hairdressing work is classified as probably carcinogenic to humans (IARC Group 2A). Aromatic amines are a group of chemicals widely used in hair dyes. Occupational exposure to these chemicals is believed to be a risk factor for bladder cancer. They may bind to the bladder mucosa and induce DNA damage in urinary epithelial cells. Exposure to carcinogenic aromatic amines among hairdressers is unknown and is in need of a biological monitoring.

**Methods:** We are measuring exposure to aromatic amines among hairdressers in a cross-sectional study design. The study population includes 300 hairdressers, 30 consumers and 60 controls. The exposure to aromatic amines is measured in peripheral blood as hemoglobin (Hb) adducts. Hb-adducts are determined by gas chromatography mass spectrometry (GCMS) for the following compounds (pg/g Hb): o-, m-, p-toluidine, 2,3-dimethylaniline [DMA], 2,4-DMA, 2,5-DMA, 2,6-DMA, 3,4-DMA, 3,5-DMA, 2-ethylaniline [EA], 3-EA, 4-EA, 3-aminobiphenyl [ABF] and 4-ABF. Later on, effect will be monitored as DNA-damage in peripheral blood lymphocytes (Comet assay) and urinary epithelial cells (micronuclei).

**Results:** Levels of Hb-adduct normally ranges from below the detection limit to 300 pg/g Hb for most compounds. Determined maximum levels are up to 4000 pg/g Hb for some compounds. The results are preliminary, based on 100 samples. Concluding results will be ready this autumn.

**Conclusion:** It is unknown whether hairdressers are at excess risk to develop bladder cancer due to carcinogenic exposures. This is the first biological monitoring study determining exposure to carcinogenic aromatic amines among hairdressers. Hairdressers with high levels of Hb-adducts will be part of an intervention trial with repeated measurements of exposure (Hb-adducts) and early effect (Comet assay/micronuclei). Biomonitoring the exposure and effect of aromatic amines give improved knowledge for risk estimation with regard to bladder cancer in occupationally exposed people.

### 43) Recent and future criteria documents from the Nordic Expert Group.

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**Introduction:** The Nordic Expert Group for Criteria Documentation of Health Risks from Chemicals (NEG) consists of six scientific experts from Norway, Denmark, Finland and Sweden. The main task is to produce criteria documents to be used by the regulatory authorities of the Nordic countries as the scientific basis for setting national occupational exposure limits (OELs) for chemical substances. The document aims at establishing dose-response/dose-effect relationships and defining a critical effect. No numerical values for occupational exposure limits are proposed.

**Results:** Our most recent publications include *Endotoxins*<sup>1</sup> (published in collaboration with the Dutch Expert Committee on Occupational Safety, presented separately at this conference), *Phosphate triesters with flame retardant properties*<sup>2</sup>, and *Occupational exposure to chemicals and hearing impairment*<sup>3</sup>.

In the near future, documents on Aluminium and aluminium compounds, Polychlorinated biphenyls (PCBs), Carbon monoxide, and Carbon nanotubes will be published. Other future projects include Occupational exposure to chemicals and coronary heart disease, Diesel exhaust and Reduced oxygen levels.

<sup>1</sup>Arbete och Hälsa 2011;45(4):1-53.

<sup>2</sup>Arbete och Hälsa 2010;44(6):1-220.

<sup>3</sup>Arbete och Hälsa 2010;44(4): 1-177.

#### **44) Estimation of work related mortality in Sweden.**

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*Jennie Bystedt, Department of Occupational and environmental medicine, Sundsvall's Hospital*

*Christina Reuterwall, Department of Public Health and Clinical Medicine, Umeå University*

**Objectives:** To estimate the work related mortality in cancer, cardiovascular and respiratory diseases.

**Methods:** Sites of cancer in IARC categories 1 and 2a were considered along with myocardial infarction, asthma, chronic obstructive lung disease, pneumoconioses and hypersensitivity pneumonitis. Analyses were restricted to ages between 25 and 74 years and we used the number of deaths in 2007 as the basis. We used conservative estimates. Population based case-reference studies were used where such were available. When such data were missing we used estimates from literature of attributable fraction.

**Results:** There were 463 work related deaths in acute myocardial infarction attributable to job-strain, shift work exhausts from motors and burning and environmental tobacco smoke. In total 270 deaths of cancer were attributed to occupational factors, approximately half of them in lung cancer. In men more than half of the cancer deaths were attributed to asbestos. We estimated the work related deaths in respiratory diseases to about 100, the vast majority in chronic obstructive lung disease.

**Conclusions:** In total about 800 deaths were estimated to be work related in these ages and cardiovascular diseases constituted the majority of these. Estimations of work related mortality may be a useful tool in setting priorities for preventive strategies.

## 45) Psychosocial work, burnout and attitudes among police officers.

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**Introduction:** Police work involves stressors specific to police work and stressors related to general organizational aspects of work. Some of the latter has previously been identified as risk factors for burnout. Of the three sub-dimensions of the burnout concept; exhaustion, cynicism, and professional efficacy, police officers have particularly shown an increased degree of cynicism. This has also been related to a positive attitude to the use of force to solve problems. In the present study the relationships between psychosocial work dimensions, burnout, and attitudes towards civilians, use of social skill or force to solve problems, were studied.

**Methods:** 500 patrolling policemen having worked as police officers 0-42 (Md=4) years, participated in the study (50% response rate). They responded to a questionnaire measuring psychosocial work dimensions (work load, control, community, reward, justice, and value conflicts) by Areas of Work Life Survey, burnout by Maslach Burnout Inventory, and Attitudes.

**Results:** In relation to an external reference group from the general population the group reported lower degree of emotional exhaustion and cynicism and a higher sense of professional efficacy. They scored somewhat poorer than the reference group on the work dimensions of control, justice and value conflict. There were positive associations between a favourable perception of the work dimensions, a high sense of professional efficacy, and positive associations towards civilians, and use of social skills. On the other hand there was a positive association between a perception of high work load, poor control, low reward and justice, a high degree of exhaustion and cynicism, and a positive attitude towards using force to solve problems.

**Conclusions:** In spite of an overall favourably reported psychosocial work environment, and good well-being, relationships between the negative aspects of the psychosocial work dimensions, burnout, and attitudes towards the use of force were in line with previous studies.

## 46) Occupational Disease System in Finland - Current Status and Challenges.

*Ari Kaukiainen*

*Medical Director, Tapiola General Mutual Insurance Company*

In Finland, work accidents and occupational diseases are compensated through the statutory accident insurance system. All employees and farmers must be covered. The occupational disease system is open, i.e. any physical, chemical or biological factor can be considered a causative agent if there is adequate causal evidence between exposure and disease. In addition, the Ordinance on Occupational Diseases lists the most usual causes. In justified suspicion of an occupational disease an insurance company will cover the examination costs. Employers and doctors are subject to mandatory reporting requirements. The level of compensation is higher than the normal social security benefits. Rehabilitation benefits are also good. The Federation of Accident Insurance Institutions functions as the co-ordinating organ of all the organisations which are engaged.

In the chain of care, the most common occupational diseases, such as toxic contact dermatitis and strain diseases, are diagnosed and treated in outpatient care, particularly occupational health services (OHS). The employer has a duty to arrange OHS by law. OHS is a part of the primary health care system and a part of the workplace health and safety system. All university and a few central hospitals have occupational medicine clinics which work in cooperation with the Finnish Institute of Occupational Health (FIOH). Examination of problematic cases is centralised in FIOH as a national diagnostic centre.

According to the Finnish Register of Occupational Diseases, around 6.000 cases or suspected cases are reported yearly, i.e. 24 cases per 10.000 employed. The trend is slowly decreasing. Noise-induced hearing loss and repetitive strain injuries both equal 25 % of all cases. The third largest group is skin diseases followed by asbestos-induced and allergic respiratory diseases. The proportion of all occupational diseases recognized by the insurance institutions is nearly 50 % of the total notified. The relative proportion of recognized cases was largest in noise-induced hearing loss and asbestos-induced diseases, much smaller in asthma.

Presently, revision of the list of occupational diseases is in process where new entries are considered. Comparison to the Commission Recommendation concerning the European schedule of occupational diseases is being made. Future challenges are both in prevention of work-related diseases, supporting work-place measures and in work-ability cooperation.

## 47) Early life low-level cadmium exposure is associated with increased oxidative stress in infants.

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Environmental exposure to cadmium (Cd) is known to induce oxidative stress in adults. However, data is lacking on potential effects in early-life. We evaluated urinary concentrations of 8-oxo-7,8-dihydro-2'-deoxyguanosine (8-oxodG), a recognized marker of oxidative DNA damage, in relation to Cd exposure, assessed based on Cd concentrations in urine and breast-milk, in 96 predominantly breast-fed infants (11 to 17 weeks of age) in rural Bangladesh. Urinary 8-oxodG was measured using liquid chromatography tandem mass spectrometry and Cd in urine and breast-milk by inductively coupled plasma mass spectrometry. Median concentration of urinary 8-oxodG was 3.9 nmol/L, urinary Cd 0.30 µg/L, and breast milk Cd 0.13 µg/L. In the simple linear regression analyses, urinary 8-oxodG was positively associated with Cd in urine ( $p=0.00067$ ) and breast-milk ( $p=0.0021$ ). Urinary 8-oxodG was negatively associated with body weight (kg;  $p=0.0041$ ), and borderline negatively associated weight-for-age z-score (WAZ). In the multivariable-adjusted linear regression analyses, controlled for age, body weight, socio-economic status and urinary arsenic, urinary 8-oxodG remained significantly associated with urinary Cd. Thus, it can be concluded that early-life low-level exposure to Cd, mainly via breast-milk, appears to induce oxidative stress. Further studies are highly warranted to elucidate whether this oxidative stress may be associated with impaired child health and development.

## **48) Systems for compensation of occupational diseases in Europe.**

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There is a long tradition for compensation of occupational diseases in most European countries, and each country has their own, national system for compensation. These systems can crudely be divided into three categories: The “general definition” system, (or system of proof), where any disease can be recognized as an occupational disease if the causal link is proven; the “pure” list system”, where only diseases on a specified list are compensated; and a “mixed system”, consisting of a specified list of diseases, but where other diseases not on the list can be compensated on a case to case basis. The “mixed system” has now been favored by most European countries, as it combines the advantages of the other two without their disadvantages.

As occupational disease is a legal and not a medical term, the definition of an occupational disease is crucial. Obviously, international standards also to a high degree influence the national legal processes. For ILO member states The ILO Employment Injury Benefits Recommendation, 1964 (No.121) defines occupational diseases as “diseases known to arise out of the exposure to substances and dangerous conditions in processes, trades or occupations.” The ILO definition furthermore presupposes “a causal relationship between exposure in a specific working environment or work activity and a specific disease”, and “that the disease occurs among a group of exposed persons with a frequency above the average morbidity of the rest of the population”. In 2009, ILO revised their list of occupational diseases, which all member states must adhere to. However, all the three systems are accepted by the ILO, as far as they as a minimum include the diseases listed in Schedule 1 (ILO Convention 121, amended in 1980).

