

EPICOH Early Conference ABSTRACT BOOK

Abstracts are organized according to the conference oral sessions program (see the detailed program on the EPICOH Early webpage: <https://epicoh2024.org/program/>)

Acknowledgment.

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November 4, Parallel morning oral sessions

Oral Session 1A

Title: Cancer. Time: 11:30-13:00. Location: Auditorium.

Chairs: Wendy Bijoux and Marie Elise Parent

Presentation Title: Occupational solar UV radiation exposure and risk of non-melanoma skin cancer: A Danish cohort study
Presentation Author: Ida Kristensen

Presentation Title: Construction work and head and neck cancer risk: results from the ICARE study
Presentation Author: Kendya Gene

Presentation Title: Occupational exposures of firefighting and prostate cancer risk in the Norwegian Fire Departments Cohort
Presentation Author: Niki Marjerrison

Presentation Title: Occupational exposure to heavy metals and welding fumes and testicular germ cell tumours risk in a French case-control study
Presentation Author: Wendy Bijoux

Presentation Title: Can an anti-inflammatory diet offset the negative effect of night shift work on cancer risk?
Presentation Author: Camille Lassale

Presentation Title: Occupational exposure to pesticides and testicular germ cell tumor in the TESTIS PRO study
Presentation Author: Céline Lamouroux

Occupational solar UV radiation exposure and risk of non-melanoma skin cancer: A Danish cohort study

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Objectives: Non-melanoma skin cancer (NMSC) is the most common cancer worldwide. The primary risk factor is solar ultraviolet (UV) radiation, which particularly affects outdoor workers. The aim is to investigate the association between occupational solar UV radiation exposure and NMSC in a Danish nationwide cohort, quantifying the association through exposure-response analyses.

Material and Methods: We conducted a register-based follow-up study combining information on the entire Danish workforce from 1977 to 2015 (DOC*X cohort) with annual exposure data based on a European UV job exposure matrix (UVJEM) and diagnoses of basal cell carcinoma (BCC) and squamous cell carcinoma (SCC). The study included a total of 2,954,885 Danish workers. We used multiple logistic regression models adjusting for relevant confounders.

Results: During follow up a total of 27,280 BCC cases and 1,147 SCC cases were identified. We observed an increasing exposure-response relation between occupational solar UV radiation and BCC, with an incidence rate ratio (IRR) of 1.48 (95% CI: 1.31-1.67) in the second lowest exposed quartile and 2.33 (95% CI: 2.06-2.62) in the highest exposed quartile, compared to the lowest exposed quartile. Results for SCC showed a non-significant increasing trend with increasing cumulative occupational solar UV radiation exposure.

Conclusions: There is a strong exposure-response relation between occupational solar UV radiation exposure and the development of NMSC in Danish workers. This finding aligns with WHO's systematic review (2023) on the work-related burden of disease and injury, reinforcing the need for effective sun-protective measures in the workplace.

Construction work and head and neck cancer risk: results from the ICARE study

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Objective: Although construction industry generates multiple exposures, including known carcinogens, there is still insufficient knowledge regarding the role of construction work in the development of head and neck cancer. We aimed to examine the association between specific tasks in the construction industry and of head and neck cancer risk.

Materials and Methods: We used data from ICARE, a large population-based case-control study conducted in France between 2007 and 2012. Analyses were restricted to men and included 2 686 controls and cases of squamous cell carcinoma of the oral cavity (n=330), oropharynx (n=509), hypopharynx (n=346) and larynx (n=423). Detailed occupational activity in the construction sector and lifestyle factors were collected by face-to-face interviews. Odds ratios (OR) and 95% confidence intervals (CI) were estimated with unconditional logistic regression models. The analyses were adjusted for age, area of residence, tobacco and alcohol consumption, and occupational exposure to asbestos.

Results: Construction work was associated with an increased risk of hypopharyngeal (OR=1.37; 95% CI 0.98, 1.93) and laryngeal cancer (OR=1.61; 95% CI 1.17, 2.21). Public work (OR=1.92; 95% CI 1.08, 3.42) and plastic floor laying (OR=2.12; 95% CI 0.92, 4.88) were associated with an increased risk of hypopharyngeal cancer. Carpentry and insulation were associated with an elevated risk of laryngeal cancer (OR=1.84; 95% CI 0.92, 3.66; OR=1.66; 95% CI 0.97; 2.83), respectively. A long duration of plastering activity also increased the risk of laryngeal cancer (OR=3.46; 95% CI 1.19; 10.04, p-trend=0.04). The risks of oral and oropharyngeal cancer were not associated with construction work in general nor with any specific task.

Conclusions: Our results suggest that construction work and several related tasks increase the risk of laryngeal and hypopharyngeal cancer.

Funding:

The ICARE study was funded by the French National Research Agency (ANR); French National Cancer Institute (INCA); French Agency for Food, Environmental and Occupational Health and Safety (ANSES); French Institute for Public Health Surveillance (InVS); Fondation pour la Recherche Médicale (FRM); Fondation de France; Fondation ARC pour la Recherche sur le Cancer; Ministry of Labour (Direction Générale du Travail); Ministry of Health (Direction Générale de la Santé).

Occupational exposures of firefighting and prostate cancer risk in the Norwegian Fire Departments Cohort

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Objectives: In their 2022 classification of firefighting as carcinogenic, the International Agency for Research on Cancer deemed the evidence of the association with prostate cancer (PC) “limited”, citing an inability to rule out that a medical surveillance bias fully explained firefighters’ excess PC incidence compared to the general population. Our aim was to compare PC risk within a firefighter cohort, applying indicators of exposures.

Methods: We used employment duration and the indicators fire exposure score, inhalation score and diesel exhaust exposure score to examine PC risk among men in the Norwegian Fire Departments Cohort (n=4251). Incident PC cases, including clinical characteristics, were obtained from the Cancer Registry of Norway (1960–2021). Cox regression was used to estimate hazard ratios (HRs) by cumulative exposure in tertiles (reference: lowest) for all, aggressive, and indolent PCs, with adjustment for age and birth cohort. The cumulative incidence of PC across birth cohorts and diagnostic periods was examined.

Results: During 123,835 person-years of follow-up, there were 268 PC cases (61 aggressive, 69 indolent, 138 unclassifiable). No clear associations emerged for any of the exposure indicators, although elevated HRs were observed for aggressive PCs in the highest tertile of fire exposure score compared to the lowest (1.51, 95% CI 0.63–2.72), and for indolent PCs in the highest tertile of inhalation score compared to the lowest (1.31, 95% CI 0.60–2.89). Assessment of cumulative incidence by stage demonstrated a greater number of diagnoses of indolent and unclassifiable PC at younger ages from 1990.

Conclusions We did not observe clear associations between our exposure indicators and PC risk. However, our study had few cases in analyses by clinical stage. Studies of PC risk among firefighters remain challenged by difficulties in exposure characterization and a limited understanding of PC etiology, as well as the unclear magnitude of a medical surveillance bias.

Funding:

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Acknowledgements: We wish to thank Jarle Jakobsen (Nordland Hospital, Bodø, Norway) for his work in the early stages of this study. We also wish to thank the fire departments that collected and shared their data that constitutes the Norwegian Fire Departments Cohort, as well as our project reference group (comprising representatives from firefighters’ unions, employers’ organisations, the volunteer organisation ‘Norwegian Firefighters Fighting Cancer’, the Norwegian Directorate for Civil Protection, the Norwegian Labour Inspection Authority, and the Norwegian Cancer Society) for their contributions to the project.

Occupational exposure to heavy metals and welding fumes and testicular germ cell tumours risk in a French case-control study

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Introduction: Testicular cancer is the first malignancy among young men in industrialized countries, with a rising incidence. However, the etiology remains unknown. Some studies suggested a link between occupational exposure to heavy metals (HMs) and welding fumes (WFs) and testicular cancer risk, but the findings are inconsistent, due to limitations in exposure assessment methods. In TESTIS-Pro study, we explored the impact of occupational exposure to HMs and WFs on testicular germ cell tumors (TGCT) risk.

Methods: This French nationwide case-control study was conducted between 2015-2018 among men aged 18-45 years old and included 454 cases and 670 controls frequency-matched on year of birth and hospital center. Questionnaire-based data were collected regarding subjects' occupational histories. The INTEROCC job-exposure matrix was then applied to the subjects' jobs coded according to ISCO-68, to assign individual occupational exposure to five selected HMs (lead, iron, cadmium, chromium, nickel) and WFs. Odds ratios and 95% confidence intervals were estimated using conditional logistic regression models adjusted for potential confounders.

Results: The prevalence of occupational exposure to HMs and WFs was 30.4% among cases and 24.6% among controls. HMs co-occur largely in occupational settings; Cramer's V statistics showed moderate to high correlations. We observed a positive association with TGCT for all selected HMs and WFs, particularly low occupational cumulative exposure to iron (OR=1.62 [1.02 ; 2.57]), and welding fumes (OR=1.62 [1.01 ; 2.58]) and high cumulative exposure to nickel (OR=1.63 [0.99 ; 2.28]). When we used a Principal Component Analysis (PCA) approach, we only found a positive association for a one-SD increase of lead exposure (OR=1.30 [0.99 ; 1.69]).

Conclusions: Evidence of an increased TGCT risk was observed for occupational exposure to several HMs and WFs. However, due to the high correlations, mechanistic studies are needed to tease out the most relevant exposure for efficient prevention strategies.

Funding and Acknowledgments:

The TESTIS-Pro project was supported through a grant from Fondation de France (00099896) and we gratefully acknowledge especially Margot Guth, Aurélie Danjou, Brigitte Dananché, Louis Bujan and Olivia Pérol for their contribution in the TESTIS-Pro project.

Can an anti-inflammatory diet offset the negative effect of night shift work on cancer risk?

Short title: Dietary inflammatory index, night shift work and cancer risk

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Background: Pro-inflammatory dietary habits and night shift work have been associated with cancer risk. Because shift work likely alters dietary patterns, we aimed to study their combined association on risk of common cancers.

