

$p=0.015$). Duration arm elevation $<30^\circ$ had a tendency to be associated with an improvement in NSP over the 2-year follow-up ($<30^\circ \times \text{time}$ ($\beta=-0.07$; $p=0.089$)). Neither duration $30-60^\circ$ nor ≥ 60 were associated with the course of NSP during follow-up. After adjusting for confounders, none of the durations of arm elevation were associated with the course of NSP over the 2-year period ($<30^\circ$ and NSP ($\beta = 0.20$; $p=0.126$); $<30^\circ \times \text{time}$ ($\beta=-0.06$; $p=0.097$)).

Conclusion Among construction and healthcare personnel, duration of working in awkward arm elevation postures was not associated with the course of NSP over a 2-year period. Arm elevation alone, without considering force exertion, may not be sufficient to influence the course of NSP.

Dermal Effects

05B.1 WORKPLACE EXPOSURE ASSESSMENT (WEA), SKIN BARRIER FUNCTION, AND OCCURRENCE OF HAND ECZEMA AMONG WORKERS HANDLING DRILLING WASTE IN NORWAY

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Introduction Knowledge on skin exposure and the occurrence of hand eczema (HE) among workers handling drilling waste from oil and gas drilling is scarce.

M and M WEA included seven waste management plants. Samples of oil drilling waste were analysed with gas chromatography with flame ionization detection (GC-FID). Dry solids from thermal treatment of cuttings fluids were incubated in an artificial sweat solution and analysed with inductively coupled plasma mass spectrometry (ICP-MS). pH of dry solids in the sweat solution was measured with Panpeha™ pH indicator strips.

Sixty-eight workers got an invitation to participate in a structured interview and skin examination. The Nordic Occupational Skin Questionnaire 2002 assessed the occurrence of skin problems and HE. Transepidermal water loss (TEWL) and hydration of the stratum corneum (SC) were measured with Tewameter 300 and Corneometer CM 825 (Courage and Khazaka Electronic GmbH).

Results WEA identified scenarios for potential skin exposure. The profile of hydrocarbons in oil-based drilling waste was similar among the different plants. The soluble fraction of dry solids in artificial sweat solution contained bioavailable metals such as Cr (from 22 to 210 ng/g), Co (from 20 to 94 ng/g), Ni (from 0,13 to 0,72 µg/g). The pH ranged from 6.5 to 12.0.

The participation frequency was of 97%. The one-year prevalence for HE and work-related HE was 30.3% and 24.2%. Ninety-three percent of the workers reported glove use for two hours or more. TEWL values >25 g/h/m² on the dorsal side of the hands, indicating skin barrier disruption, were measured in 55% of the workers. TEWL and hydration of SC values were associated to the occurrence of HE.

Conclusion Potential skin exposure to irritants, allergenic metals, skin occlusion from gloves, skin barrier disruption and high occurrence of HE among workers handling oil and drilling waste are of concern.

05B.2 DERMAL EXPOSURE TO SOLVENTS: A NEED FOR QUANTITATIVE ANALYSIS

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For many years, airborne exposure was considered as the main work-related exposure and efforts have been made both on air monitoring and reduction of respiratory exposure. Nevertheless, recent studies have shown that preventive strategies with an exclusive focus on airborne exposures may falsely indicate a 'safe' environment. In 2014, WHO highlighted the importance of dermal exposure and its potential impact on human health. Moreover, it stipulated that the current technical and knowledge gaps related to the assessment of skin exposure have major lacunae.

In this context, there is an increased demand for standardized methods and tools for measuring and assessing skin exposure to hazardous agents.

We have developed an analytical method to simultaneously identify and quantify 195 volatile organic compounds (VOC) in dermal patches with activated charcoal cloth (ACC). Furthermore, we have done several field studies in different industrial settings, by the simultaneous assessment of dermal exposure using the ACC patches (on the hand, arm and neck), together with assessment of the respiratory exposure and determining the actual internal dose via urinary biomonitoring. Toluene, acetone and styrene exposure was found in a thermoplastic panel factory, styrene exposure in a composites body parts manufacturer, limonene and 1-methoxy-2-propanol exposure in a company that produces and prints plastic cartridges, and acetone and toluene in a pharmaceutical company. The results obtained from the quantitative ACC patches have been compared to the data obtained using Riskofderm for skin exposure, and the penetration through the skin was further estimated using IH-Skinperm and correlated with biomonitoring results.

Based on the analytical development and the results of the different field studies, we can conclude that ACC patches represent a suitable technique to evaluate the deposition of VOCs on the skin. We further believe that assessing dermal exposure to solvents using ACC patches can substantially improve occupational health programs.

05B.3 SKIN HEALTH IN CROATIAN HAIRDRESSING APPRENTICES AT THE BEGINNING OF VOCATIONAL EDUCATION: A NEW COHORT STUDY

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Introduction Hairdressing apprentices are at high risk of developing occupational contact dermatitis.