The European Union has in addition developed two separate lists of occupational diseases (Commission Recommendation 2003/670/EC) , one for diseases which have been scientifically recognized as being occupational in origin, which are liable for compensation (Annex I), and one additional list of diseases “suspected of being occupational in its origin which should be subject to notification (Annex II). Thus, the EU lists serve several purposes, both for compensation, prevention, and comparative statistics between the member states.

This presentation will discuss some of the differences and challenges related to the national and international systems for compensation for occupational disease in the European countries.

## 49) Occupational Disease System in Norway – Current status and challenges.

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Compensation for occupational diseases in Norway is administered by two bodies, partly by the Social Security system, and partly by the insurance companies. All employers in Norway are members of a compulsory compensation system administered by the insurance companies. The requirements for causation are in theory more liberal in the insurance compensation system, but in practice there are no major differences between the two systems. Both systems are based on a common list of occupational diseases. Up to now, musculoskeletal diseases have not been included on the list, except for hand/arm vibration syndrome. The annual number of recognized occupational diseases per 100 000 workers in Norway is lower than in many other European countries.

After 50 years without any substantial change of the Norwegian list of occupation diseases, an expert committee proposed in 2008 a revised list to the Government. In addition to a specific list of diseases, the expert committee recommended a “safety net”, where diseases not on the list also could be assessed for compensation under certain conditions. This recommendation corresponds to the “mixed” system which currently is practiced in Denmark. The proposal for a new list of occupational diseases in Norway included three new items:

-Selected musculoskeletal diseases in the shoulder, elbow, wrist, hand and knee.

-Post traumatic stress syndrome (PTSD) after longstanding extraordinary psychological stress. 3. Selected reproductive effects. Neck and low back conditions were not included, neither was breast cancer after many years of night work.

There is a general agreement in Norway that the “double” compensation system both from the social security system and from the insurance companies, including two different laws, different causal requirements and separate compensation procedures is inconvenient. Several initiatives have been taken for a joint system for compensation for occupational diseases in Norway. This process is still ongoing.

**Reference:** NOU 2008: 11 Yrkessykdommer

<http://www.regjeringen.no/pages/2093033/PDFS/NOU200820080011000DDDPDFS.pdf>



## 50) Response patterns in finger and central body skin temperatures under mild whole body cooling.

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**Introduction:** The actual heat loss may be underestimated especially in studies employing mild whole-body cooling, if AVA-rich distal areas are not taken into account. In the present report, we illustrate the skin temperature response pattern in fingers (rich in AVAs) to transient whole-body cooling as compared to non-acral body sites (without AVAs).

**Methods:** Eight men participated in the study. During the test the subjects were dressed in shorts, socks and shoes and stayed seated with the arms on insulated supports at heart level. The air temperature of 32 °C was after 25 minutes gradually reduced to 13 °C (0.2 °C/min). Core, finger (sulcus lateral to the nailbed) and non-acral skin (8 points) temperatures were measured.

**Results:** During cooling the mean skin temperature in all subjects decreased at a similar rate. Higher variation in the end of the cooling could be explained by differences in body fat ( $R^2=0.902$ ). Simultaneously, the finger cooling could start with up to about 1 hour difference in different subjects.

**Discussion and conclusion:** Mean skin temperature did not give any idea on when the subjects left thermal neutrality. It is strongly recommended to measure finger (or toe) temperatures when maintaining the thermal comfort of the subjects in dynamic conditions is important.

## 51) Work in heat: ventilation solutions in clothing.

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**Introduction:** There are several solutions to keep the workers at good thermal state at hot or cold workplaces, for example, PCM (phase change materials) and ice; electrically heated clothing; increase/decrease clothing insulation, e.g. with smart textiles; water based cooling/heating; air based systems, ventilated clothes.

**Methods:** Following methods can be used to increase the ventilation in the clothes: use of air permeable clothes; increase possibilities for ventilation (design solutions); active ventilation (e.g. fans) etc. Polluted atmosphere may not allow to use the methods above. Ventilation in protective clothing, e.g. for CBRN protection may require inlet air filtering or a separate (compressed) air source.

**Results and discussion:** Various solutions have been tested with natural and forced ventilations, and flow rates. Dry and wet tests were carried out. Ventilation is an effective way to increase heat loss. Ventilation utilizes body own capacity (sweating) to regulate heat loss. At extremely high temperatures considerable air flows are required for sufficient cooling: 100 l/min may not be enough. The larger is the ventilated skin area, the more effective it is due to enhanced evaporation.

## 52) Wired revolutions? Learning and using subversive Internet technologies.

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In late December 2010 a series of demonstrations and protests were sparked in the Middle East and North Africa (MENA), sometimes referred to as the “Arab Spring”. As it was spreading rapidly from Tunisia to Egypt, and later on to Yemen, Libya, and Syria, sometimes peacefully and in some cases causing states of civil war, many commentators made comparisons to the revolutions of 1989 and the dissolution of the Soviet Union. One distinct difference is, however, that there have been structural changes in the global media landscape with the introduction of Internet infrastructures across the region.

A recurrent theme of debate and controversy has been the role of new Internet technologies, notably those referred to as 'social media', in facilitating, intensifying and even being described as the 'cause' of the uprisings in the MENA region. While the 1990s only revealed rare cases of pre-World Wide Web usage of computer networks<sup>1</sup> in political uprisings, the last few years social media services such as Facebook, Twitter and Youtube have been used not only to distribute news and reports by protesters, but have in some cases been the only means of communicating with the outside world during times of heavy state censorship<sup>2</sup>. Sometimes, as in the case of Egypt, this flow of information was conceived to be dangerous enough for president Mubarak to order all the Internet Service Providers to shut down the routing of the networks to the outside world, causing a complete Internet blackout as the protests grew on the Tahrir square in Cairo.

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<sup>1</sup> See for example preserved Internet Relay Chat logs from the 1991 Soviet coup d'état on <http://www.ibiblio.org/pub/academic/communications/logs/report-ussr-gorbachev>

<sup>2</sup> For example during the 2009 Iran elections.

### **53) A logistics approach to work in elderly care (al.i.d.a)<sup>3</sup> - Development and evaluation of a preventative concept.**

*Sigrid Küfner*

As part of its preventative work, the Accident Prevention and Insurance Association for the Health and Welfare Sector (Berufsgenossenschaft für Gesundheitsdienst und Wohlfahrts-pflege or BGW) also engages in measures to prevent work-related risks to the health of the staff at the companies that are insured with BGW. The day-to-day work of the staff at elderly care units frequently includes tight schedules and staff shortages, which result in high stress levels posing a risk to their health.

As part of a five-year pilot project involving 20 units offering elderly care, BGW tried to establish whether it was possible using the consultation concept “A logistics approach to work in elderly care – al.i.d.a”, to enable the staff to optimise their daily working procedures and, by doing so, to ensure healthier working conditions on a long-term basis. The foremost goal of BGW during this process was to achieve the integration of health-and-safety promoting measures in the daily working routines. The primary aim of the various facilities was to reduce stress levels at work and to ensure healthier working conditions by optimising workflows and – consequently - a more efficient use of staff.

During the project period of 12 to 24 months, the 20 facilities - divided into four cohorts (each consisting of five units) - were accompanied by an external consultant assisting them with the implementation of the al.i.d.a. consultation concept in pooled group consultation sessions taking place at different times. The basic elements of this project consisted in the organisation of a clearly defined number of workshops and training sessions for the project participants of each cohort as well as a certain number of individual consultation sessions per facility.

The evaluation of this preventative concept was carried out by an independent research institute. On the one hand, the data collected during the projects at the different facilities i.e. results from employee surveys, workshop logs and project completion reports issued by the various units was evaluated. In addition, a structural procedure was used to record statements made by the employees. This included the use of moderated workshops with one cohort each at the end of the project as well as moderated workshops at each single facility; in addition surveys were carried out among the residents and relatives as far as this was possible.

The results of the evaluation have shown that this consultation concept, which was specifically developed to help improve the workflows in elderly care, is a suitable tool to achieve the goal of BGW i.e. to make a contribution to the prevention of work-related health risks. On the other hand, even the goals that were set out for the different facilities have been met i.e. an improvement of use-of-staff planning, which in turn led to an improvement of workflows, the qualification of the project participants, an increase in work satisfaction, a drop in the number of days on sick leave etc. In addition, the participants benefitted greatly from the opportunity of comparing notes with the staff from other facilities.

Now the al.i.d.a consultation project is part of the regular services offered by BGW.

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<sup>3</sup> The acronym al.i.d.a. is based on the German title ‘Arbeitslogistik in der Altenpflege’

## **54) From analogue to digital: the skeumorphs and metaphors we use.**

*Stefan Larsson*

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This paper has a twofold focus. Firstly a discussion is made on digitalisation of society as a whole, what happens to society when (parts of) it becomes digitally represented. What does digitalisation mean to society in a broad perspective? The implications are relevant to a number of important social processes and phenomena, including legislation, state politics, innovation and entrepreneurship, social and commercial foundations, social norms, people's integrity, worklife, creativity, social exclusion and education. In short, it is of fundamental importance for the social, legal, the commercial and coded in general. How should we approach the study of such a mass-embracing phenomenon?

Secondly the paper analyses the role of language and metaphors in this transition. What does it mean that concepts are metaphorically re-used in a digital context? For example, what does this mean for law? What does this mean for worklife? Concepts are constantly transferred to new phenomena that carry similar elements. The development of information and communication technologies, combined with their massive distribution and use, has created a considerable need for labels and concepts that can describe the multitude of phenomena that follow. Although the phenomena in their technical nature are brand new, concepts for pre-existing phenomena are metaphorically transferred because they share some similar elements or associations. Some features from the previous phenomenon fit well, while others do not. Not only does the digitalisation create a need for a whole new set of metaphors, on one hand, but it changes the definition of already present concepts, on the other. It is the latter process that here is lies in the concept of skeumorphs. Consider for instance the examples of transition from regular mail to e-mail and from photography to digital imagery. Metaphors can thus serve as a conceptual bridge between one technology and another (Cass & Lauer, 2004, p. 253). In line with this, it must be considered whether the social norms that regulated the former phenomenon, which has lent its name, can also colour the new phenomenon.

## 55) Experiences from the Accreditation of Occupational Health Services in Norway.

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**Introduction:** From 1.1.2010 a bill on public obligatory accreditation system for occupational health services (OHS) in Norway was introduced. In order to be accredited the OHS has must have at least 3 full time OHS professionals, a quality assurance system and be able to document skills in occupational medicine, occupational hygiene, ergonomics, psychosocial work environment and systematic health, environment and safety work. The accreditation is performed by the Labour Inspection Authority and is free of charge to the OHS.

**Method:** A web based questionnaire was sent to all the Norwegian occupational health services (OHS) with questions about the experiences with their own accreditation process. We received responses from 241 OHS (75%).

**Results:** 94 % of the respondents had applied for an accreditation. Only 1 % of the respondent had decided not to apply.

52 % of the OHS had to make various adjustments in order to seek approval. The most common adaptations were improving the quality system of the OHS (42 %), creating a plan for the development of professional skills (48 %) and increase staffing levels in the occupational hygiene (36 %) and occupational medicine field (37 %).