Methods: We used data from the MCC-Spain study, a population-based case-control study in Spain, including 4325 cancer cases (colorectal, breast, prostate, stomach) and 3560 population-based controls. Based on a food frequency questionnaire, we calculated the energy-adjusted dietary inflammatory index (E-DII). We split the population according to the median E-DII to define anti- and pro-inflammatory diet. We assessed self-reported lifetime night shift work information. Unconditional logistic regressions were used for each cancer type, adjusting for potential confounders.

Results: Ever night shift workers reported a more inflammatory diet (higher E-DII score), and a higher intake of calories, red meat, alcohol and sugar compared to never shift workers. The E-DII was associated with higher risk of all tumors. Using “day workers with anti-inflammatory diet” as the reference, we observed no increase in risk for cancer in ever night workers who followed an anti-inflammatory diet. A pro-inflammatory diet was associated with elevated odds of colorectal and stomach cancer in both day workers (OR=1.68, 95%CI [1.45-1.95] for colorectal, OR=1.74 [1.32-2.31] for stomach) and night workers (1.59 [1.26-1.99] and 1.57 [1.03-2.36], respectively). Every night workers with a pro-inflammatory diet had increased odds of breast (1.27 (0.91-1.79) and prostate (1.31 [0.89-1.73]) cancer. Our results suggest differences based on categories of diet/night shift status, but there was no evidence of an interaction (multiplicative nor additive).

Conclusions: In a large case-control study, a pro-inflammatory diet was associated with higher risk of four tumors, and there was an excess risk associated with night shift work for breast and prostate cancer. Following an anti-inflammatory diet may help offset the excess cancer risk associated with night shift work.

Occupational exposure to pesticides and testicular germ cell tumor in the TESTIS PRO study

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Introduction Testicular cancer is considered as a rare cancer, however an increase in its incidence has been observed in recent decades. Previous studies identified associations with the occupation of farmer, increased serum organophosphate pesticides levels and living near crops treated with certain pesticides. The aim of this analysis was to estimate the effects of occupational exposure to pesticides on the risk of developing a testicular tumor in adulthood.

Methods The TESTIS study is a multicenter case-control study based in 20 French university hospitals between January 2015 and April 2018. 1124 participants (454 cases; 670 controls) were included and interviewed in the study. Then, the level of pesticide exposure was defined in three different ways: by experts and by the application of job-exposure matrices (JEM) ALOHA and FRIJEM. A cumulative exposure score was then defined for each participant by weighing the duration in each exposure level: 1 for low and 2 for high levels. Two categories were defined: \leq , or $>$ to median.

Results Exposure to high levels of pesticides was significantly associated to TGCT with a crude OR of 1.65 [CI95% 1.03-2.66] with expert assessment, slightly reduced after adjustment, and an adjusted OR of 1.79 [CI95% 1.08-2.99] according to ALOHA. The high cumulative exposure was significantly associated to TGCT with the expert assessment (OR 1.74 [CI95% 1.05-2.91]) and FRIJEM (OR 1.89 [CI95% 1.13-3.16]). The trend test is significant ($p=0.02$) for all analyses performed.

Discussion The risk of TGCT was constantly associated with occupational exposure to pesticides, supported by significant trend tests for intensity and duration, in favor of an exposure -effect.

Conclusion This is the first study to show an association between testicular germ cell tumors and occupational exposure to pesticides. These results need to be confirmed by additional studies, particularly to elucidate potential pathophysiological mechanisms.

November 4, Parallel morning oral sessions

Oral Session 1B

Title: Lung and respiratory exposure biomarkers and morbidities. Time: 11:30-13:00. Location: Ramon y Cajal.

Chairs: Parveen Bhatti and Zheshun Jiang

Presentation Title: Using exhaled breath condensate for biomarker analysis in occupational lung disease

Presentation Author: Evi De Ryck

Presentation Title: Occupational Exposome and Lung Function Decline

Presentation Author: Wenxin Wan

Presentation Title: The SafeChrom project - Integrative analyses of circulating microRNAs in hexavalent chromium exposed workers

Presentation Author: Zheshun Jiang

Presentation Title: Occupational rhinitis among workers in the Norwegian salmon processing industry

Presentation Author: Gro Tjalvin

Presentation Title: Respiratory Morbidities among Cotton Processing Workers in western region of India

Presentation Author: Sanketkumar Suthar

Presentation Title: Workplace characteristics of hairdressers, estheticians and food service workers in relation to lung cancer risk in the WELCA study

Presentation Author: Lisa Leung

Using exhaled breath condensate for biomarker analysis in occupational lung disease.

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Objective: Inhalation is an important route through which occupational exposure can reach and potentially affect pulmonary function. In this context, exhaled breath condensate (EBC) is a promising non-invasive matrix to assess lung-related biomarkers mainly coming from the lower respiratory tract. Therefore, we will evaluate what biomarkers can be measured in EBC in a pilot study and assess them in workers with respiratory lung disease.

Materials and Methods: As a pilot study, in twelve healthy participants, IFN γ , IL-1 β , 2, 4, 6, 8, 10, 12p70, and 13, TNF α , MMP-1, 2, 7, and 9, VEGFR-1/Flt-1, E- and P-selectin in addition to untargeted proteomics (only EBC) were measured twice six months apart in EBC and plasma samples after method optimisation. As part of the EU EPHOR project, in 147 workers with lung disease that were followed up over one week, questionnaire data, EBC and plasma samples and spirometry measurements were collected on Monday and Friday. IgE, inflammatory markers, untargeted proteomics, and cotinine are being assessed.

Results: The pilot study showed one significant correlation between plasma and EBC, namely for IL-10 ($\rho=0.68$) and several associations between biomarkers and lung function measurements. 29,606 peptides were found in EBC samples of which 179 could be linked to 28 proteins, and several showed significant associations with lung function measurements. In the EPHOR study, we are assessing correlations between plasma and EBC and associations will be sought between biomarkers and lung function.

Conclusion: This will result in a better insight in how the lung function is linked to internal effects and how workers can be followed up. This research will contribute to better follow-up of occupational exposures and thereby improved prevention of occupational lung disease by giving means to assess biological exposure and effects in minimally invasive matrices such as EBC.

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Occupational Exposome and Lung Function Decline

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Objective: Work-related exposures may accelerate lung function decline. However, the occupational drivers of lung function remain poorly understood.

Material and Methods: This study aimed to comprehensively explore the impact of the occupational exposome based on a multi-centre, prospective cohort: ECRHS (European Community Respiratory Health Survey), involving participants aged 20- 44, followed for over 20 years. Spirometry was performed at each visit. Based on participants' lifetime job information, we assessed 51 occupational exposures to construct the occupational exposome by linking with five job-exposure matrices, covering 31 chemical, 13 biological, and 7 physical exposures. We applied an Exposome Wide Association Study (ExWAS) to determine single exposure-response associations between the exposure and decline in forced expiratory volume in 1s

(FEV₁), after strictly adjusting for age, sex, centre, pack-year, education, early-life risk score, home environment risk score, and air pollution risk score in linear mixed-effect models. An interaction term between average exposure during follow-up and year since follow-up was included in the model to estimate the accelerated longitudinal FEV₁ annual loss.

Results: A total of 5,391 subjects were included in the study. From ExWAS analysis, five occupational exposures (flour, endotoxin, foods, enzymes, and storage mites) were found to be associated with accelerated decline in FEV₁ without correcting for multiple comparisons (with a faster decline in FEV₁ between 5.5 to 8.7 ml/yr per 1 SD increase in exposures). None remained statistically significant after controlling for a 5% false discovery rate.

Conclusions: Our analyses illustrated the application of exposome framework in occupational epidemiology, and the initial results uncovered less investigated factors potentially affecting lung function decline. Future efforts will use multipollutant approaches to fully investigate the complex interactions among exposures.

The SafeChrom project - Integrative analyses of circulating microRNAs in hexavalent chromium exposed workers

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Objective: Exposure to hexavalent chromium (Cr(VI)) occurs during several occupational activities and leads to lung cancer. Growing evidence suggests that microRNA (miRNA) plays an important part in carcinogenesis. This study was to explore circulating miRNAs of Cr(VI) exposed workers and to identify the potential biological function of differentially expressed miRNA (DEM).

Material and Methods: This study included 89 Cr(VI) exposed workers and 47 controls (male and non-smokers) recruited in the SafeChrom project. MiRNA was extracted from plasma followed by DNase treatment, library preparations, miRNA sequencing, and DEM analysis. Messenger RNA (mRNA) analysis was performed via qPCR. Target genes of DEM were predicted, and enrichment and protein interaction network analyses were performed to understand their potential biological function.

Results: A total of 1937 miRNAs were detected and 59 DEMs were identified in the exposed workers (21 up-regulated and 38 down-regulated miRNAs). 169 genes were identified to be associated with the up-regulated DEMs and 609 genes were associated with the down-regulated DEMs. Target genes for both up- and down-regulated DEMs were significantly enriched in three KEGG terms: miRNAs in cancer, small cell lung cancer and non-small cell lung cancer. Network analysis revealed hsa-miR-184 as a central interactor in the up-regulated DEMs, and hsa-miR-200c-3p, hsa-miR-429, hsa-miR-106a-5p and hsa-miR-210-3p were central interactors in down-regulated DEMs. Protein-protein interaction showed a high number of interactions and confirmed the results obtained by enrichment analysis, in which AKT1, CCND1, CDK4 and E2F3 were recognized as hub genes. Blood mRNA expression levels of hub genes are ongoing.

Conclusions: Our study suggests that Cr(VI) exposure results in differential expression of miRNAs in occupational workers. The identified DEMs in exposed workers combined with bioinformatics analyses suggest possible roles for specific miRNAs, of which some may be associated with Cr(VI)-induced toxicity and carcinogenicity. Further studies are needed to validate the mechanism of those DEMs and their target genes.