Materials and methods Data on skin health are presented for 352 hairdressing apprentices attending vocational schools in 24 Croatian towns at the beginning of their education, in a screening phase of a prospective cohort study. Apprentices were recruited from September to December 2017. The study protocol included: Nordic Occupational Skin Questionnaire and International Study on Asthma and Allergy in Children Questionnaire for the evaluation of self-reported skin and atopy symptoms, clinical skin examination interpreted by means of Osnabrueck Hand Eczema Severity Index (OHSI), genotyping filaggrin (FLG) gene polymorphisms 2282del4 and R501X from buccal swabs, skin pH and transepidermal water loss (TEWL) measurements.

Results In the total sample (n=352, median age 15, 18 males), a history of respiratory and/or skin atopy symptoms was reported by 44.89%, hand/wrist eczema by 11.93%, and a history of dry hands (without eczema) by 34.38% of apprentices. One or more hand/wrist skin changes were found at the clinical examination in 18.18% of apprentices, with the OHSI score ranging from 1 to 6. Washing hands >20 times per day was identified in 12.78% of apprentices. An FLG gene mutation (R501X) was found in only one apprentice. The median (range) for hand TEWL and pH was 13.1 (4.36–62.69) and 5.68 (4.28–7.13), respectively. OHSI score was positively correlated with hand TEWL (Spearman rho 0.16; p=0.0026), and pH (Spearman rho 0.13; p=0.0186).

Conclusion The results indicate a high prevalence of self-reported atopy (45%) and moderate prevalence of self-reported (12%) and clinically observed skin symptoms (18%) on the hands/wrists of hairdressing apprentices already at the beginning of education, without FLG mutations as a risk factors. This emphasizes the need to ameliorate preventive examinations of children before enrolling to schools for professions with high risk of exposure to skin hazards.

05B.4 WORKERS' COMPENSATION CLAIMS FOR OCCUPATIONAL CONTACT DERMATITIS: 20 YEARS OF DATA FROM VICTORIA, AUSTRALIA

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Background Occupational contact dermatitis is one of the most common occupational diseases, but there is a lack of reliable information on incidence. Despite acknowledged limitations, workers' compensation statistics may provide insights into contact dermatitis patterns.

Objective The objective of the study was to characterise historical patterns of workers' compensation claims for occupational contact dermatitis.

Methods This was a retrospective analysis of workers' compensation claims for occupational contact dermatitis from 1996–2015 (n=3,348) accepted by WorkSafe Victoria in Victoria, Australia. Accepted claims per 1 00 000 person-years stratified by sex, age and industry were calculated.

Denominators for the population at risk were obtained from the Australian Bureau of Statistics using Victorian Labour Force Survey data.

Results The compensation claims rate of occupational contact dermatitis was 6.72 per 1 00 000 person-years for the overall twenty-year period. There was a significant reduction in claims from 11.84 in 1996 to 1.78 in 2015. Males had a higher overall claims rate of 7.97 compared to the rate for females of 5.18. Over the twenty-year period the rate for males decreased from 14.46 to 1.7 compared to a reduction from 8.4 to 1.8 for females. This decrease was still observed when the data were standardised for underlying changes in the age structure of the population. There was an overall decline across all high-risk occupational groups

Conclusions There was a fivefold decrease in accepted claims for occupational contact dermatitis for the twenty-year period from January 1996 to December 2015 for the state of Victoria in Australia. These results need to be regarded with caution as the declining rate of accepted occupational contact dermatitis claims may indicate changes in workplace dermal exposures or improvements in workplace skin protection practices over time, or they may be driven by underlying changes to the workers' compensation system or changes to claims behaviour amongst workers.

05B.5 EFFECTIVENESS OF A SKIN CARE PROGRAM FOR THE PREVENTION OF OCCUPATIONAL CONTACT DERMATITIS IN HEALTHCARE WORKERS

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Healthcare workers (HCW) are at risk for developing hand dermatitis (HD) caused by exposure to wet work. Guidelines for the prevention of HD recommend regular use of moisturizers, however in practice their use remains low and their effectiveness is poorly investigated.

The main objective of this randomized control trial was to assess whether an intervention aimed at improving skin care leads to reduction in HD severity. The intervention included provision of cream dispensers with electronic monitoring of use, regularly communicated to the HCW. The primary and secondary outcomes were change from baseline in Hand Eczema Severity Index score (□HECSI) and Natural Moisturizing Factor (□NMF) levels as a biomarker of early changes in the skin barrier. Nine wards (285 HCW) were allocated to an intervention group (IG) and 10 wards (216 HCW) to the control group (CG).

At baseline, IG and CG had similar exposure to wet work, use of skin care and severity of HD. At follow-up (1 year) the IG showed significantly higher frequency of hand cream use as compared to the CG (self-reported data). Though, electronically collected data in the IG showed that the average frequency of 0.4 cream applications/shift was far below recommended 2 applications/shift. The HECSI reduced significantly in the IG for -6.2 (95%CI -7.7,-4.7) and in the CG -4.2 points (95% CI -6.0,-2.4). There was no difference in □HECSI or □NMF between IG and CG, however the subgroup showing mild symptoms showed significantly larger improvement in HD symptoms as compared with CG.