56 % of the OHS believed that accreditation had led to better quality, and 27 % that the accreditation would lead to a higher price on their own OHS.

**Conclusion:** Most of the Norwegian OHS market is covered by accredited OHS 1 year after the introduction of an accreditation system. More than half of the OHS had to make various adjustments in order to become accredited. This seems to have lead to a better quality of OHS.

## 56) Effects on the exposure to hazardous head and neck flexion during dental work in the oral cavity of an intervention with prismatic glasses including optometric correction - A randomised controlled study.

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**Background:** Neck/shoulder musculoskeletal disorders (MSDs) are very common among dentists and dental hygienists all over the world. A 12 month prevalence among dentists of over 60 % has been reported (Alexopoulos et al., 2004). Awkward and static working postures seem to play an important role for the development of neck and upper extremity symptoms among these professions. Studies among dentists have shown that head flexion exceeding 45°, are present during 10% of the total working time (Jonker et al., 2009).

**Aim:** To quantify the effects on the exposure to extreme head and neck flexion, perceived exertion and comfort, when using prismatic glasses including optometric correction during work in the oral cavity.

**Methods:** The study population consisted of forty-five participants. After a basic ergonomic education, baseline measurements of head and neck kinematics were made using inclinometers. Perceived exertion and comfort were rated by the participants. An intervention group (n=25), selected at random from the participants, received prismatic glasses and optometric correction when needed and were compared with a control group (n=20). Follow up assessments were made after the intervention.

**Results:** At follow up there was a reduction in both the intervention group (8.7°) and in the control group (3.6°) regarding head flexion. Neck flexion was reduced by 8.2° in the intervention group and 3.3° in the control group. The difference between the intervention and the control groups, i.e. the effect of the intervention, was statistically significant for both head (5.1°; p=0.009) and neck (4.9°; p=0.045) flexion. No effect of the intervention was seen regarding perceived exertion and comfort.

**Conclusion and clinical relevance:** Prismatic glasses decrease the exposure to extreme head and neck flexion during dental work. The reduction accomplished is likely to contribute to a reduced risk of developing neck pain among dentists and dental hygienists.

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## 57) Risk assessment for formaldehyde by the Swedish Criteria Group for Occupational Standards.

*Birgitta Lindell<sup>1</sup>, Johan Högberg<sup>2</sup>, Gunnar Johanson<sup>2</sup>, Johan Montelius<sup>1</sup>*

Formaldehyde is used in the production of resins and as a preservative. It is also a part of the human metabolism. The Swedish level limit and ceiling limit values are 0.5 and 1 ppm, respectively, and the compound is noted as a carcinogenic and sensitizing chemical. The Criteria Group which produces science-based consensus documents as a basis for the Swedish Work Environment Authority in their decisions on legally binding OELs has now updated the documentation on formaldehyde. Consequently new Swedish OELs of 0.3 and 0.6 ppm, respectively, and a skin notation is suggested.

**Conclusions by the Swedish Criteria Group:** The critical effects of occupational exposure to formaldehyde are mucosal irritation and genotoxicity. Slight eye irritation was noted in volunteers at 0.2-0.3 ppm. Increased airway reactivity was seen in animals at 0.3 ppm. Genotoxic effects of occupational exposure were reported at average levels of 0.1-0.4 ppm, although with peak exposures. Damage to DNA in the respiratory mucosa was shown in rats at 0.3 ppm.

Formaldehyde is carcinogenic in humans. An increased risk of nasopharyngeal cancer and myeloid leukaemia was reported in epidemiological studies. Formaldehyde causes tumors in the nose cavity in rats.

Cytotoxicity and cell proliferation due to irritation are necessary events for the carcinogenic effect of formaldehyde in the upper respiratory tract. Exposure levels of 0.2-0.3 ppm should therefore not cause cancer in the airways. It is not known if irritation is a prerequisite for induction of leukaemia.

**References:** The consensus report has been published in Swedish in *Arbete och Hälsa*. An English version will be published in *Arbete och Hälsa* in autumn 2011.

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## 58) Why risk the rewarding professional fulfillment – a grounded theory of physician’s engagement in the development of health care.

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**Introduction:** The need for trans-professional collaboration when developing health care has been stressed by practitioners and researchers. Since physicians have a lot of impact on those processes, their willingness to engage forms a core part of this issue.

**Aim:** To gain a deeper understanding of physicians view their engagements in health care developments.

**Method:** The study design was to, by a grounded theory approach, develop a conceptual model based on empirical data from qualitative interviews with hospital-working physicians (n=24).

**Results:** The satisfying experience of being useful and to develop at work, conceptualized as “The rewarding professional fulfillment” (core category) was explained to motivate physician’s engagement in health care developments. Such experiences were gained when achieving meaningful results, having impact, learning and developing, and fulfilling one’s mission. Reinforcing organizational preconditions that served to facilitate their engagements in developments were work-place continuity, effective strategies and procedures, a clearly defined mission regarding participation in developments, and possibilities for gaining knowledge about organization and developments. Two opposite tendencies of role-taking emerged: lingering to a doctor-role with high autonomy in relation to organization and management, with clinical work as the main source of fulfillment and low engagement in developments, or approaching a full employee-ship role with a rewarding sense of fulfillment also from organizational engagement.

**Conclusion:** The experience of rewarding professional fulfillment from participation in activities aimed at developments are crucial for physician’s engagement and taking on an employee-ship responsibility in the organization.

## **59) Broadening our understanding of future Internet possibilities.**

*Peter Ljungstrand*

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While the Internet, and the cultures and habits that it affords has reached some form of maturity in the developed world, there is still substantial room for further innovation and development. Policymakers and other authorities repeatedly points towards the Internet as holding the promise for the future's society and economy, and there are substantial investments in Internet-related R&D. However, this research tend to focus on analytic and descriptive approaches to emerging phenomena related to people's lives on the net, or on the enabling technologies that could extend the reach and capabilities of the Internet as we know.

Due to the nature and complexity of the subject matter, we suggest that currently dominating R&D approaches needs to be complemented by more cross-disciplinary work that explicitly tries to overcome disciplinary boundaries. Building on established knowledge, approaches and methods in various areas, while looking forward and asking not only what-is, but what-if, in an exploratory, design-oriented approach. The ultimate goal of this approach is to broaden the common understanding of what could be, with the aim to inspire future problem-solving, as well as contribute the foundations for of an initiated public debate on what is possible or not, as well as what is desirable or not, in terms of how future Internet-induced developments might affect our society and ourselves. In my talk, I will give a brief background of the roots of this type of research, and highlight a few example projects and the results thereof.

## **60) Migrant workers in Swedish agriculture-A new project on attitudes, possibilities and challenges.**

*Peter Lundqvist & Catharina Alwall Svennefelt*

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*Swedish University of Agricultural Sciences, Alnarp, Sweden*

Finding competent work force is a challenge for many farmers and owners of companies within agriculture and horticulture. This is even more a great issue when it's a matter of finding seasonal workers. During a number of years there has been an increasing share of the work force with a non-Swedish background. But – they are not immigrants who are becoming integrated in rural areas – they are migrant workers from other countries.

The working conditions for these migrant workers are not well documented and their own experiences and attitudes and not yet studied. There is also lacking knowledge about the perspectives of the Swedish co-workers and the owners / managers on farms with migrant workers.

With economical support from the Swedish Farmers Foundation for Agricultural Research (SLF) these issues will be studied during the next up-coming years.

The project will start with a short up-date on other relevant studies, published reports and papers as well as connections with other researchers in this area – both national and international. An important network has been established with other researchers at Lund and Malmö universities. A web-based study to employers will also be done in the first part of this project.

In the following part there will be work-place studies with in-depth interviews involving migrant workers as well as Swedish co-workers and employers in order to get a base-line of knowledge for further actions. The results will be presented and discussed at a work-shop with involved stakeholders, organisations, authorities, researchers and other in order to create an action plan, an initial guide book for employers and managers as well as a research plan for further research.

## **61) Swedish researcher network on vibration and health - [www.vibnet.se](http://www.vibnet.se)**

*Ronnie Lundström*

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The overall aim of the researcher network - VIBNET - is to bring together researchers and research groups in Sweden engaged in research and development projects in the area of exposure and health effects of vibration, primarily in the workplace. VIBNET will for example discuss and compile the current state of knowledge in different parts of the problem areas of hand-arm vibration (HAV) and whole-body vibration (WBV). Based on identified needs VIBNET also aims to initiate research projects with all or part of new approaches and issues. Furthermore, the aim is to discuss the training needs that exist in the area and if there is a need for teaching media in the area and if so in what format (textbooks, web-courses, etc).

The main focus of the network's approach will be predominantly national scientific meetings focusing on specific issues such as mechanisms of vibration injury, exposure, survey methodology, rules, values, standards, prevention, research and training needs. The issues raised will be discussed within especially assigned working groups and reported at networking meetings. There will also be possible, when necessary to co-opt experts to the network as an example from regulatory authority, industry and occupational health.

VIBNET is expected to be of especially great benefit and support for young researchers or graduate students. This in turn means that Sweden can continue to maintain research and development with continued high quality in the area. At last, the network's website ([www.vibnet.se](http://www.vibnet.se)) provide an interactive forum for information about the state-of-the-art of human response to vibration, current research projects, publications, regulations and standards, international conferences and workshops, VIBNET activities, network core members, and more.

## **62) Work motivation in dairy farming.**

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Swedish agriculture needs qualified and motivated workers. If working in agriculture is to be promoted as an attractive occupation and a motivating work place it is important to know what attracts and motivates people to work in the profession. The purpose of this study was to identify attraction and motivation factors important for students, employees and employers in choosing to work and remain in the profession as dairy farm worker. Furthermore, the purpose was also to study if they had corresponding opinions.

The study was conducted during the year 2008-2009 and comprised 194 agricultural students 197, employed dairy farm workers and 147 dairy farm employers. Questionnaires were used in order to study essential questions such as: What would attract you to choose dairy farming as a profession? What attract and motivate you in your work? Furthermore, in order to illustrate the employer's point of view, they were asked what they believed were important attraction and motivation factors for dairy farm workers.

The three groups studied had comparable opinions on what attract and motivate dairy farm workers in their daily work. Even though, their prioritizations were different, they agreed that having fun at work, good leadership, feeling pride in their work, job security, good team spirit, living in the countryside, meaningful and interesting work, safe and healthy workplace, flexible work tasks, the farm having a good reputation and feedback from supervisors were among the most important attraction and motivation factors. They also agreed that working irregular hours, overtime and weekends were less important.

The results in this study indicate that prospective and existing dairy farm workers were predominantly motivated by intrinsic factors (doing something because it is inherently interesting or enjoyable) and not by extrinsic factors (doing something because it leads to a separable outcome).

### **63) Ergonomics and safety in the human-horse environment.**

*Lotta Löfqvist, Stefan Pinzke*

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Horses were historically used in farm work and as means of transportation. By the early 20<sup>th</sup> century, horse power gave way to the tractor and other mechanical devices. Today, in most of industrialized countries, the horse is no longer used as a transportation and pulling device, but rather for riding, racing and limited farm/ranch work.