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Occupational rhinitis among workers in the Norwegian salmon processing industry

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Objective: Occupational rhinitis is a work related inflammatory nasal disease that might precede the development of occupational asthma. Salmon processing workers are exposed to bioaerosols comprising proteins, including allergens. Previous literature has suggested an increased risk of occupational asthma and rhinitis among these workers, but data on airborne exposure to bioaerosols is limited. We aimed to assess the prevalence and severity of rhinitis symptoms among salmon processing workers exposed to bioaerosols.

Material and Methods: A cross-sectional study was performed among 748 employees in 9 Norwegian salmon processing plants. Full shift exposure measurements (n=353) were collected from 222 workers in the same plants and in the same week as questionnaires were completed and were analysed for the inhalable fraction of total protein. Pearson's chi-square test was used to test differences in self-reported nasal symptoms between process line workers (n=672) and office/administrative workers (n=76).

Results: Ever rhinitis without having a cold was more prevalent among workers in the processing line than among office/administrative workers; 46% vs 30% (p=0.009). Processing workers also reported more nasal symptoms during the workday the past week: Itching (37% vs 24%, p=0.03); Fullness/congestion/blockage (42% vs 21%, p<0.001); Sneezing (49% vs 29%, p=0.001); and Discharge/runny nose (50% vs 23%, p<0.001). Personal exposure to total protein was higher among salmon processing workers (median 3.0 µg/m³, range 76 µg/m³) than among office/administrative workers (0.9 µg/m³, 12 µg/m³).

Conclusions: Workers in the processing line in Norwegian salmon processing industry have a higher prevalence of work-related rhinitis symptoms compared to administrative workers in the same industry. In further analyses an industry-specific Job-Exposure-Matrix (JEM) will be used to elucidate possible exposure-response associations.

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Respiratory Morbidities among Cotton Processing Workers in western region of India

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Objective: The cotton textile industry presents significant occupational health risks due to cotton dust exposure, which can result in respiratory conditions such as chronic cough, phlegm production, wheezing, dyspnea, and chest tightness. This study aimed to evaluate the prevalence of respiratory morbidities among workers in cotton processing units and the surrounding community in the Kadi region of North Gujarat, India.

Material and Methods: A cross-sectional survey was conducted among 60 workers from both organized and unorganized cotton processing units and factories located in the outskirts of Kadi and Detroj region. Data were collected on demographic, socioeconomic, and general health parameters. Respiratory morbidity was assessed using the validated Medical Research Council (MRC) UK Respiratory Questionnaire. Data was entered into MS Excel and analyzed using IBM SPSS software.

Results: The prevalence of respiratory symptoms among the workers was as follows: cough (38.3%), phlegm (36.7%), grade 3 dyspnea (8.3%), grade 4 dyspnea (45%), wheezing (45%), and chest tightness (56.7%). Male workers exhibited a higher prevalence of cough and grade 3 dyspnea compared to female workers. Respiratory morbidities were notably higher among workers who did not use personal protective equipment (PPE) and those with over five years of exposure to cotton dust.

Conclusions: This study highlights a high prevalence of respiratory symptoms among cotton processing workers in the Kadi region. Increased rates of respiratory morbidities were observed among male workers, those with prolonged exposure to cotton dust, and those not utilizing PPE. These findings emphasize the urgent need for preventive interventions, such as mandatory PPE usage and improved workplace conditions, to safeguard the respiratory health of workers in the cotton industry. Further research, with larger sample sizes and longitudinal study designs, is warranted to provide more definitive evidence on the respiratory health impacts on these workers.

Workplace characteristics of hairdressers, estheticians and food service workers in relation to lung cancer risk in the WELCA study

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Objective: To explore the relationship between workplace characteristics of hairdressers, estheticians and food service workers and lung cancer risk.

Materials and Methods: In a population-based case-control study on women in the Paris area (2014-2017), information on sociodemographic factors, tobacco consumption, and lifetime occupational history was collected through in-person interviews for 731 incident lung cancer cases and 751 population controls. Participants working in occupations suggested to have excess lung cancer risks in previous studies, such as hairdressers, estheticians, and food service workers, were administered specific questionnaires asking about workplace characteristics like job type, setting, clientele sex, ventilation, number of seats, and presence of frying stations. The relationship between the workplace characteristics of hairdressers, estheticians, and food service workers and lung cancer risk was evaluated. Odds ratios and 95% confidence intervals (OR (95% CI)) were estimated using logistic regression, adjusting for smoking and other covariates.

Results: Compared to women never employed in these occupations, hairdressers and estheticians (n=32) and food service workers (n=142) were more likely to have a lower level of education and be current smokers. Positive associations with lung cancer risk were suggested for hairdressers and estheticians employed for ≥ 10 years (1.68 (0.62-4.57)), working in establishments with ≥ 6 seats (1.81 (0.44-7.49)), and never having ventilation in the workplace (1.71 (0.66-4.49)). For food service workers, elevated ORs with lung cancer risk were observed for ever employment as a dishwasher (1.72 (0.75-3.97)), ever working in fast food establishments (1.49 (0.33-6.77)), and ever having frying stations in the workplace (1.53 (0.87-2.71)).

Conclusions: In this exploratory analysis, certain workplace characteristics of women working as hairdressers, estheticians, and food service workers are suggestively associated with lung cancer. Due to the imprecision of our risk estimates related to few exposed participants, further studies focusing on these occupational populations with detailed workplace information are required.

Funding:

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November 4, Parallel morning oral sessions

Oral Session 1C

Title: Exposure assessment. Time: 11:30-13:00. Location: Charles Darwin.

Chairs: Hans Kromhout and Viviane Remy

Presentation Title: Exposure to metals in workers from the metal recycling industry: GreenMetalWaste study in Sweden
Presentation Author: Anja Stajnko

Presentation Title: Exploration of a diverse external exposome dataset
Presentation Author: Sander Ruiter

Presentation Title: Occupational exposure to incidental metal nanoparticles: a systematic review
Presentation Author: Noemi Paulin

Presentation Title: Analysis protocol to assess occupational exposure to microbial contamination in woodworking environments
Presentation Author: Marta Dias

Presentation Title: Exposure to electromagnetic fields in bus drivers: an example of the Swiss Bus-Exposure Matrix application
Presentation Author: Viviane Remy

Presentation Title: A less detailed job axis in a quantitative job exposure matrix results in a similar exposure-response association
Presentation Author: Johan Ohlander

Exposure to metals in workers from the metal recycling industry: GreenMetalWaste study in Sweden

Anja Stajniko¹, Eva Dock^{1,2}, Robert Linder^{1,2}, Malin Engfeldt^{1,2}, Mats Leeman^{1,2}, Else Åkerberg Krook^{1,2}, Eva Assarsson^{1,2}, Henrik Enquist^{1,2}, Camilla Dahlqvist^{1,2}, Åsa Ek³, Theo Bodin⁴, Anastasiia Snigireva⁴, Michael Levi⁴, Karin Grahn^{4,5}, Gunilla Rydenstrand⁵, Evana Amir Taher⁵, Gunilla Runström⁶, Bodil Björ⁷, Helen Bertilsson⁷, Pernilla Wiebert^{4,5}, Anna Dahlman Höglund⁶, Lars Modig^{7,8}, Maria Albin⁴, Karin Broberg^{1,3}

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Objective: The transition from fossil fuels to green energy is increasing the demand for metals, particularly critical raw materials, resulting in a drastic expansion of the metal recycling industry. However, there is limited knowledge of potential exposure risks among workers in this industry. Accordingly, in a cross-sectional study within the GreenMetalWaste project, we aim to assess metal exposure among workers from Swedish metal recycling companies.

Material and methods: We have recruited 133 workers (83% male, average age 40y) from 13 companies, and 70 controls from companies outside the metal recycling industry. The companies recycle metals from different end-of-life products, including e-waste, batteries, fluorescent tubes, metal scrap etc. Workers provided urine and blood after at least 4h of work, pre-shift urine, personal inhalable and respirable air measurements and a questionnaire about work tasks and occupational history.

Results: According to the preliminary results of air measurements, around 16% of workers had inhalable inorganic dust levels exceeding the Swedish occupational exposure limit (OEL) of 5 mg/m³ for 8h of work, with high exposures, particularly among workers conducting maintenance and manual sorting. Furthermore, measurements of 39 different metals in air samples revealed that some workers had levels of Mn, As, Co, and Pb exceeding the OEL, while others had levels of Cr, Cd, Co, Pb, Mn, Fe and Al above 10% of the OEL.

Conclusions: To assess the actual uptake of metals in workers, air measurements will be supplemented with metal analyses in biological samples of workers. This will include multiple critical raw materials as well as known toxic metals such as Pb, Hg and Cd. Based on the air measurements, we expect to observe significantly higher levels of several metals in blood and/or urine of workers compared to the controls and variations in metal exposure depending on specific work tasks.

Funding:

The GreenMetalWaste project was funded by The Swedish Research Councils FORTE and FORMAS (2021-01757).

Exploration of a diverse external exposome dataset

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Objective: New technologies such as sensors and chemical screening assays allow for measuring the external exposome at the individual level, providing detailed information on exposure concentrations and dynamics over time. Data that is generated through these technologies is plentiful and diverse and requires advanced analytical methods. We are exploring several data analysis techniques to extract meaningful and comprehensible exposure profiles from a large external exposome dataset of a working population across Europe.

Material and methods: Personal external exposome data was collected for ~250 workers within the Exposome Project for Health and Occupational Research (EPHOR) project. Data was collected using combinations of: sensors for particulate matter, light, UV, noise, temperature and humidity; accelerometers for physical activity levels and sleep; passive samplers for screening of >3000 volatile and semi-volatile organic compounds; heart rate monitors and a daily ecological momentary assessment (EMA) questionnaire for contextual information such as work times. Measurements were collected for 5 days per participant.

Results: Sample analysis and data preprocessing is ongoing at the time of writing for this abstract. Planned analyses include enriching measurement data by combination of measurements (e.g., differentiating between workplace and non-workplace exposures using EMA results) to develop more informative parameters, variable selection to prioritize which measurements are most explanatory for differences between the workers and clustering to identify groups of similarly exposed workers. Determinant analyses will be performed to explain clusters based on factors such as job type, SES or country. These analyses may give new insights in how, why and where workers are exposed, which can be used to improve health-related research.