The range of persons exposed to risks from horse activities however, is broad and including farriers, veterinarians, riding instructors, riders for pleasure, horse attendants, jockeys, and riders for work like ranchers and mounted police.

Yet when compared to the frequency of research on mechanical hazards, current research on horse-related hazards is slim. This presentation will provide an overview of current and emerging aspects of hazards associated with horses. Furthermore, it will assert that with a world wide population of 59 million horses, research of horse related hazards are being stalled by inadequate focus on the horse as a hazard.

Results from the authors' previous studies and work in progress on Swedish horse issues will be presented. Examples from the following five studies will be giving: 1) Riding instructors work environment and health, 2) Working with horses in a correct way, 3) Farriers work environment, 4) Ergonomic evaluation of long-shafted tools in horse stables and 5) Horse safety on the roads. All five studies aim to serve as the foundation of recommendations on understudied aspects of risks from horse hazards with a special focus on safety and ergonomic issues.

**Key word:** Horses, work environment, hazards, risk factors

## 64) Measurements of deposition of inhaled welding fume particles in the human lungs.

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1.Ergonomics and Aerosol Technology Department of Design Sciences Lund University

2.Occupational and Environmental Medicine, Laboratory Medicine, Lund

**Introduction:** Epidemiological studies have associated exposure to welding fumes with a range of adverse health effects, such as airway irritation, bronchitis, lung function changes and possibly also increased risk of lung cancer. However, knowledge is limited about the underlying mechanisms behind these effects and the dose-response relationships. The objective of this study was to determine the respiratory tract deposition of inhaled welding fume particles.

**Method:** The deposition probability of inhaled welding fume particles was determined experimentally in the range 20-530 nm for four welders with an instrumental set-up developed at Lund University (RESPI, Löndahl et al. 2006). The welders were breathing spontaneously through a mouthpiece while sitting in a relaxed position. The deposition was also calculated with the ICRP model for comparison.

**Results:** By number the deposited fraction of inhaled welding fume particles was  $0.20 \pm 0.08$ . Several experimental challenges made it difficult to determine the deposition fraction by mass. The measurements did not cover the complete distribution and especially not the large particles that contribute much to the inhaled mass. In addition, the density of the particles was not easy to determine because of multiple charging of the particles.

**Conclusions:** The study indicates that deposition of welding fume particles by number is comparable to other common air pollutants; lower than for fresh traffic exhaust particles but approximately similar to biomass combustion particles.

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## 65) Scientific bases for occupational exposure limits (consensus reports) from the Swedish Criteria Group for Occupational Standards.

Johan Montelius<sup>4</sup> Johan Högberg<sup>5</sup> Gunnar Johanson<sup>2</sup>

In Sweden administrative, legally binding occupational exposure limits (OEL) are set by the Swedish Work Environment Authority (SWEA). The Swedish Criteria Group for Occupational Standards (<http://www.av.se/teman/hygieniska/kriteriegruppen>) at SWEA, are responsible for producing the scientific basis (consensus reports) in this work. The consensus report is the basis for the proposed OEL, however, the OEL may also be influenced to a variable degree by economical and technical considerations. The Criteria Group consists of 17 scientists/experts, a secretariat and some observers.

Most recently published consensus reports deals with Asphalt fumes, Formaldehyde and Organic acid anhydrides. They are/will be published in Swedish (1) and in English (2). Consensus reports on Ethylamine, Diethylamine and Carbon dioxide have been accepted and will be published in *Arbete och Hälsa* (<https://gupea.ub.gu.se/dspace/handle/2077/3194?locale=en>) in the beginning of 2012.

At present consensus reports are being prepared for the following substances:

n-Butyl acrylate	Aluminum	Tungsten	2-Aminoethanol
Carbon monoxide	Endotoxins	Nickel	Bisphenol A
Phosphate triesters	Cyclohexane	Iron	Halogens (F <sub>2</sub> , Cl <sub>2</sub> , Br <sub>2</sub> , I <sub>2</sub> )
N,N-Dimethylformamide	Copper	Silica	Hydrogen sulfide
2-(2-Butoxyethoxy)ethanol	Chloroethane	Zink	N-methyl-2-pyrrolidinone
2-(2-Methoxyethoxy)ethanol	Diethyl ether		

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## 66) Measuring the implementation of organizational occupational health interventions.

*Karina Nielsen*

*knn@nr*

**Introduction:** Current legislation in the countries of the European Union emphasize organizational occupational health interventions (changes in the design, organization and management of work) as an important way to improve employee health and well-being. However, recent reviews find mixed results and conclude but that there is insufficient knowledge as to determine ‘true’ intervention effects (Murta et al., 2007; Egan et al., 2008).

**Methods:** A longitudinal intervention design was applied in a part of the postal service in Denmark. The project included 2 intervention groups and 2 comparison groups. In this study we only include results from the intervention groups. A participatory intervention process (Nielsen et al., 2010) was developed and conducted in the two intervention groups. At follow-up (n = 138, response rate 74%), items were included that allowed the analysis of the impact of action plans. These results are presented here.

**Results:** Results indicated that the spread among participants concerning the implementation of action plans was wide. Depending on the action plans, 40-100% had heard of the action plans, 23-100% reported they had worked on action plans, 16 to 78% of participants reported the actions plans had improved working conditions, while 1 to 15% of participants reported action plans to have lead to a deterioration in working conditions. Together these provide a check of whether intervention activities have been implemented according to plan and their specific impact on working conditions.

**Conclusion:** The study shows the importance of careful documentation of the implementation process. Organizational occupational health interventions are unlikely to reach all participants in a similar manner and it is important to document implementation to tease out real effects. Furthermore, such measures may serve as a tool for organizations to improve their implementation strategies.

## 67) Does Ageing increase the risk to Occupational Accidents? (Poster).

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In most western countries the work force becoming older nowadays. 75 persons died in Swedish work related accidents in 2007 (1). Of these, 33% were 55 years old or more although only 22% of the workforce was in this age group (1). Most of this hazards and deaths among the workforce in Sweden happened in agriculture and forestry (1). Of the total number of 727 people in Sweden who died in 1997-2007 from work related accidents 7% of the employed and 72% of the holders came from the sector of agriculture and forestry (1). At the same time farmers are one of the occupations that often work until they are beyond the normal retirement age in Sweden. Of them working in agriculture in Sweden 22% are aged 55-64 years and 15% are 65 years or older; (2). Hazards and accidents cause organisations and society economic losses but, even more importantly, physical and mental suffering for individuals and families. Research declares that it is mainly the elderly who run the risk of accidents (3; 4). The aim in this study was to analyze if the older agricultural holders were more frequently involved in work related accidents. Do some accidents happen more often in the oldest age group?

Which part

of the body is most frequently hurt in different age groups? What can be done to decrease the risk of injury in the oldest age group of agricultural holders?

**Method:** The data material of the study was based on two data sets. The first data set was telephone interviews with 223 injured agricultural holders (96% men and 4% women) performed by The Swedish University of Agriculture Science and Statistics Sweden. The second data set was 990 police reported tractor drivers' accidents reiterated in the Swedish Traffic Accident Register. The tractor drivers were 12-91 years of age and 98% were men and 2% were women.

**Result:** The result shows that senior agricultural holders suffered more from hit and kicked by animals, and vehicle accidents, than younger holders. Older farmer more often got injured outside. The older workers sustained more skeleton injuries. Ankle and foot accidents were more common in this group. Older farmers also take longer time to heal after an accident. Elderly tractor drivers were more often involved in accidents during daylight on a 90 km/h road. These accidents most often occurred when the tractor was turning into or out of a road and or were overtaking accidents involving private cars.

**Discussion:** Elderly agricultural holders need specially to hold in mind that their bodies are no longer as young and strong as before even if it is necessary to be careful and consider the risks in all age groups. Functional aging give an increasing risk for accidents due to decreased distance vision, hearing problem, increased problem with eyesight, and decreased reactions, but their work experience seem to compensate most of the problems. Despite this but additional to the longer healing process after an injury elderly need consider their work situation, work environment and driving.

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## 68) Biomarkers for benzene exposure – a field study on tankers and a review of the literature.

*Ralph Nilsson*

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**Introduction:** Seafarers on tankers are one of the occupational groups exposed to benzene and studies have indicated an increased incidence of leukemia. There has been an interest in the use of biomarkers for surveillance of benzene exposure but the practical value of different biomarkers has been questioned.

**Method:** The results are based on a literature search and a field study. Twenty men working on deck on tankers and a control group of 17 seamen, not working on deck, were followed with personal air samples, measurement of benzene in end-exhaled air, and timed urinary samples for several days during and after work tasks with possible peak exposures to benzene. The urinary samples were analysed for U-benzene, t,t-muconic acid (t,t-MA), and 8-hydroxydeoxyguanosine (8-OHdG).

**Results:** The average concentration of benzene in air during a watch (approximately 4 h) ranged between 0 and 50 mg/m<sup>3</sup> with peak exposures up to 143 mg/m<sup>3</sup>. The kinetics of the urinary biomarkers showed some variation between the subjects but in general, if the exposure had occurred in the morning, the excretion of U-benzene peaked within a few hours, t,t-MA in the afternoon and 8-OHdG in the evening the same day as the exposure occurred. The concentration of benzene in end-exhaled air, which reflects the concentration in blood, declined rapidly.

**Conclusions:** The time of the sample in relation to exposure and the kinetics of different biomarkers are crucial if biomarkers should be used as a quantitative measurement of the uptake of benzene. Better knowledge of intra- and inter-individual variability of redistribution and metabolism of benzene is also required as well as other factors that could influence the results. The results from the different biomarkers in the study seemed biologically plausible. At present it seems that biomarkers only could be used for semi-quantitative measurements of benzene uptake and exposure.

## 69) Aspects on health risks related to work with vibrating machinery in mining.

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**Introduction:** Mining history confirms that the prolonged use of vibrating tools in colliery-work tasks may lead to a number of pathological effects primarily in the peripheral neurological, vascular and musculoskeletal systems. The major adverse health outcomes from whole-body vibration exposure are a variety of degenerative conditions and pain syndromes. In addition, hypothesis on possible systemic and cardiovascular effects has also been addressed.

More recently evidence has been gathered to support the view of a causative relation between vibration exposure and an exaggerated vascular reaction to cooling (“Vibration white fingers”). Lately it has become generally accepted that disorders of the peripheral nervous system are associated with working with vibrating machinery.

**Results:** Vibration and other workplace factors in mining may combine to produce an exaggerated adverse health risk. Joint effects and effect modification of vibration have been suggested regarding ergonomic load, posture, physical and psychosocial stressors. Grip-force interacts with perceptual sensibility, pain, personality traits and work technique. Chemical agents may modify the effect. The risk of vascular disorders and “vibration-white fingers” has also been confounded in mining by e.g. specific exposure to airborne particles.

There are several interacting conditions related to the manifestation of the symptoms from the vibration disorders. Cold is the major trigger of HAVS symptoms. “Vibration white fingers” denotes the exaggerated vascular response to cooling. Increased cold sensitivity and pain are parts of neurosensory manifestations. Other stressors may also contribute to the manifestation of signs.

**Conclusions:** A distinct exposure - response relation is lacking for mining hazards, to which workers vary in susceptibility, the risk is modified by manifold other factors, the symptoms are episodic and only occasionally manifested by triggers, and where the measuring of the critical aspects of the exposure is difficult, strict health surveillance is crucial. Vibration exposure in mining is one such hazard.

## **70) Ergonomics for music students.**

*Ing-Marie Olsson*

*Physiotherapist at the Malmö Academy of Music and at the Artist- och Musikerhälsan.*

Since 2004 the Malmö Academy of Music within Lunds University gives their students, studying to music teachers five hours of education in music – ergonomics. One of the purposes of the course is to train the students to be more aware of how the body works and how they can find more relaxed and efficient positions while playing. Also teach them to be able to, later on in their profession, guide their pupils to a more functional working position. Another purpose with the course is to discuss and learn how stress affects us and how to cope with it.

By teaching the students, both physically and mentally another purpose is to give the students tools to prevent later problems.

## 71) Neck problems in symphony orchestra musicians in Denmark.

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### Introduction

Symphonists often play their instrument for four-six decades and with only little possibility of variation in neck position. According to the literature neck problems (NP) are among the major musculoskeletal problems in musicians<sup>1,2,3</sup>. Perceived NP have been reported higher in symphonists than in the general workforce<sup>3</sup>.

Objective: Investigating NP among symphonists.

### Methods

A cross-sectional study among 441 musicians in six Danish symphony orchestras; 342=78% filled in a questionnaire about health and working conditions, 216=49% were physically examined.

Statistics: Prevalence calculation and robust logistic regression with orchestra as cluster variable.

### Conclusion

Self-reported NP and clinical findings were

- common in both genders and statistically associated with being of female gender;
- common in all instrument groups and statistically associated with playing string instruments.

Impaired range of motion and pain at motion of the neck were often not related clinical findings.

<sup>1</sup>Ledermann RJ: Neuromuscular and musculoskeletal problems in instrumental musicians. *Muscle Nerve* 2003;27:549-61.

<sup>2</sup>Fjellman-Wiklund A, Sundelin G: Musculoskeletal discomfort of music teachers: an eight-year perspective and psychosocial work factors, *International Journal of Occupational and Environmental Health* 1998;4:89-98.

<sup>3</sup>Paarup HM et al: Prevalence and consequences of musculoskeletal symptoms in symphony orchestra musicians vary by gender: a cross-sectional study. Submitted 2011 (in review).

## **72) Fatigue Management Programs: status and recommendations.**

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Fatigue Management Programs – systematic organizational interventions to manage employee fatigue – are seen by many as preferable to hours of work legislation. However, little is known about the effects of these programs, either on employee or organizational outcomes. This paper describes a qualitative review of Fatigue Management Programs, which aims to (i) catalogue common measures used; (ii) assess the extent to which these measures are evidence-based; (iii) suggest ways to improve existing programs; (iv) identify requirements for robust quantitative assessment of program effects.

We find that programs to date are primarily aimed at occupational drivers. Common program elements are schedule management, education and sleep disorder screening and treatment. Few programs to date monitor fitness for duty, use employee incentives or promote open reporting as part of a fatigue management strategy. While many programs are research-based, there is a need for robust and independent evaluations to assess their effect on fatigue outcomes.

### **73) Fatigue management in the transport sector.**

*Ross Owen Phillips*

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A promising way to tackle transport operator fatigue is for the employing organization to implement a systematic fatigue management programme. An in-depth review of 61 fatigue management interventions is described. The aim is to assess the state of the art in organizational fatigue management, catalogue measures used, and pave the way for robust evaluation of the effects of such programmes. Although the causes of fatigue transcend the driver's home and work life, we find that organizational programmes can contain elements that both minimize fatigue risk due to work-time activity and help the employee manage fatigue at home.

Common components of programmes to date, primarily aimed at the occupational driver, are schedule management, education, and sleep disorder screening and treatment. There are few programmes that monitor fitness-for-duty, use employee incentives, promote an open reporting culture, or use competency-based selection and recruitment, as part of the ongoing fatigue management attempt. While many programmes and official guidelines are research-based, more robust and independent evaluations are needed to assess their effect on fatigue-related incidents and accidents. This is important because fatigue management as part of normal HSE activity of all types of companies has the potential to reduce fatigue-related accidents involving professional and private drivers alike.



#### **74) Professional dancers – work, worries and good examples.**

*Eva Ramel, PhD, RPT, lecturer at Department of Occupational Therapy and Gerontology, Lund University, Lund.*

Several studies point to the fact that professional dancers have much pain and problems with the musculoskeletal system (MSD). A project was therefore initiated to find out what the persons in the dance world believed could be done about that in order to minimize these problems. Six professional dance companies were asked to participate, which they all did, and a contact person for each theatre was appointed. Dancers who were on the sick list at least one day because of MSD during one fall season, were consequently asked to participate and were then interviewed by telephone.

During the following spring season dancers who had NOT experienced MSD were interviewed about the previous fall season in a similar way. All six ballet masters and twelve other persons affiliated with the companies were also interviewed. Together 49 semi structured interviews were then analyzed with a content analysis and from the individual/group/societal levels. A lot of good examples were suggested by the participants, which could then be used to some extent for a kind of change at work within the professional dance world.

## **75) Total and bioaccessible metal concentrations of fly ash from the incineration of forest residues.**

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Many researchers have described possible occupational risks to humans when industrial by-products and recycled materials are utilized, recycled or landfilled. Activities that cause potential occupational risks to humans when industrial by-products are used include: 1) transport of the by-product, 2) intermediate storage in a pile, 3) pre-processing of by-products, 4) construction, 5) use of the construction, 6) structural maintenance and repairs, and 7) accident risks. In this study, the metal content and extractability (bioaccessibility) of metals from a mixture of bottom ash and fly ash was determined in order to assess the potential for occupational risks from ash handling.

The artificial gastric fluid was prepared by dissolving 60.06 g glycine in 2 L of deionized water and adjusting the pH to a value of 1.51 with HCl. The ash was sampled from ash-silo at the small-sized (6 MW) municipal district heating plant incinerating clean forest residues. Metals were extracted according to USEPA 3051A and analyzed with a Thermo Electron IRIS Intrepid II XDL Duo inductively coupled plasma optical emission spectrometer. The extraction recovery (R) values (%) were determined as the ratio of the extractable metal concentration at a liquid to solid ratio of 10 L/kg to the total metal concentration in the ash.

Metals found included Al, Ba, Cd, Co, Cr, Ni, and Pb. The highest extractable concentrations in the artificial gastric fluid were observed for Al and Ba, which were 6400 mg/kg (d.w.) and 1780 mg/kg (d.w.), respectively. The extractable recoveries for the metals varied between 32.5 and 97.9 % in the artificial gastric fluid.

In terms of human health risk assessment, we conclude that careful handling of ash is recommended in order to prevent ash dusting and the exposure of workers to metals including Al, Ba, Co, Cr and Ni as well as to soluble metallic compounds. Conceivable routes of exposure include the inhalation of airborne ash particles, the inadvertent wiping of the mouth with dirty hands, and dermal exposure.

## **76) Experience from an Action Oriented Research Intervention at an Operating Unit – A view from the road.**

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Many hospitals in Sweden were built in the 1960s and 1970s. Since then, considerable progress has been made in the medical science, providing new possibilities and new challenges. This is also true for the work environment in which the medical practice take place. Possibilities in the sense that more conditions are now curable, challenges in the sense that our overall costs for healthcare are increasing, putting new demands on effectiveness which in turn could affect the work environment. This is especially true for resource intensive highly specialized healthcare units such as operating units.

The basic assumption in the Op-Design project is that the areas of work environment, effectiveness and patient safety are interdependent. The aim of the project is to improve all three of them and since they are interdependent, a holistic approach is called for.

The project could be divided into three phases with different focuses; 1) *the past*, looking at how the personnel experienced their work subjectively through interviews, 2) *the present* looking at how the work *is* through objective methods such as naturalistic observations, health controls and mapping of physical ergonomics as well as investigations of the visual ergonomics of the workplace, and 3) *the future* interventions intended to result in innovation, change and improvement of the work environment, effectiveness and patient safety in such way that all three areas are contented.

As of now, data collection for the second phase is completed. The third phase has been initiated in the form of an action oriented development project based on experiential learning. This part is a collaboration between operating unit practitioners and academics, using the results from previous phases as input. A visual ergonomics intervention is also in the works.

## 77) Poster: Usage of the WHO surgical safety checklist -Analysis of compliance with a safety intervention and possible improvements.

Christofer Rydenfält<sup>1</sup>, Gerd Johansson<sup>1</sup>, Per Odenrick<sup>1</sup>, Kristina Åkerman<sup>2</sup> och Per-Anders Larsson<sup>2</sup>

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**Background:** Previous research shows that pre-operative checklists reduce the number of communication and medical errors as well as improve the safety attitudes among the operating theatre personnel. Previous research also indicates that the personnel's attitude towards different questions on the WHO checklist differs between questions. Despite this, previous research says very little about how the checklist is used in practice.

The purpose of this study was to determine compliance with the WHO checklist and to suggest possible improvements.

**Method:** 24 timeout procedures from four commonly occurring surgical procedures were video recorded. The procedures were analyzed according to a predefined observation protocol based on the checklist. In order to be able to explain deviations, qualitative notes were made regarding the nature of other activities occurring in parallel with the timeout.

**Result:** The percentage of answers varied between questions in the checklist. In 6 of the cases when the question of personal presentation was raised, the whole operating team presented themselves, in the other cases only parts of the team. In 5 cases the presentation was postponed until later. The anesthetist nurse and the surgeon dominated the timeout in the studied cases. The theatre nurse was not as active and it happened that the timeout was initiated while the theatre nurse was occupied with other tasks.

**Discussion:** The checklist is not always used as intended. We find it plausible that those questions getting the most attention are the ones perceived as the most important and of common interest by the team. For instance personal presentations could be perceived as unnecessary by those who know everybody. To make the whole team involved in the timeout calls for the addition of another question directed towards the theatre nurse that is perceived as relevant by the whole team. Such question could for instance discuss material and instruments.

## **78) Norms and Internet from interaction design point of view.**

*Kari Rönkkö*

*Blekinge Technical Highschool (BTH)*

The idea of code as law on Internet constitutes an interesting interaction design challenge, i.e. how code influence users and their work practices from a normative point of view. That is, implemented code in the form of released software applications provides and restricts opportunities of behaviour on Internet. Today many software applications are created by software developers without strong ideas and consideration of the normative effects. From an interaction design perspective these normative effects can be discussed from user experience and participatory design point of view. In relation to the former, norm is one means to identify different types of user experiences, and help explaining the circumstances and consequences of those. Norms as a user experience phenomenon can also be used as basis for designing new digital inventions.

In relation to the latter we just are beginning to understand how “Internet as a culture” or cyberspace are influenced by different structures in internet. Structures that have been expressed as architectures that in a sense regulates users’ freedom. Awareness is the first step in growing participatory design culture among the habitants of Internet.