Conclusions: Several analysis methods are being explored to analyse a large and diverse dataset of external exposome data to obtain an integrative understanding of exposure profiles in the European working population.

Occupational exposure to incidental metal nanoparticles: a systematic review

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Objective: This work aims to review the scientific literature dealing with the exposure to incidental metal nanoparticles (IMNPs) in work environments, by analyzing the specific emission patterns and the different environmental and human monitoring strategies in papers focusing on the main productive processes.

Materials and Methods: In December 2023, a literature search was performed by adopting specific search strings suitable for Web of Science, PubMed and Scopus. By applying the exclusion criteria in accordance with PRISMA workflow, on the initial 2879 articles retrieved 46 articles were included in this review.

Results: The results were summarized for each productive process: welding (25), additive manufacturing (AM, 15) and others (i.e. laser/plasma cutting, sintering, 6). All analyzed processes showed significant IMNPs release whose magnitude and patterns varied according to the features of adopted technologies, process phase, materials employed and monitoring conditions. Welding displays persistently elevated average particle levels, almost always exceeding the pilot nano reference values (NRVs, 20,000 n/cm³) [1]. AM presents high IMNP-release during printing and cleaning phase where, depending on the technology employed, shows comparable average concentrations with respect to welding. Maximum detected release instead exceeds the NRVs ceiling threshold limit for nearly all technologies. Only limited data are available on human biomonitoring coupled to quantitative metal IMNPs assessment to provide a consistent dose-response evaluation.

Conclusions: The development of novel technologies poses the necessity to identify and assess the related risks. The general fragmentation of the available information dealing with the IMNP release in occupational settings highlights the relevance of the review as a framework for supporting definition of safety measures for managing risks associated with IMNPs. To properly evaluate the IMNP risks and protect workers, further studies are needed to define standardized monitoring methodology, to identify standard reference benchmarks and potential biomarkers of effect to be evaluated.

1. British Standards Institute (BSI) Nanotechnologies Part 2: Guide to Safe Handling and Disposal of Manufactured Nanomaterials 2007.

Analysis protocol to assess occupational exposure to microbial contamination in woodworking environments

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Abstract: Workers in the woodworking industry may be exposed to several microbial contaminants that can lead to respiratory diseases.

Objective: The aim of this study is to define the most suitable analysis protocol that allows a proper occupational exposure assessment to microbial agents in woodworking environments.

Material and Methods: The analysis approach applied in this study comprehends several analyses that are used as a complement to overcome the advantages and disadvantages of each and was developed to be applied in woodworking environments such as “Do It Yourself” (DIY) stores with a wood cutting area, and in sawmills. Those methods include culture-based methods for quantifying both fungal and bacterial colonies, identifying fungal species, and testing antifungal susceptibility. It also includes molecular tools for the detection of fungal species clinically relevant and/or with toxigenic potential, and to detect mutations in fungal isolates.

Results: Using both methods allowed us to obtain more accurate results. For instance, using the SKC Button Aerosol Sampler with a 0.8 µm, 25 mm polycarbonate filter linked to an SKS pump as a personal air sampler, in DIY stores, *Aspergillus* section *Fumigati* was identified by culture-based methods incubated at 27°C in 6 out of 48 (12.5%) samples, while incubated at 37°C it was observed in 27 out of 48 (56.25%) samples, and through molecular tools (RT-PCR) in 48 out of 48 (100%) samples. This approach allowed to recover a higher number of isolates for further azole resistance screening, corroborating the thermotolerance of this *Aspergillus* section and the awareness of the widespread in both settings.

Conclusions: With the application of this comprehensive protocol, it was possible to conclude that the use of all these analysis methods, in parallel, is crucial to not only overcome the constraints of each but also to allow an accurate exposure assessment and, consequently, the risk characterization.

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IPL/IDI&CA2023/ASPRisk_ESTeSL; IPL/IDI&CA2023/ARAFSawmills_ESTeSL

Exposure to electromagnetic fields in bus drivers: an example of the Swiss Bus-Exposure Matrix application

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Background: The Swiss Bus-Exposure-Matrix (BEM) is a database detailing exposure levels for 17 physical, chemical, and ergonomic hazards across 705 bus models used in Switzerland from 1980 to the present. This study uses BEM data to describe and assess temporal variations in exposure to electromagnetic fields (EMF) and to estimate individual cumulative exposure among Swiss bus drivers.

Material and Methods: Electromagnetic fields were measured using the dosimeter PMM 8053, focusing on low-frequency (5 to 100 kHz) and high-frequency (100 kHz to 7 GHz) electric and magnetic fields. Exposure values were averaged using the robust regression on order statistics (ROS) method and modeled using Integrated Nested Laplace Approximation, then applied to the Swiss bus inventory to construct the BEM. Data from a 2022 online questionnaire, which listed the buses driven by participants, were used to assign EMF exposure values by cross-referencing bus models.

Results: The study included 916 drivers, of whom 710 (77.5%) indicated their bus-driving history, the oldest having started in 1985. The BEM assessed annual EMF exposure based on work rates. In 2022, mean exposures were 0.40 V/m for high-frequency electric fields, 0.49 V/m for low frequency electric fields, and 0.18 μ T for low-frequency magnetic fields. From 1985 to 2022, mean exposures to high-frequency and low-frequency electric fields increased, while low-frequency magnetic field exposure decreased. The highest cumulative high-frequency electric field exposure was 19.7 V/m for a full-time bus driver with 34 years of employment, and the lowest was 0.12 V/m for a part-time bus driver with one year of employment.

Conclusions: While personal exposure measurements are the gold standard in occupational hygiene and epidemiology, they are challenging to collect for a large cohort. The Swiss BEM provides an acceptable alternative for assessing EMF exposure in bus drivers, facilitating the investigation of their potential short- and long-term health effects.

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A less detailed job axis in a quantitative job exposure matrix results in a similar exposure- response association

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Background: Quantitative job exposure matrices (JEMs) have been developed to assign exposure utilizing ISCO-68 coded job information. For extended compatibility with the less detailed ISCO-88 coding, a quantitative JEM using the same underlying model was developed. We compared exposure-response relationships between cumulative respirable crystalline silica and lung cancer risk using a quantitative JEM based on ISCO-88 (88-JEM) and ISCO-68 (68-JEM).

Material and Methods: Based on a common set of approximately 15,000 silica measurements, job-region- and time specific exposure levels were estimated for both the 88-JEM and the 68-JEM, and linked to participants' job histories. Exposure-response relationships in the international lung cancer case-control study SYNERGY were analysed by logistic regression and generalized additive models.

Results: The 88-JEM and the 68-JEMs yielded similar silica-lung cancer associations, with elevated lung cancer risks across each cumulative exposure quartile. The 88-JEM exhibited a minor not statistically significant upward bend in the exposure-response curve at higher exposures.

Conclusions: To accurately detect associations between disease risk and occupational exposure, quantitative JEMs can be applied in community-based studies that provide job histories in either ISCO-88 or ISCO-68.

Funding:

We extend our sincere appreciation to the SYNERGY study group and the principal investigators of the original studies (<https://synergy.iarc.fr/collaborators/>). The SYNERGY project is funded by the German Social Accident Insurance (DGUV), and is coordinated by the International Agency for Research on Cancer (IARC), the Institute for Prevention and Occupational Medicine of the DGUV, Institute of the Ruhr-University Bochum (IPA) and the Institute for Risk Assessment Sciences at Utrecht University (IRAS). The original studies were funded by a list of agencies including: Canadian Inst Health Research and Guzzo-SRC Chair in Environment and Cancer; the Canadian Cancer Society and the Occupational Cancer Research Ctr of Ontario; the French agencies ANSES, ANR, ARC, INCA, FRM, InVS, DGT, and the Fondation de France; the German Federal Ministry of Education, Science, Research, and Technology and the Ministry of Labour and Social Affairs; EC's INCO-COPERNICUS program; Polish State Committee for Scient. Research; Roy Castle Foundation; NIH/ NCI/ DCEG

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November 4, Parallel Afternoon Oral Sessions

Oral Session 2A

Title: Shift work. Time: 14:00-15:30. Location: RITA LEVI.

Chairs: Kyriaki Papantoniou and Norvil Mera

Presentation Title: Relationship between Atypical Working Hours and multiple lifestyle factors and health outcomes

Presentation Author: Hanifa Bouziri

Presentation Title: Role of sleep deficit and chronotype in the association of night shift work with overweight and obesity among hospital workers

Presentation Author: Isabel Santonja

Presentation Title: Assessment of prevalence and pharmacological management of anxiety and depression among night-shift workers: A cross-sectional study in Spain

Presentation Author: Cristina Márquez

Presentation Title: The association of night shift work and its characteristics with self-perceived depression symptomatology – Findings from EPHOR study

Presentation Author: Marina Ruiz Rivera

Presentation Title: Impact of night shift work on immune markers among a cohort of workers in Spain, EPHOR study

Presentation Author: Mei Gascón Burillo

Presentation Title: Night shift work and epigenetic modifications: MiRNA relative expression levels among a European cohort of night shift workers

Presentation Author: Barbara Harding

Relationship between Atypical Working Hours and multiple lifestyle factors and health outcomes

Hanifa Bouziri¹, Annette Leclerc¹, Marie Zins¹, Jack Siemiatycki^{2,3}, Marcel Goldberg¹, Sofiane Kab¹

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Context: Atypical working hours (AWHs), including long working hours, alternate schedules, staggered hours, less than 48 consecutive hours off weekly, night work, and weekend work, are increasingly common.

Objective: To describe personal correlates and health-related effects of AWHs.

Methods: Data from the French population-based CONSTANCES cohort was used. Collected data includes socio-economic status, job histories, AWHs, and personal habits (sleep, diet, exercise, tobacco, alcohol, and other substances). Health data were obtained from various sources (namely, questionnaires, health exams and linkage to the national healthcare utilisation database). Finite mixture models optimised by the Expectation-Maximization algorithm were used to identify clusters of co trajectories of AWH exposures throughout careers. Associations between each type of AWH and health outcomes were examined using logistic regression models adjusted for age and geographical origin and stratified by sex and occupation.