## **79) Poster: Participation and safety training in Nursing Homes The workers' point of view. Cases study in Sweden and Italy.**

*Ph.D. Candidate: Valentina Santi Löw*

**Introduction:** The education on safety and wellness is considered a fundamental tool to prevent accidents in workplaces. The legislation, however, while giving guidance on mandatory training and information, does not give indication regarding how to design and deliver a type of training that is capable of really changing the attitudes and behaviour of workers, training too often reduced to a limited and purely formal act. Research on safety education in care environment and its outcome on workers' psychosocial health, turnover rates, job satisfaction and productivity are here explored.

**Objectives:** This study wants to investigate the relationship between workers' participation in safety training and the improvement in safety and wellness perception in the context of nursing homes. Another objective is to explore how environmental and personal factors can influence the workers learning process concerning safety issues.

**Methodology:** The theoretical source of this thesis is based in the studies by Donald Alan Schön, influential American thinker in developing the theory and practice of reflective professional learning in the twentieth century. His concept of reflective practice inquiry affected teacher education, health professions and architectural design, exactly the three main areas of my study. At the same time, An empirical study based on the experience of the workers in nursing homes was carried out.

Results of the survey were reported in focus groups in order to discuss future possible scenarios. Interviews with experts on safety issues in work environments, on workers' rights and in care environments are compared with the theoretical sources.

**Results and discussion:** The research pointed out how traditional methods in education could remain far away from the specific needs of workers in care, where the functional management plays an important role for the perception of safety in the work environment. The paper providing a systematic approach on evaluating how the technical and functional performance of training activities, opens the discussion on the effectiveness of a participatory approach in the training process on health and safety at work, topic where tradition and expediency may be standing in for knowledge.

**Keywords:** Participation, Education, Wellbeing, Working Environment, Environmental Psychology, Safety, Interdisciplinarity, Risk Perception, Risk Communication.

## **80) Studying organizational occupational health interventions from an organization theory perspective.**

*Johan Simonsson Abildgaard*

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**Introduction:** Currently organizational occupational health interventions (OOHIs) are being evaluated using primarily effect evaluation and secondarily process evaluation. This is also the case in an intervention project currently being implemented in the Danish postal service. Recent reviews of the literature on OOHI underline the necessity for increased knowledge of what mechanisms drive change (Murta et al., 2007; Egan et al., 2008). To address this, the current project will explore the qualitative processes from initial planning to completed implementation of the intervention.

**Methods:** A longitudinal OOHI design was applied in a part of the postal service in Denmark. The project includes two intervention groups and two comparison groups. Field study and interview data from the intervention groups are used to illustrate the critical points in the intervention process, especially illuminating the points of translation where, for instance, strategy decisions are translated into action plans, or action plans are translated into action. This use of “translation” as a methodological lens is based on both Rovik (2007) and Latour (1987).

**Results:** Analysis revealed how and at which points in the intervention process the consultants, the employees, the context, and situational factors influenced the progress of the interventions. Results indicate that during and in between points of translation, several important processes take place. Enabling employee participation in the OOHI is problematic, production issues overrule the OOHI and management constantly reposition the project in relation to current organizational strategies.

**Conclusion:** This study shows that there is a great deal of knowledge to be gained from opening the black box of interaction between intervention and organizational context, hereby unravelling the complex multitude of processes happening around interventions. From this project we learn how qualitative organizational research methods can improve the knowledge of what processes affect the outcome of OOHIs.

## 81) Experience and early results from a study on miners' health in Northwest Russia.

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**Background:** New cases of occupational diseases have doubled in Murmansk Region in 10 years, as new technology has been introduced in the work environment. Working as a miner is associated with elevated health hazard. In Murmansk Region official numbers indicate that mine workers exposed to vibration and cold are most at risk. We aimed to describe their WBV exposure and health, associations and the influence of cofactors, using international methods.

**Material and methods:** A questionnaire based on VIBRISK, with elements from FinRisk and the Tromsø-Archangelsk study was created for data collection in mine employees in Kirovsk.

**Results:** 1) The questionnaire contains questions on WBV and cold exposure, duration of employment and sociodemographic factors. It also contains questions on low back pain (LBP), shoulder pain (SHP) and neck pain (NP) in sections of similar structure, using VAS scale and categories. It was translated, back-translated and tested on a random chosen group of mine employees, their feedback used for content, volume and language. 2) Data collection experience: after testing, translating and ethical approval, 3530 employees answered the questionnaire with letters of informed consent, during the annual regular medical examination. Supervisors present were instructed on the collection procedure. Answers were entered into a database in Kirovsk, with Russian ownership, and available for researchers in Norway for a defined period. 3) Early preliminary results will be presented.

**Discussion/ conclusion:** The study has provided data from a large population of mine workers, with high participation rate. It provides a new view on mine workers health than regular health examinations, indicating some degree of under/over-reporting and healthy workers effect. The large database allows for analysis on several subgroups and provides valuable experience for the creation of a larger study across the Barents region.



## 82) Styrene exposure trend in the Swedish reinforced plastics industries 1970-2010.

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*Keywords: Styrene exposure, reinforce plastic, trend in occupational exposure*

**Introduction:** Styrene is used in the reinforced plastics industry (AP industry) and is classified as a possibly carcinogenic to humans, group 2B, by IARC. Personal exposure measurements of styrene have been conducted on a larger scale in Sweden since 1970. These measurement reports are stored by the Swedish Work Environment Authority (AV, Arbetsmiljöverket). Large technical improvements over the years have been taken to reduce exposure. The purpose of this study is to study the exposure pattern in the AP industry between 1970 and 2010.

**Method:** Multi-day measurements of air concentrations of styrene have been systematically implemented in the AV studies within the AP industry in years 1970-72, 1987-89, 1997 and 2009, and are now systematically undertaken. The data included contains personal samples and workplaces in each measurement exercise were representative for the Swedish AP industry as plastic boat manufacturing (large- and small scale), large plastic tanks, cisterns and general plastic product manufacturing. In each study were determined between 44 to 100 full shift styrene samples at similar worksites. The number of exceeds of the Occupational Exposure Limits (OEL) were recorded and the average styrene exposure levels for the total AP industry were calculated. All exposure data is related to Swedish OEL (2004) for styrene (90 mg/m<sup>3</sup>).

**Results:** 95% of the full shift samples (n = 125) exceeded the OEL in years 1970-72 with mean 515 mg/m<sup>3</sup>. In 1987-89 exceeded 42 % the OEL while 15% of the samples with mean 49 mg/m<sup>3</sup> in 1997. In 2009 exceeded 46% of personal measurements OEL with mean 84 mg/m<sup>3</sup>. For the corresponding measurements inside the respirator (face mask) in 2009, the mean exposure level was 6 mg/m<sup>3</sup>.

**Discussion:** Technical improvements have substantially reduced styrene exposure during the 1970's and 1980's. The last 10 years, the exposure levels have increased and 64% of the personal measurements exceed the proposed limit value.

### **83) Dangerous enclosed spaces aboard ships- study of shipments of wood pellets, wood chips and logs.**

*Urban Svedberg*

**Introduction:** A recent survey has shown that there have been at least 101 enclosed space incidents resulting in 93 deaths and 96 injuries, since the IMO Resolution A.864(20) -Recommendations on entering enclosed spaces - was adopted in November 1997. Examples of enclosed spaces aboard ships are cargo spaces, double bottoms, fuel tanks, ballast tanks, cargo pump-rooms, chain lockers, and cargo space accessways.

In waters in and around the Nordic countries seven deaths among seafarers have occurred in enclosed spaces between 2005-2009 in connection with transportation of wood pellets, wood chips and logs. The present study investigated the atmospheric conditions in cargo space accessways, the location of these accidents.

**Method:** Five shipments of wood pellets and 41 shipments of wood chips and logs were investigated before discharging the cargo. Air samples were collected in the undisturbed air of the enclosed spaces in cargo space accessways before the hatch covers were removed. Concentrations of oxygen, carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO) and hydrocarbons were determined. In addition to this field operation, information on a recent accident with wood pellets was collected from the police investigation.

**Results:** Wood pellets emit CO thorough autooxidation. In shipments of wood pellets the CO levels ranged between 1500-15000 ppm and a lowest oxygen level of 0.8 % was recorded after seven weeks at sea. In the recent accident with wood pellets, two deaths occurred within 24 hours after loading. Wood chips and logs consume oxygen and emit CO<sub>2</sub> through microbiological processes. In shipments with wood chips and logs the mean oxygen level was 10±7.3% (mean ± S.D) and complete oxygen depletion was seen in 20 % of the shipments, after 2-3 days at sea.

**Conclusions:** Deadly atmospheric conditions may develop within 24 hours of loading these seemingly harmless cargoes. Improved safety procedures, along with better technical design of ships are needed in order to prevent further accidents.

## 84) Aerosol model nanoparticles for protein / biomolecule corona determination in physio-logical buffers – possible means of determining particle toxicity and fate in humans.

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Keywords: nanoparticles characterization, protein corona, biomolecules, toxicity, generation of nanoparticles

Awareness of health effects due to nanoparticle exposure has continuously increased over the last decade. The primary route of exposure is by air, as particles deposit in the respiratory tract. Due to the special properties of nanoparticles, such as a high surface area to mass/volume ratio, concern has been raised with regards to their potential effects in biological systems. In recent years the particles interaction with biomolecules has been acknowledged as crucial for the understanding of particle toxicity (Lynch, 2009). When biomolecules bind to the particle surface a dynamic protein/biomolecule corona is created (Cedervall, 2007). The protein corona is dependent on the surface chemical properties, the size and morphology of the particles. The protein corona is believed to be important for the biological effects of nanoparticles.

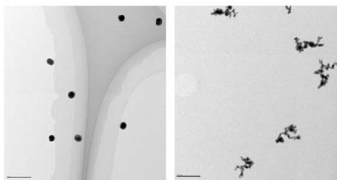


Figure 1 Gold nanoparticles generated by high temperature evaporation condensation (HT). To the left sintered 60 nm nanoparticles and to the right 60 nm dimer agglomerates.

In this work we present a method to investigate the composition of the biomolecule/protein corona on model nanoparticles in three different physiological fluids bovine serum albumin (BSA) porcine serum and porcine lung fluid. Gold nanoparticle (AuNP) agglomerates and spheres (60 nm dimer) were generated by high temperature evaporation condensation (HT), see figure 1. To generate the spheres agglomerates were sintered at 400°C. Both spheres and agglomerates were characterized online by tandem differential mobility analysis (T-DMA) and aerosol particle mass analysis (DMA-APM) (Ehara, 1995).

Both particle types, spheres and agglomerates, were deposited onto solutions of bovine serum albumin (BSA), porcine lung fluid and porcine blood serum using an electrostatic precipitator (ESP). AuNPs in suspension with BSA were characterized with dynamic light scattering (DLS) on selected time-intervals (h to days). AuNPs were also deposited directly into porcine lung fluid and blood serum. Using sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) the protein corona was determined for AuNPs deposited into lung fluid and blood serum.

DLS data indicate that particle-biomolecule complexes had formed in suspension for AuNP depositions in BSA with sizes of approximately 160 nm. The DLS signal could be observed over the course of several days for particles deposited into BSA.

Results from SDS-PAGE indicate that the protein corona is different between agglomerates and spheres in porcine blood plasma (Figure 2). The result also indicates that the corona is different between particles deposited into lung fluid and blood serum.

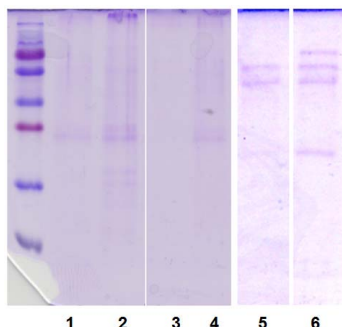


Figure 2. Results from SDS PAGE for gold nanoparticles mixed with porcine blood. 1 and 2 show the corona signature for spherical AuNP in full plasma and 10 times diluted respectively, 3 and 4 show corona signature for agglomerates in full and 10 times diluted plasma respectively. Bands 5 and 6 show the background signature of 10 times diluted and full blood plasma respectively.

In conclusion: We have shown that the protein / biomolecule corona can be studied using model particles generated in aerosol phase. Also, the observed corona is different between particles administered to porcine blood serum and lung fluid.

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## 85) A Growing Professionalism Within The Global File Sharing Community.

*Måns Svensson,*

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The empirical data that is presented in this paper comes from two main data collections; one online survey in the global file sharing community, which is complemented by qualitative data from focus group interviews conducted with last-year students in Swedish elementary schools.

**The Survey:** In April 2011 the famous logo of the global file sharing community The Pirate Bay was complemented with the picture of a magnifying glass and the site's name was changed into The Research Bay. Visitors who clicked on the altered logo was transferred to an online survey and in the 72 hours that the study was running 75 000 file-sharers filled out a questionnaire hosted by our research group (Cybernorms). This makes it the largest survey conducted amongst the file sharing community ever. The survey was conducted in English and contained both multiple choice and open questions. The aim of the online study was to describe a file sharing community from within and thereby to shed light on underlying demographics and social structures of the phenomenon that has emerged as one of the greatest challenges to IP law ever.

Some results of the survey: The online study shows among other things that close to 95 percent of the file sharers who filled out the questionnaire were male and that 3 out of 4 live in either Europe or the US. More people are looking for e-books than for pornography - however most of the file-sharers are searching for movies, music, TV shows and computer software. The most common method of distribution of digital media files, besides using BitTorrent trackers such as The Pirate Bay, is off-line file sharing (e.g. USB sticks and mobile phones).

The focus group study: The focus group study was conducted during the period of March to June 2011 in the city of Linköping in Sweden. We conducted ten focus group interviews in five different schools and the interviews were recorded, transcribed and analyzed. This study indicate that file sharing amongst those in ninth grade is a takers' culture, where both downloading and usage of online streaming sites is very popular, while contributing to the file-sharing community is not prioritized at all. Furthermore the students expressed a fear of getting caught while using illegal file sharing solutions, but also knowledge about anonymizing techniques to lower the risks.

Combined empirical data relevant for IP law: The article summarises and concludes the empirical data from both the survey conducted via the pirate bay site, as well as the following focus group interviews. The article can thereby be characterised as having a predominantly empirical centre of attention. It clearly displays the type of computer-generated behaviour that fundamentally has come to challenge copyright regulation throughout the world, and therefore has to be continuously understood and researched. One of the main findings is showing a growing professionalism within the file sharing communities. Specialized key sharers use advanced methods for secure downloading from the global net and then the files are spread through local networks by for example "sneaker sharing".

## **86) Transformational leadership and the importance of relationship continuity at work.**

*Susanne Tafvelin & Kristina Westerberg*

*Department of Psychology*

*Umeå University, Sweden*

Transformational leadership has been found to influence a range of positive outcomes in organizations, for example increased employee satisfaction, commitment and well-being. However, few studies have taken into account the ongoing change in today's organizations and the fact that this might hinder or enable the leaders-follower relationship. In this study we examined the moderating effect of two variables closely connected to organizational change, namely tenure with the immediate supervisor and social support from co-workers. Changing supervisor or changing work group, with potential loss of social support, is hypothesized to lower the effect of transformational leadership on two employee outcomes; commitment and role clarity.

The sample consisted of 158 randomly selected social service employees in a larger municipality in the north part of Sweden, who were invited to participate in a survey. The results of moderated regression analyses revealed interaction effects by both the tenure with the leader and social support from co-workers. When employees had spent a longer period of time with the supervisor the effect of transformational leadership was stronger on both role clarity and commitment. When employees felt social support from co-workers the effect of transformational leadership was stronger on commitment, but not on role clarity. These results demonstrate the importance of relationship continuity, and the possible downside of the ongoing restructuring in today's organizations.

## **87) Occupational disease in Iceland.**

*Kristinn Tómasson*

In Iceland occupational diseases are not in general compensated; to any other extent than other disease conditions. However, the employer has the responsibility to ensure safe and health workplaces and can through civil court case be found liable for occupational diseases that have developed among his employee. All diseases are possible which can be linked to the occupation in a causative manner. However, occupational diseases those are due to conditions that prevail only for a short time, days at the most, can be compensated in the same manner as occupational accidents by the social insurance system. The payment involved in these cases is higher than regular sickness benefits from the social insurance system. No formal list of disease or conditions has been issued.

Occupational diseases are reportable by physicians, who should take note of EU Commission Recommendation of 19. September 2003 of occupational diseases when filing the report. The number of these reports is though small or less than 10 per 100.000 occupationally active. The physician should in all cases ensure that the link between exposure and work is clear or suspected. In the case when the link is suspected the Administration for Occupational Health and Safety needs to study the causal process, including the work environment. This may lead to special demands towards the employers may be issued by Administration to prevent further cases. The documents created in this process may be used in civil court cases by the employee to get fair compensation for his disability and harm due to his / hers occupational disease

## **88) Incivility as a dimension of counterproductive work behaviour A study focusing the target perspective.**

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**Introduction:** Uncivil behaviour such as rude, discourteous behaviour and lack of regard for others has recently been recognized as an important phenomenon in work- and organizational psychology. The deleterious effects of incivility for both the individuals and the organization have been discussed. Workplace incivility can be defined as low-intensity deviant behaviour with intent to harm the target in violation of workplace norms for mutual respect (Pearson, Anderson & Wegner, 2001).

The aim of the present study was to contribute with further knowledge about the relationship between perceived workplace incivility and mental health problems, low job satisfaction and intention to leave the organization. The hypothesis was that perceived incivility would be positively related to mental health problems, low job satisfaction and intention to leave the organization.

**Method:** An internet-based questionnaire was sent to 490 white-collar workers in a large Swedish organization. A total of 266 (77 female and 189 male) completed surveys were received. The questionnaire included demographic items and scales measuring quantitative demands, job insecurity, control, social support, optimism, mental health, job satisfaction and intention to leave.

**Results:** The results showed, in line with the hypothesis that workplace incivility correlated positively with mental health problems, low job satisfaction, and intention to leave the organization.

However, when controlling for demographic variables, optimism, quantitative demands, job insecurity, control and social support, workplace incivility explained additional variance only in mental health. No additional variance was explained in satisfaction and intention to leave the organization.

**Conclusions:** It can be concluded that workplace incivility is linked to mental health problems and low job satisfaction and employees intention to leave the organization. Incivility is a unique predictor of mental health problems but regarding low job satisfaction and intention to leave other factors in the model did explain all the variance.



## 89) Musculoskeletal disorders and asymmetric work posture of the upper extremity and back in music teachers.

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**Introduction:** The aim of this cross-sectional study was to investigate the relationship between physical work load, defined as playing posture and playing time per week, and musculoskeletal disorders in music teachers. Many musical instruments requires an asymmetric playing posture, with the instrument held with one arm elevated, and, with some instruments, players also have to bend the head and/or hold their lower back to one side.

**Methods:** A questionnaire was distributed, with questions on work-related musculoskeletal disorders (1) and physical working conditions (2). The study population consisted of all music teachers employed at a Swedish municipal music school. Out of 61 music teachers, 47 (77%) agreed to participate, including 28 women and 19 men. The study group was divided into two groups depending on if they had an asymmetric (bowed strings, flute, trombone and guitar) or symmetric (clarinet, oboe, bassoon, trumpet, keyboard and percussion) upper extremity/back playing position.

**Results:** Of the total participants, 77% reported musculoskeletal disorders during the preceding 12 months. Music teachers with an asymmetric playing position had significantly more musculoskeletal disorders (back and shoulders combined) compared to music teachers with a symmetric playing position ( $p=0.042$ ). Female teachers reported significantly more disorders in the neck ( $p=0.02$ ), the shoulders ( $p=0.025$ ) and the thoracic back ( $p=0.01$ ) than male teachers. String teachers reported more disorders than other instrumental groups. No significant difference between musculoskeletal disorders and amount of playing time per week was found.

**Conclusions:** This study demonstrates that an asymmetric playing posture may affect the amount of musculoskeletal disorders in the upper extremity and back. Music teachers have as much musculoskeletal disorders as professional orchestra musicians and music students, but have a partly different work context (3,4,5). They are important as role models, being those who are in the position to guide our future musicians to a healthier work life. Further studies need to be carried out on larger groups of musicians to allow for more accurate conclusions.

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## **90) The Predicted Heat Strain Model (ISO7933) severely over- or underestimated Core and Skin Temperature in Protective and Light Summer Clothing.**

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*Thermal Environment Laboratory, Division of Ergonomics and Aerosol Technology, Department of Design Sciences, Faculty of Engineering, Lund University, Sweden*

**Introduction:** Heat stress is a person's net heat load that exposed to combined factors such as air temperature, relative humidity, air velocity, radiation, metabolism and clothing factors. A mild or moderate heat stress may cause discomfort and a deterioration of performances. If the heat stress level reaches human tolerance limits, heat-related illnesses such as heat syncope, heat cramp, heat exhaustion and heat stroke may occur. It is thus meaningful to have predictive measures to supervise those people who may suffer great heat strain. A feasible approach is using heat strain models. The aim of this study was to examine the reliability of the Predicted Heat Strain (PHS) Model in predicting physiological responses under various scenarios.

**Methods:** Eight male subjects participated in the study. Three levels of air temperature were selected: 20.0, 30.0 and 40.0 °C. The water vapor pressure in the chamber was kept at either 2.0 or 3.0 kPa. Five sets of different vocational clothing ensembles (light summer clothing & heavy protective clothing) were involved. The subjects walked on a treadmill at a speed of 4.5 km/h inside a climatic chamber for totally 70 minutes. The heart rate, skin and core body temperatures were recorded throughout the experiment. The metabolism, sweat rate and evaporative rate were also acquired using relevant instruments.

**Results:** It can be deduced from RMSD (root mean standard deviation) values that the PHS model performed well in clothing CLM at 20.0 °C, and clothing L, HV and MIL at 30.0 °C. However, for other 7 test scenarios, the PHS model generated either unreasonable rectal temperature or unreasonable skin temperature. In particular, the PHS model had both unreasonable rectal temperature and skin temperature for test scenarios of clothing FIRE at 30.0 and 40.0 °C.

**Conclusions:** The PHS model severely overestimated core body temperature during high insulation protective clothing such as FIRE. For summer light clothing such as L and MIL, the predicted skin temperature was underestimated. Thus, the model should be further revised to enhance its applicability.