Results: Of the 163,491 participants, 81,934 (50%) reported at least one AWH exposure period during their career. Five exposure clusters were identified: Cluster 1 had high exposure to staggered hours, inadequate rest, weekend work, and long daily hours. Cluster 2 experienced staggered hours and alternating shifts, with significant night and weekend work. Cluster 3 had extensive weekend work and inadequate weekly rest for nearly half. Cluster 4 was highly exposed to weekend work, staggered hours, night work, and alternating shifts, with frequent long daily hours and inadequate rest. Cluster 5, similar to Cluster 1, but had more managers and professionals facing staggered hours and inadequate rest.

Many health outcomes were associated with AWHs, including poor self-perceived health, metabolic syndrome, diabetes, dyslipidemia, hypertension, depression, substance use, sleep deprivation, obesity, and sexual dissatisfaction.

Conclusions: We identified several distinct lifetime profiles of AWH exposure. The associations between AWH profiles and various health outcomes require replication and further investigation.

Role of sleep deficit and chronotype in the association of night shift work with overweight and obesity among hospital workers

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Objective: To explore the combined effect of shift work, sleep deficit and chronotype on overweight and obesity prevalence.

Material and Methods: We conducted an online survey among current day workers, former and current night shift hospital workers in Vienna (n=799). Respondents with missing information in key variables were excluded from the analysis (n=21). Overweight and obesity were defined as BMI ≥ 25.0 kg/m² and ≥ 30.0 kg/m², respectively. Sleep deficit was defined as average sleep duration being shorter than individual sleep need. The association of shift work, sleep deficit and chronotype with overweight and obesity was investigated using logistic regression models adjusted for age and gender (model 1) and other potential confounders [model 2 (M2)]. Effect modification by sleep deficit and chronotype was evaluated.

Results: Overweight was more prevalent among former (34.4%) than among current night shift workers (29.0%) and day workers (26.8%). The prevalence of obesity was similar across groups (around 20.0%). Sleep deficit was most prevalent among current shift workers (n=65, 22.4%). Former and current night shift workers with sleep deficit had a higher prevalence of obesity, but risk estimates were non-significant and attenuated after adjusting for additional confounders. In the whole sample, evening chronotype (n = 413) was significantly associated with obesity [M2-OR (95% C.I.) = 1.99 (1.29-3.09)] and with overweight or obesity [M2: 1.42 (1.04-1.96)]. This result persisted in stratified analysis by work categories. Compared to day workers with a morning chronotype, former night shift workers with an evening chronotype had higher odds of obesity [M2-1.75 (0.81-3.83)] and overweight or obesity [M2-1.52 (0.84-2.75)].

Conclusions: Evening chronotype was associated with being overweight and obesity across all shift work categories. In addition, results from an ongoing European survey on the joint effect of sleep, chronotype will be analysed and presented in the conference.

Conflicts of interest and source of funding:

IS, SH, EW, ES and KP are involved in the project "Development and evaluation of strategies to reduce and prevent obesity in shift workers (SHIFT2HEALTH)" funded under the EU HEALTH call "HORIZON-HLTH-2022-STAYHLTH-01-05: Prevention of Obesity Through the Life Course". The authors declare no conflicts of interest.

Assessment of prevalence and pharmacological management of anxiety and depression among night-shift workers: A cross-sectional study in Spain

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Objective: The prevalence of depression and anxiety in Spain is estimated to be 4% and 7%, respectively. The prevalence of both conditions may be higher among night-shift workers due to the physical and psychological demands combined with circadian disruption.

Material and methods: This study included 404 participants (193 day-shift and 211 night-shift workers; 92% health sector and 8% transportation sector in Barcelona). Depression and anxiety were assessed using the PHQ-9 (clinical depression ≥ 10 score out of 27) and GAD-7 (clinical anxiety ≥ 14 score out of 21) scales. Using adjusted logistic regression, we assessed the association between night-shift work and a) the prevalence of depression and anxiety disorders and b) the prevalence of pharmacological treatment for these disorders.

Results: Among the 404 participants, 23% of the population met criteria for depression (17% for day-shift and 28% for night-shift) and 18% for anxiety (14% for day-shift and 22% for night-shift). Overall, 8% of our population (8% day-shift and 8% night-shift) reported use of depression medications, while 5% of the population (3% day-shift and 6% night-shift) reported use of anxiety medications. Night-shift work was associated with a greater odds of depression (OR 2.22, 95%CI 1.35-3.71) and anxiety (1.93, 95%CI 1.13-3.34). However, we did not find a relationship between night-shift work and the use of depression (OR 0.9, 95%CI 0.42-1.19) nor anxiety (OR 1.27, 95%CI 0.44-3.91) medications.

Conclusions: Within our cohort, the prevalence of depression and anxiety were notably higher than in the general Spanish population, especially among night-shift workers. We did not find an association between night-shift work status and the use of medications for these conditions. Medication use for these conditions may be underreported in our population due to stigma or participants may be managing symptoms through other non-pharmacologic means.

Funding:

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The association of night shift work and its characteristics with self-perceived depression symptomatology – Findings from EPHOR study

Marina Ruiz Rivera^{1,2}, Gemma Castaño-Vinyals^{2,3,4,5}, Manolis Kogevinas^{2,3,4,5}, Pilar Díaz Pérez^{3,4,6,7}, Sebastiana Quesada⁸, Sergi Martínez Peña⁹, Karin Broberg^{10,11,12}, Anne Helene Garde^{12,13}, Jordi Julvez Calvo^{1,2}, Barbara N Harding^{2,4,5}

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Objective: Night shift workers may be more prone to depression than their day shift working counterparts. Prior research has not examined in detail whether night shift work characteristics impact associations between night shift work and depression.

Methods: Only participants with complete data on shift characteristics and depressive symptoms, using the patient health questionnaire 9 (PHQ-9), from Spain, Denmark and Sweden were selected. Out of 845 participants, 755 were included in the analysis. Night shift work characteristics were measured through self-reported intensity (nights/week) and history (years) of night shift. We applied linear regression models to explore associations between night shift work and depressive symptomatology. Models were adjusted for age, sex, educational level, center, marital status, smoking and history of anxiety.

Results: Our population had a mean age of 42, and 54% were night shift workers (either permanent or rotative). Compared to non-night workers, night shift workers showed an increase of 1.66 points (95%CI 0.97, 2.35) on the PHQ-9 score. Compared to day workers, night shift workers that work 1-3 nights/week showed an increase of 1.3 points (95%CI 0.46, 2.14) in the PHQ-9; and an increase of 2 points (95%CI 1.18, 2.83) among those who work ≥ 4 nights/week. Regarding night shift history, compared to those who worked < 5 years in night shift, workers with 5-10 years of history showed an increase in the PHQ-9 of 1.1 points (95%CI 0.1, 1.9), and those with > 10 years showed an increase of 0.7 point (95%CI -0.1, 1.5).

Conclusions: Night shift work was associated with elevated depressive symptomatology. We observed evidence of a dose-response between greater intensity of night shifts and elevated depressive symptoms, but not for night shift work history.

Impact of night shift work on immune markers among a cohort of workers in Spain, EPHOR study

Mei Gascón^{1,2,3}, Ana Espinosa^{1,2,3,4}, Ruth Aguilar¹, Pilar Díaz Pérez^{2,4,5,6}, Sebastiana Quesada⁷, Sergi Martínez Peña⁸, Barbara N. Harding^{1,2,3}, Manolis Kogevinas^{1,2,3,4}, Gemma Castaño-Vinyals^{1,2,3,4}

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Objective: Night shift is associated with changes in the circadian rhythms of many markers including cytokines, but studies have been small. We examined the effects of night shift work on immune markers, specifically the levels of cytokine/chemokines and growth factors (CK).

Material and Methods: This study included 193 permanent day shift workers and 211 permanent night shift workers from Spain. A blood sample was collected from each worker at approximately the same time of the day (beginning of shift for day workers, end of shift for night workers). We measured 28 CKs in plasma samples by Luminex

using the Cytokine Human Magnetic 30-Plex Panel LHC6003M. We applied log₁₀ transformation and used mixed models with plate as random effect to examine how night shift work, duration (no night shift, ≤ 5 years, > 5 to < 10 years, ≤ 10 years), frequency (no night shift, ≤ 2 consecutive nights, > 2 consecutive nights) and intensity (no night shift, ≤ 3 nights shift week, > 3 nights shift week) variables can influence the levels of CKs. Models were adjusted by sex, age, education, tobacco and alcohol use. The results are presented in % change.

Results: We observed a significant reduction for IP-10 levels for permanent night shift workers compared to permanent day shift workers (% change: -13.14, 95%CI -22.72 to - 2.23). This reduction was more pronounced for participants with ≤ 10 years of permanent night shift work (% change: -15.61, 95%CI - 26.74 to -2.6). No significant differences were observed for the other CKs. In addition, we did not observe any pattern for the variables of frequency and intensity.

Conclusions: Night shift work appears to modulate the immune response with a few alterations in specific CK levels.

Night shift work and epigenetic modifications: MiRNA relative expression levels among a European cohort of night shift workers

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Objective: To date, the major pathways contributing to cardiovascular disease among night shift workers remain poorly understood. MicroRNAs (miRNAs) have been identified as novel regulators of cardiovascular risk factors and are estimated to control more than 30% of the human protein coding genome. We examined the expression levels of 5 candidate miRNAs among night shift workers.

Materials and methods: RNA was extracted from plasma samples of 110 night and 90day shift workers from Spain and Sweden who were part of the EPHOR study, followed by deoxyribonuclease treatment, complementary DNA synthesis, and quantitative real-time polymerase chain reaction using target-specific assays for five miRNAs (*miR-122-5p*, *miR-107*, *miR-155-5p*, *miR-21-5p*, and *mir 103a-2-5p*). We described characteristics of the study population, and expression levels of the miRNA assays. In adjusted linear regression models, we examined associations between night shift status and the log transformed relative expression levels of all miRNAs.