## **91) Hand Arm Risk Assessment Method (HARM) – evaluation of a method for assessment of biomechanical exposure of the upper limbs when performing manual tasks as well as its suitability to use within work environment inspection.**

*Minke Wersäll*

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**Introduction:** Hand Arm Risk Assessment Method (HARM) is a tool to assess the risks of developing complaints of the arm, neck or shoulders during manual work. The method was developed in the Netherlands, partly as an aid to work environment inspectors.

The purpose of this study was to evaluate the HARM-method for assessment of biomechanical exposure of the upper limbs when performing manual tasks as well as its suitability to be used within work environment inspection.

**Method:** Ten labour inspectors conducted assessments of five video-recorded work tasks. Assessments made with HARM were compared with these made with the Assessment of Repetitive Tasks (ART) tool and with Hand Activity Level (HAL) - both methods for assessment of biomechanical exposure of the upper limbs - and with the model for the assessment of repetitive work in the provisions of the Swedish Work Environment Authority on ergonomics for the prevention of musculoskeletal disorders, AFS 1998:1. HAL is based on a threshold limit value for hand activity. The method combines the assessment of hand activity with perceived effort in the hand and forearm.

The assessments were made twice, two weeks apart. Following each assessment the inspectors answered questions about each method's suitability. Three experts (X) made the same assessments, first individually just like the inspectors', and then they agreed upon a consensus estimation. The observers' assessment was compared with a "gold standard" that was created by the results of the technical measurements which replaced the consensus estimates for the head and arm positions as well as wrist motions in the HARM, ART and HAL assessments.

**Results:** The inspectors' assessment of HARM and ART showed in comparison with the respective "gold standard" some underestimation of risks. Conformity in the test-retest was 68 % at appraisal with HARM and 66 % with ART. Based on the inspectors' observations it was revealed that force and frequency were experienced as the most difficult to assess. The individual assessments also indicated that the work position of the hand and forearm showed the largest deviation. Hand activity was both over and undervalued in comparison with technical measurements, suggesting that it is difficult to simply assess hand activity by observation. Furthermore, the model for identifying physically monotonous, repetitive work in the provision was perceived to be the most difficult to use for performing assessments, as it has few criteria and no support for the assessment of hand/arm and hand intensive movements. This underlines that there is a need for other models as a supplement to the provisions.

**Conclusions:** The results showed that the HARM and ART were relatively similar in content and structure and provided relatively similar results. HARM is more detailed than ART as it takes into account the vibration exposure as a single factor and shows more consideration to the duration of exposure. The HARM-method provides support for the assessment; it is easy to use, it needs pen and paper only and is in that sense available, it is fast and takes into account the whole of the assessment of biomechanical exposure of the upper limbs. ART is very similar to HARM, HAL is more limited and can be used as a rapid screening of hand load.

## 92) Is heat stress a cause of chronic renal disease along the Central American west coast?

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**Background:** A high and increasing incidence of chronic kidney disease (CKD), not explained by conventional risk factors and with marked within-country geographical differences in prevalence, occurs along the Central American pacific coast. It has anecdotally been linked to male sugarcane workers. The results from four recent cross-sectional population-based studies suggest that repeated dehydration might be a risk factor for decreased kidney function and, in the long run, also for clinical CKD. We here discuss the basis of this hypothesis.

**Results:** All studies observed a high prevalence of decreased kidney function in men in agricultural lowland villages. In the first Nicaraguan study findings were most marked in lowland male agricultural workers, and in miners, whereas coffee workers from highland (i.e. cooler) plantations had no increased risk. The second Nicaraguan study identified male non-specified agricultural field workers (crops: bananas, rice, corn, sugar), whereas the third did not observe any relation with occupation. One study from El Salvador observed a relation between reduced kidney function and duration of work at lowland sugarcane and cotton plantations among men as well as women, whereas there was no increased risk among sugarcane workers from highland (i.e. cooler) plantations. Differences between studies seem related to selection study populations and analytical approaches.

**Conclusions:** Harsh and hot work on plantations without adequate water supply, likely also interacting with other environmental or occupational risk factor, may be a risk factor for CKD. The hypothesis can be tested, if heat exposure in different occupational settings is measured, together with biologically sound intermediate outcomes.

### **93) Occupational Disease Registration, Assessment and Recognition – for which objective(s).**

*Peter Westerholm*

The Swedish system for occupational disease (OD) recognition and compensation – based on the Law on Occupational Injury Insurance in force since 1978 and last amended 2009 - differs from systems of most other countries in being based on a general occupational disease concept rather than list(s) of disease entities which may be recognized as Occupational Diseases contracted by persons. These differences carry practical implications which will be presented. Main observations

What constitutes an OD? R: All diseases caused by or significantly contributed to by work or work factors and assessed as more likely to be occupationally caused than not.

- Who does the assessments? R: Civil servants at four departments of the National Social Insurance Agency on the basis of medical certificates, special investigations and other material available in health records and other documents.

- What is paid for in compensation? R: Income loss is compensated in the public Social Security Insurance system. Compensation for pain, suffering and discomfort is paid by the Labour Market Insurance Company Ltd (AFA) to recognized cases of OD.

- Who pays for the Occupational Injury Insurance? R: Employers are obliged to contribute with levies on a flat rate basis. No differentiation of premiums determined by accident or disease rates.

- Is there a preventive program in the Swedish system? R: No. The system is for compensation, not for Occupational Disease prevention.

Some of the problems and implications with regard to a) compensation payments and b) prevention will be discussed.

## 94) Physical workload during assembly of spherical roller bearings.

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**Introduction:** The work at an assembly line for spherical roller bearings is believed to be heavy and repetitive. An expected increase in production will lead to the assembling task being a larger part of the workday. The aim was to evaluate (1) the effect of a faster pace in the production line on the physical workload and (2) differences in workload when assembling three types of bearings.

**Methods:** Technical measurements were performed to determine the physical workload, (1) during an ordinary day with normal production (three men), and (2) when assembling, at a set pace, the three different types of bearings, light medium and heavy (six men). Every subject assembled each bearing for 60 minutes. Postures and movements in head, upper back and upper arms were measured by inclinometry and in wrists/hands by goniometry. The muscular activities in the trapezius and forearm extensors were measured by electromyography.

**Results:** The measurement for the ordinary workday showed that the work at the assembly station was performed with a pronounced head flexion (90<sup>th</sup> percentile 55°) and implied high angular velocities for the wrists (right wrist, 50<sup>th</sup> percentile 31 °/s). Moreover, working 10% longer time at the assembly station will lead to an increase in angular velocity for the hands by 3 °/s.

The heaviest bearing gave the highest muscular activity in the forearm while the medium bearing gave the highest head flexion.

**Conclusions:** Work at the present assembly station gave high muscular load for the forearms and high angular velocities for the wrists. The design of the bearings influences the workload during assembly.

## 95) Return-to-work and its sustain ability after a work site oriented intervention among burnout patients on sick-leave.

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**Introduction:** The present study describes the development and evaluation of a workplace-oriented intervention for persons on long-term sick leave for clinical burnout, aimed at facilitating return to work (RTW) by job-person match through patient-supervisor communication (Karlson et al. BMC Public Health 2010,10:301). Additionally, preliminary results from a second longer follow-up period, with the aim to evaluate the sustainability of the RTW, will be presented.

**Methods:** In a prospective controlled study, subjects were identified by the regional social insurance office 2–6 months after the first day on sick leave. The intervention group (n = 74) was compared to a control group who had declined participation, being matched by length of sick leave (n = 74). The RTW was followed up, using sick-listing register data, until 1.5 years after the time of intervention. A further 1-year follow-up is presently being analysed. The intervention group also responded to questionnaires at baseline and follow-ups.

**Results:** There was a linear increase of RTW in the intervention group during the 1.5-year follow-up period, and 89% of subjects had returned to work to some extent at the end of the follow-up period. The increase in RTW in the control group came to a halt after six months, and only 73% had returned to work to some extent at the end of the 1.5-year follow-up.

Burnout symptoms, sleep disturbances, mood, and self-reported cognitive functioning improved 8 months after the intervention but only marginally further at the 1.5 year follow-up, still differing from external reference groups.

**Conclusions:** We conclude that, in spite of remaining symptoms, the present study demonstrated an improvement of long-term RTW after a workplace-oriented intervention for patients on long-term sick leave due to burnout.

## 96) Old People at Work – A proposal for a systematic review of knowledge for further research.

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**Introduction:** There is a lack of knowledge about how the workplace should be designed to suit both younger and older and if developments require special measures when it comes to safety. The project will be conducted in the context of the research at EAT, METALUND (Centre for Medicine and Technology for Working Life and Society) and the Ageing and Design Research and Development Program. This program is institution-wide and the aim is to take advantage of the broad expertise that exists in technology and design to contribute to Sweden being a country where people can age with confidence and where their experiences are utilized.

The definition of old people should be counted in proportion to the increased life expectancy, but we decided to start at the age of 50 to be able to compare with previous studies. We set no upper age limit.

### **Main research questions:**

1. To what extent are older people represented in the labor market and what are the conditions like, looking at various branches? Reports state that the number who continue to work, paid or unpaid, outside AKU:s surveys, is about 600 000 people or 40 % of the age group 65 and older. Currently 70 % in the age group 55-64 in Sweden works which is significantly higher than the EU average. Probably there are differences between highly educated or skilled workers and those less skilled. This knowledge survey will follow the classifications of the Swedish Work Environment Authority but there are reasons to identify any reports on the development of employment services. One of them is the growing market of employment services and recruitment of seniors and the tasks they convey, for example “*Hyr en pensioner*” (rent a retired person) and “*Go Veteran*”.

2. Are there special considerations to be taken regarding the physical environment? How should the workplace be designed and work organized to meet the needs of older people?

What examples are there for alignment of the physical design, organization and content of work for older employees? Technological change is another variable which contributes to changing conditions for all but perhaps particularly for old people. Previous publications point out that those workers who are approaching retirement will obviously not become involved in technology development projects. Recent studies of older IT-users revealed that the debate is often characterized by outdated notions of their ability and willingness to change.

3. How does their continued presence in the workplace affect safety in different branches? Here, a number of aspects need to be included. Knowledge of how physical capacity is affected by age are mapped out, such as muscular strength, vision, hearing, body temperature and coordination skills and balance. Psychological factors are identified in terms of ability to process and coordinate information relative to short-term memory and different kind of computers. This includes issues of mobile computing application of all kinds, as well as learning skills, attitudes toward organizational change, motivation and expectations.

**Research design:** This knowledge survey encompasses publications in scientific data basis such as Science Direct and Medline, publications from Swedish Work Environment Authority and Swedish Statistics. Besides publications from work life research the survey will include some publications from the gerontology field. The analysis and conclusions will be discussed in a reference group associated with METALUND and EAT.

### **Some questions for discussions at the NAM Conference 2012:**

- Is this relevant knowledge considering demographic and societal development?
- What variable or questions are missing in our survey?
- Should this development, with an increase of old people at work, even be encouraged?



## Appendix - Deltagarförteckning

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