Results: Participants were on average 44 years of age, predominantly female (94%), and worked in the health sector. We found that *mir-21-5p*, *mir-155-5p*, *mir-103a-2-5p* and *mir-107* were highly correlated with each other, and *mir-122-5p* was moderately correlated with the other miRNAs. Results suggest higher expression levels of the miRNAs in night shift workers, most notably for *mir-21-5p* (coefficient 0.38, 95%CI -0.11, 0.87) and *mir-107* (coefficient 0.36, 95%CI -0.13, 0.84), however results were not statistically significant.

Conclusions: Night shift work appeared to be associated with an elevated expression level of circulating miRNAs. Future work should explore potential dose-response associations between intensity and duration of night shift work and miRNA expression levels and also how these biomarkers relate to biomarkers of cardiovascular health among the population to further gain insight on the potential role of miRNA in cardiovascular health among night shift workers.

Funding:

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November 4, Parallel Afternoon Oral Sessions

Oral Session 2B

Title: Disability, rehabilitation and return to work. Time: 14:00-15:30. Location: RAMON Y CAJAL

Chairs: Sarah Daniels and Sonja Senthonar

Presentation Title: A multi-method examination of work disability among immigrant workers in British Columbia, Canada

Presentation Author: Sonja Senthonar

Presentation Title: What can secondary data tell us about the work-related health outcomes of geographically-mobile workers in British Columbia, Canada?

Presentation Author: Robert Macpherson

Presentation Title: The effectiveness of pharmacotherapy of alcohol-related disorders and diseases on labour market marginalisation

Presentation Author: Devy L. Elling

Presentation Title: Civilian employment outcomes for UK Armed Forces personnel with battlefield injuries, and the role of pain and mobility

Presentation Author: Howard Burdett

Presentation Title: Returning to Work After Cancer: Survivors' Perspectives on Barriers and Facilitators

Presentation Author: Amaia Ayala Garcia

Presentation Title: Return to Work with Long Covid: A Qualitative Study

Presentation Author: Sarah Daniels

A multi-method examination of work disability among immigrant workers in British Columbia, Canada

Sonja Senthana¹, Mieke Koehoorn², Christopher McLeod²

¹The School of Health Sciences, University of Northern British Columbia, Canada; ²The School of Population and Public Health, University of British Columbia, Canada.

Objective: This program of research investigated the work disability experiences of immigrant workers compared to Canadian-born workers in the province of British Columbia, Canada to identify inequities where they exist.

Methods: Workers' compensation claims data were linked with immigration and health records to investigate differences in work disability including disability duration, provision of work-related rehabilitation services and modified work, and longer-term cardiovascular-related outcomes using a series of regression models by injury outcomes. Drawing on these quantitative findings, 17 injured immigrant workers were interviewed to understand the contextual reasons for observed differences.

Results: Roughly 106,000 workers' compensation claims were included, of which 20% were approved for immigrant workers across the injury groups. Immigrant workers experienced persistent differences in disability duration compared to Canadian-born workers. For example, at the 50th percentile, refugee men and women were off 10 to 14 days longer, respectively, for back strain injuries compared to their Canadian-born counterparts. Immigration was associated with a decreased odds ratio (OR) of receiving modified return to work within 30 days of injury, including for example for fractures among economic (OR=0.94), family (OR=0.84) and refugee classification workers (OR=0.42), compared to Canadians. The odds of new-onset cardiovascular-related outcomes following a work injury, as one indicator of a stressful life event, were variable with a higher odds of diabetes but a lower odds of acute myocardial infarction for immigrants compared to Canadians. Interviews with immigrant workers revealed complex contexts and intersecting challenges to navigating work disability, from language barriers and inaccessibility of case managers to misaligned work accommodation practices that prolonged rehabilitation.

Conclusions: This program of research provided a comprehensive understanding of work and health inequities experienced by immigrant workers. Key recommendations are provided for stakeholder groups (workers' compensation, settlement organizations) to support the re(integration) of immigrant workers to the labour market following work disability.

Funding:

This research was supported in part with funds from a Michael Smith Foundation for Health Research Trainee award (award no. RT-2021-1760) and from the WorkSafeBC research program (award no. 2021-RM04) held by Sonja Senthana. SS, MK and CBM are supported by research operating funds through the Partnership for Work, Health, and Safety – a research partnership between WorkSafeBC and the University of British Columbia.

What can secondary data tell us about the work-related health outcomes of geographically-mobile workers in British Columbia, Canada?

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Abstract topic: Return to work

Objective: To provide key findings from a program of research which combines different forms of secondary data to identify and compare the work-related health outcomes of geographically-mobile workers injured in the province of British Columbia, Canada.

Methods: Workers' compensation claims data, tax return data, and Census and survey data were used to identify geographically-mobile workers in British Columbia using different definitions, including inter provincially mobile workers (working in the province and living outside the province), intra-provincially mobile workers (working and living in the same region of the province), and mobile industry workers (maritime and land transportation). Negative binomial and quantile regression models were used to compare injury claim rates and work disability duration.

Results: Inter-provincially mobile workers represented a small proportion of workers' compensation claims (1%) and experienced lower injury claim rates than resident workers (RR: 0.39, 95% CI: 0.35-0.44). However, when matched with resident workers with similar characteristics, they experienced longer work disability duration, with approximately two more weeks at the 50th percentile and over one month of disability at 75th percentile. Inter-provincially mobile workers had longer work disability duration than intra-provincially mobile workers, but the latter group accounted for a larger proportion of compensation claims (7%) and also experienced longer work disability duration than non-mobile workers, regardless of whether the injuries were acute, chronic, and episodic. Compared to trucking, aquaculture and marine transportation workers experienced the highest claim rates (RR: 1.68 and RR: 1.26, respectively). However, work disability duration is longest for workers in the fishing and rail transportation sectors.

Conclusions: This research demonstrates how we can use multiple sources of data to both identify different forms of geographically mobile workers and understand their injury and claims experience. Furthermore, this research demonstrates the need for greater prevention and rehabilitation efforts among these types of workers.

Funding:

This research was supported by "Policy and Practice in Return to Work After Work Injury: Challenging Circumstances and Innovative Solutions" an operating grant from the Canadian Institutes of Health Research (CIHR) (Application Number 326950), "Policy and Practice in Return to Work After a Work Injury: Challenging Circumstances and Innovative Solutions" a research partnership grant funded by the Social Science and Humanities Research Council (Application Number 895-2018-4009), CIHR (Application Number 159064), multiple universities and partners, and the Research and Workplace Innovation Program of the Workers Compensation Board of Manitoba.

Availability of data: Workers' compensation claims data were not publicly available and were made available to the researchers by Population Data BC (www.popdata.bc.ca) with permission of the data

steward, WorkSafeBC. Interjurisdictional workers' data were made available to the researchers through request of custom tables from Statistics Canada (<https://www.statcan.gc.ca/en/reference/custom>). All other data were publicly available from Statistics Canada.

The effectiveness of pharmacotherapy of alcohol-related disorders and diseases on labour market marginalization

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Funding: This study is funded by the Systembolaget's Alcohol Research Council (grant id: FO2022-0044).

Objective: Alcohol-related disorders and diseases (ARDD) are associated with labour market marginalisation, such as long-term sickness absence (LTSA) and unemployment. Among those who receive treatment, ARDD pharmacotherapy remains underutilised. The treatment effects of pharmacotherapy on labour market marginalisation remain largely unexplored. This study aims to assess the effectiveness of ARDD pharmacotherapy on LTSA and unemployment.

Material and methods: A longitudinal cohort study was conducted using the Swedish Work, Illness and Labour Market Participation (SWIP) cohort, which links various nationwide registers. This study included gainfully employed individuals who received a first-time ARDD diagnosis between 2006 and 2019 (N=150,736 individuals). The exposure was the use of pharmacotherapy (disulfiram, acamprosate, naltrexone, nalmefene, or any combination of these), estimated using the 'tablet-per-day' method. Labour market marginalisation was measured by LTSA (≥ 90 days/year) and unemployment (≥ 180 days/year). Additional information included sociodemographic characteristics (sex, age, education), use of other medications, and other mental health diagnoses. Individuals were followed from first-time diagnosis to death, emigration, or end of data linkage (31 December 2020). Cox regression models were conducted to examine the effectiveness of pharmacotherapy with LTSA and unemployment. Individuals with an ARDD diagnosis who did not use any pharmacotherapy served as the reference group.

Results: Preliminary results suggest pharmacotherapies, used as monotherapy or combined, were associated with a higher risk of LTSA. The use of acamprosate, as monotherapy or in combination with naltrexone, was associated with a higher risk of unemployment compared to those who did not use pharmacotherapy, while other pharmacotherapies were associated with a lower risk of unemployment.

Conclusions: The use of pharmacotherapies for ARDD may be associated with increased work incapacity, which leads to LTSA. Whereas using ARDD pharmacotherapy may decrease the chance of becoming unemployed. This underscores the importance of an early treatment process to ensure a healthy workforce.

Civilian employment outcomes for UK Armed Forces personnel with battlefield injuries, and the role of pain and mobility

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Objective: Numerous UK Armed Forces personnel were evacuated from the conflicts in Iraq and Afghanistan following battlefield injury. Many of these, particularly those with amputations, will leave Service as a consequence. We examined whether battlefield injury and amputation reduced employment rates after leaving the UK Armed Forces, and any role of pain and mobility.

Materials and Methods: Battlefield injured participants (n=406) and uninjured comparators (n=107) were drawn from the ADVANCE cohort of UK Service personnel who were aeromedically evacuated to a UK hospital while on deployment to Afghanistan. Pain and mobility were drawn from the EQ-5D measure of health outcomes and analysed as potential mediators to a relationship between battlefield injury with or without amputation and employment.

Results: 21.2% of the injured group were not in paid employment, compared with 14.3% of the uninjured comparison group. Within the injured group 27.5% of those with amputations were not in paid employment, compared with 18.1% for those without amputations. Although those with amputations had an increased risk of being unemployed compared to the uninjured (adjusted rate ratio 1.69 (95% confidence interval (CI) 0.95, 3.00)), this was not statistically significant.

For those injured without amputation (compared to the uninjured), there were indirect effects on employment through both mobility (aRR 1.32, 95% CI 1.11-1.69) and to a lesser extent pain (aRR 1.10, 95% CI 1.01-1.31). Neither mobility nor pain mediated the relationship between injury and employment for those with an amputation compared to the uninjured.

Conclusions: Any relationship between injury and employment for those injured without sustaining an amputation compared to the uninjured is likely due to the mediating effects of mobility and to some extent pain. Those without amputations may require additional support for the sequelae of their injuries to facilitate re-entry to the civilian labour market.

Returning to Work After Cancer: Survivors' Perspectives on Barriers and Facilitators

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Objective: Individuals who have experienced cancer often face challenges when returning to work after sickness absence (SA). Previous research indicates that cancer survivors are at a higher risk than the general population of leaving the labor market prematurely or experiencing unemployment due to the lasting effects of the disease and its treatment. This study aims to identify the barriers and facilitators associated with the return to and retention in the workplace of salaried workers in Catalonia after a SA due to cancer.

Material and methods: The research employed a descriptive qualitative approach with a socio-constructivist perspective. Theoretical sampling was conducted to the point of data saturation. Three discussion groups, each consisting of seven participants who had experienced a SA due to cancer in Catalonia, were formed. The sessions were conducted virtually, recorded, transcribed verbatim, and analyzed using thematic analysis and mixed coding.

Results: The detected barriers to job reincorporation included: (1) coping with the same workload as before the SA, (2) sequelae associated with cancer treatment that affected their ability to work (stress, low ability to concentrate, chronic fatigue, mobility limitations), (3) having jobs with a high physical load, (4) expectations of colleagues and bosses. Facilitating factors included: (1) sessions with psycho-oncologists, (2) availability of holidays to adapt their return after SA, (3) the possibility of teleworking, and (4) job adaptations. Regarding proposals to improve this process, the most outstanding were the implementation of policies that allow a gradual return to work adjusted to the people who want to adhere to it and generalize the possibility of doing psycho-oncological therapy.

Conclusions: The end of SA following cancer treatment is a critical period for individuals, as they often encounter numerous challenges. Implementing measures such as a gradual return to work could mitigate many of these difficulties.

Funding:

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Return to Work with Long COVID: A Rapid Review of Support and Challenges

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Objective: The Covid-19 pandemic has significantly affected the workforce, especially for those who subsequently developed long COVID (LC). There is limited knowledge about how to support people with LC (PwLC) to return to work (RtW) and the barriers and facilitators to effective support. A rapid review using narrative synthesis aimed to address these gaps.

Methods: The review utilised the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach, conducting database searches in October 2023 across MEDLINE, Embase, APA PsycINFO, EBM Reviews, Health Management Information Consortium, Web of Science, and Google Scholar. Quality assessment was performed using JBI Systematic Reviews critical appraisal tools.

Results: The review included 40 studies published between 2021 to 2023, with varying methodological rigor. RtW rates among PwLC ranged from 36.7% to 87.6%. LC is associated with increased labour inactivity and long-term absence. Lower rates of RtW are mostly associated with severe cases and manual occupations. RtW rates fluctuated over time post-COVID-19 infection.

Effective non-workplace-based interventions included interdisciplinary healthcare programs and rehabilitation focusing on pacing and breathing strategies, measured by sick leave days, work ability index, or RtW rates.

Qualitative studies of PwLC highlighted the need for workplace support like flexible hours, remote work, and job adjustments, while barriers included a lack of understanding of LC, inadequate workplace guidance, and educational gaps among managers. Facilitators included recognising LC as a legitimate medical condition, eligibility for disability benefits, and self-management strategies.

Conclusions: The unpredictable nature and wide variety of LC symptoms complicates RtW for PwLC. Since LC symptoms overlap with other conditions like chronic fatigue syndrome, effective interventions on RtW from these conditions may apply to LC. Lack of understanding and awareness of LC presents significant challenges for workplace support. Consistent guidelines on LC's definition, compensation, and disability status may facilitate the provision and take-up of support.

November 4, Parallel Afternoon Oral Sessions

Oral Session 2C

Title: Psychosocial Work Environment and Health Risks. Time: 14:00-15:30. Location: CHARLES DARWIN.

Chairs: Reiner Rugulies and Kathy Badarin

Presentation Title: Person-related work and the risk of type 2 diabetes: a Swedish register-based cohort study

Presentation Author: Kuan-Yu Pan

Presentation Title: The Interplay Between adverse psychosocial work environment and Work-Life Balance

Presentation Author: Svetlana Lakisa

Presentation Title: Interactive effects of changes in overtime and night shifts during the COVID-19 pandemic on burnout in nurses: a longitudinal study

Presentation Author: Emanuele Maria Giusti

Presentation Title: Job strain, social support, and alcohol-related health problems: A register-based cohort study.

Presentation Author: Emelie Thern

Presentation Title: Psychosocial work exposures and diagnosed depression in Finnish men and women: an application of European Job-Exposure Matrix

Presentation Author: Laura Salonen

Presentation Title: Psychosocial work environment's impact on hazardous alcohol use in different occupational groups: results from the Stockholm Public Health Cohort

Presentation Author: Erica Jonsson

Person-related work and the risk of type 2 diabetes: a Swedish register-based cohort study

Kuan-Yu Pan, PhD¹, Alicia Nevriana, PhD¹, Melody Almroth, PhD^{1,2}, Daniel Falkstedt, PhD¹

¹Unit of Occupational Medicine, Institute of Environmental Medicine, Karolinska Institutet, Sweden;

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Objective: Person-related work requires workers to interact with individuals not employed at the workplace, such as clients and patients, and can cause emotional labour, emotional demands, and confrontation. These stressors may increase workers' risk of type 2 diabetes (T2DM), but their impact may differ depending on the level of support received from colleagues. We aimed to examine the association between person-related work and the risk of T2DM, and the effect modification of social support at work.

Material and Methods: The study population consisted of around three million T2DM-free, employed individuals aged 30-60 years in Sweden in 2005. Three dimensions of person-related work – general contact with people, emotional demands, and confrontation – and social support were respectively assessed using job exposure matrices. T2DM cases in 2006-2020 were determined based on drug, patient, and death registers. Multi-variable Cox regression models were used.

Results: A total of 216,640 individuals developed T2DM. High exposures to emotional demands and confrontation were respectively associated with 20% and 15% increased risks of T2DM in men and 24% and 20% in women. In both men and women, there was statistically significant effect modification by social support regarding emotional demands and confrontation. The associations between the two dimensions and T2DM were higher among those with low social support than those with high social support.

Conclusions: In both men and women, dimensions of person-related work, including emotional demands and confrontation, are associated with an increased risk of T2DM, and low social support at work seems to amplify the magnitude of these associations.

Funding:

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The Interplay Between adverse psychosocial work environment and Work-Life Balance

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Objective: The adverse psychosocial work environment can significantly impact employees' work-life balance. Conflicts with managers, tensions between co-workers, and various forms of workplace abuse contribute to a stressful atmosphere and impact the balance between professional and personal life. This study aims to analyze the association of different dimensions of conflicts at work that can affect work-life balance.

Material and Methods: Computer-assisted personal interviewing method was used to obtain the representative sample of 2503 hired workers during the cross-sectional workforce study survey in 2022. The associations were analyzed by using logistic regression - odds ratios adjusted for gender, age, and education.

Results: Almost every third of respondents mentioned a lack of work-life balance, odds of imbalance were higher for males, younger workers, higher education levels, and higher salary quartile. All types of conflicts at work triple the odds of lack of work-life balance: conflicts between co-workers (OR = 3.40) or groups of workers (OR = 3.35), conflicts with managers (OR= 3.23), as well as conflicts with clients (OR=2.58). Workplace abuse or threats of it contribute to imbalance - psychological (OR=3.47) and physical (OR=2.24) abuse or threats of it and sexual harassment (OR=4.90) significantly affect work-life balance.

Conclusions: Lack of work-life balance is more common in adverse psychosocial work environments, where conflicts and abuse occur. It is known that lack of work-life balance is associated with job satisfaction and lower productivity, therefore, it is important to communicate the hidden effects of workplace conflicts and abuse to employers, encouraging them to implement targeted preventive measures.

Funding:

The project "Internal consolidation of RSU and external consolidation of RSU with LSPA" (No. 5.2.1.1.i.0/2/24/I/CFLA/005) grant "BALANCE4LV research: Assessing and Enhancing Work-Life Balance in the Latvian Context (No. RSU-PAG-2024/1-0012) is financed within the framework of the European Union Recovery and Resilience plan and the state budget.

Interactive effects of changes in overtime and night shifts during the COVID-19 pandemic on burnout in nurses: a longitudinal study

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Early Career category of the presenting author: Starting Phase

Objective: The nature of the associations between changes in overtime, night shifts and burnout in healthcare workers remains underexplored due to reliance on cross-sectional studies and self-reported measure of exposures. This longitudinal study aimed to evaluate the independent and interactive effects of changes in overtime and night shifts, obtained from administrative records, on nurses' burnout.

Materials and Methods: N=317 nurses working in an Italian university hospital filled the Maslach Burnout Inventory in September 2019 and again in December 2020. Overtime and night shifts were derived from administrative data and their yearly changes were categorized into three groups each. Linear regressions were used to estimate 2020 burnout differences between exposure groups, controlling for 2019 burnout levels, demographic and work-related characteristics, and to test the interaction between the exposures.

Results: The mean±SD daily overtime was 0.62±0.51 hours/day in 2019, with a mean [95%CI] increase of 1.00 [0.92,1.08] hour/day in 2020, these figures were 0.77±0.16 and 1.71 [1.64,1.77] in the Onset of High Overtime group. These nurses had higher emotional exhaustion (4.33 [1.69,6.96]), depersonalization (2.10 [0.46,3.74]), and poor personal accomplishment (2.64 [0.51,4.78]) than Stable Low Overtime nurses. Night shift nurses worked a mean of 52.18±17.56 night shifts in 2019, with a mean increase of 2.46 [0.51,4.41] in 2020. Nurses in the Increase in Night Shifts group had lower emotional exhaustion (-4.49 [-7.51-1.46]) than No Night Shift nurses. Interaction analyses revealed that this effect was limited to those in the Stable Low Overtime group. Moreover, increases in night shifts were associated with higher depersonalization and poor personal accomplishment in Stable High Overtime nurses.

Conclusions: Changes in work organization during the pandemic were associated with nurses' burnout, net of its pre-pandemic levels. Both chronic exposure and a sharp increase in overtime worsened burnout, underscoring the need for specific regulations and actions to address it.

Acknowledgment: This study is funded by "Bando COVID Insieme per la Ricerca", by Regione Lombardia/Fondazione Veronesi. The funder had no involvement in the study design, collection, analysis and interpretation of the data, writing of the report, decision to submit the paper for publication.

Job strain, social support, and alcohol-related health problems: A register-based cohort study

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Objective: Previous research indicated that low job control and passive jobs are positively associated with alcohol-related morbidity. However, little is known about other alcohol-related consequences and the role of social support. The current study aims to examine the association between job strain (combination of job demand and job control) and alcohol-related health problems, and to what extent social support moderates this association.

Materials and Methods: A register-based cohort study was conducted using information from the Swedish Work, Illness, and Labor-market Participation (SWIP) cohort, including 3 million individuals registered in Sweden in 2005. Job exposure matrices (JEM) were used to obtain information on job demands, control, and social support, which was linked to the individual's occupation. Information on the outcome of alcohol-related health problems was collected between 2006 and 2020 from multiple registers containing information on alcohol-related morbidity and mortality. Survival analyses were used to examine the association between the job strain and alcohol-related health problems, adding the dimension of social support as an effect modifier.

Results: Preliminary results suggest that job strain has varying effects on alcohol-related health problems. Compared to individuals in low strain jobs with strong social support, the protective effect of having an active job remained regardless of level of social support (Hazard ratio [HR]: 0.56, for both low and high). Among those in high strain jobs, low social support is associated with an increased risk (HR: 1.15), while high social support is linked to a decreased risk (HR: 0.68). Individuals with passive jobs face increased risk regardless of social support (HR: 1.06 and HR: 1.11, for low and high, respectively).

Conclusions: In Sweden, high social support appears to be of importance in high strain jobs with regards to buffering the effects of work-related stress in relation to alcohol-related health outcomes.

Funding:

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Psychosocial work exposures and diagnosed depression in Finnish men and women: an application of European Job-Exposure Matrix

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Objective: This study examines the association between psychosocial exposures assessed using a newly developed European Job-Exposure Matrix (EuroJEM) and the risk of diagnosed depression in Finnish men and women.

Material and Methods: A 90% random sample of 30–60-year-old Finnish residents in 2010 with occupational information was included in the study (n=885,709 men, n=882,660 women). The Psychosocial EuroJEM is a harmonized measure based on three gender-specific national JEMs, categorizing the proportion of workers in each occupation exposed to high job demands and low decision authority into four categories: 0-24%, 25-49%, 50-74%, 75-100%. Job strain was defined as the combination of decision authority and job demands using a 50% proportion cut-off. Cox proportional hazards regression was used to analyze the association between psychosocial work exposures and the first healthcare visit due to depression in 2011–2021, controlling for age and education.

Results: The prevalence of diagnosed depression was 6.8% in men and 11.5% in women. Both crude and adjusted results showed statistically significant associations between low decision authority and depression in both genders. For the job demands, the associations with diagnosed depression varied. Compared to the lowest proportion exposed to high job demands, the second lowest proportion was associated with a higher risk of depression (only in women with an HR 1.16, 95% CI 1.12-1.20), while even higher proportions of exposure were associated with a decreased risk. In the age- and education adjusted models, high job strain was associated with a higher risk of diagnosed depression (in men), compared to low job strain (low job demands – high decision authority).

Conclusions: Our findings from EuroJEM align with previous findings utilizing national JEMs. The gender differences in the associations might be due to differential stress reactions or gender-based segregation in the labour market.

Psychosocial work environment's impact on hazardous alcohol use in different occupational groups: results from the Stockholm Public Health Cohort

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Objective: The association between psychosocial work environment (PWE) and hazardous drinking is inconsistent in the literature. We aim to evaluate how PWE is associated with hazardous alcohol use at an occupational level, hypothesizing different implications across occupations.

Material and Methods: We conducted a longitudinal cohort study using Stockholm Public Health Cohort data linked to national registers. Baseline data from 2006 and 2010, included self reported sociodemographic characteristics, health factors, occupation, and PWE. PWE categories—active, passive, high-strain, and low-strain (reference) work—were based on job control and job demands. Follow up, four years later measured hazardous drinking, defined as heavy episodic drinking (5+ units/month) and hazardous average consumption (men: >14 units/week, women: >9 units/week). The study included 18,747 working individuals with complete responses on exposure and outcome. Logistic regression, stratified by occupation, assessed PWE's effect on hazardous alcohol use.

Results: At follow-up, 20% reported hazardous drinking. The associations of PWE with hazardous drinking varied greatly when stratified by occupation. In the total study population, only active showed a slightly increased likelihood when compared to low-strain (OR: 1.10). Among occupations, high-strain work generally increased the likelihood of hazardous drinking, notably among craft/tradesmen (OR: 5.46), but was protective for service/sales (OR: 0.45), healthcare, and clerical support workers. Passive work was mostly protective, especially for Science, Technology, Engineering, and Mathematics workers (STEM) (OR: 0.42), though the likelihood increased for management (OR: 2.01), administrators/supervisors, construction, and plant/machine operators. Active work was also generally protective, but to a milder degree, as seen among business and marketing (OR: 0.72). Active work increased the likelihood of hazardous drinking among construction workers (OR:1.50), STEM, healthcare and plant/machine operators.

Conclusions: The association of PWE on hazardous alcohol use varied in magnitude and direction depending on occupation, with the most pronounced variation seen among high-strain work, indicating a need for occupation-based research.

Funding:

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November 5, Parallel morning oral sessions

Oral Session 3A

Title: Workplace Well-Being and Job Satisfaction. Time: 11:30-13:00. Location: MARIE CURIE.

Chairs: Evangelia Demou and Svetlana Lakiša

Presentation Title: Gender differences in teacher job satisfaction and general well-being in 11 territories worldwide: a cross-cultural study in 2023

Presentation Author: Thomas Lim

Presentation Title: Strategies and recommendations to reduce and manage the psychosocial work-related impact of COVID-19 in the health and social care sector

Presentation Author: Flor Rivera

Presentation Title: Intention to leave the profession for European nurses and physicians: Evidence from the Meteor Survey

Presentation Author: Laura Maniscalco

Presentation Title: Modification in Quality of Life and Health in Medical Students across Graduation

Presentation Author: Szymon Szemik

Presentation Title: Navigating Policing: The Impact of Motherhood and Workplace Social Support on the Wellbeing of Female Police Officers and Staff

Presentation Author: Mahnoz Illias

Presentation Title: Laughing at work: what does evidence say?

Presentation Author: Leonie Matteau

Gender differences in teacher job satisfaction and general well-being in 11 territories worldwide: a cross-cultural study in 2023

Sofia Temam¹, Thomas Lim^{1,2}, Nathalie Billaudeau¹, Stephanie Alexander¹, Ange-Andréa Lopo³, Morgane Richard³, Marie-Noël Vercambre¹

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Objective: Gender inequalities in the workplace persist around the world, often to the detriment of women. In the highly feminized education sector, how is women's well-being impacted? Our aim was to examine gender differences in teacher job satisfaction and general well-being and their stability across cultures.

Material and Methods: Between February and June 2023, 23,366 teachers from 11 territories across four continents responded online to the 2nd edition of the International Barometer of Education Staff (I-BEST): Argentina (n=1,782), Belgium (n=937), Cameroun (n=421), Canada (outside Québec) (n=765), France (n=9,595), Japan (n=532), Morocco (n=739), Québec (n=1,751), Spain (n=2,723), Switzerland (n=1,597), and United Kingdom (n=2,524). In each of these territories, we evaluated differences between male and female teachers in job satisfaction (score range: 0-9) and subjective well-being (score range: 1-8) using linear regression models adjusted for potential confounders: age, teaching level, household partner and household child(ren). Then, we formally assessed the heterogeneity in gender differences across territories using a meta-analysis approach.

Results: The percentage of female teachers among the respondents ranged from 58% (Cameroon, Morocco) to 86% (Switzerland). Across territories, results were highly heterogeneous (I-squared>70% for both indicators), with globally a slight trend towards lower levels of general well-being among women, but no definite pattern regarding job satisfaction. More specifically, among French teachers, women scored respectively 0.12[0.04;0.21] and 0.12[0.05;0.19] points higher than men on job satisfaction and general well-being, inversely in Argentina, women scored -0.43[-0.67; -0.19] and -0.39[-0.58;-0.20] points lower respectively. In the other territories studied, no clear pattern emerged regarding gender disparities in teacher well-being.

Conclusions: Depending on the territories, well-being levels could be slightly lower or, on the contrary, slightly higher among female teachers compared with their male counterparts. Multilevel analysis including demographic/economic/cultural territory-level indicators could be helpful to better understand this heterogeneity and the gendered differences in well-being across territories.

Funding:

This research received no external funding.

Strategies and recommendations to reduce and manage the psychosocial work-related impact of COVID-19 in the health and social care sector

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Objective: To identify and present workplace interventions and recommendations developed in response to the COVID-19 outbreak intended to tackle psychosocial risks and improve workers' mental health and well-being in the EU's health and social care (HeSCare) sector.

Methodology: A Delphi study with experts in the field and multimodal searches in the scientific and grey literature were used to identify workplace interventions and compile recommendations developed in the COVID-19 context, focusing on workers in the HeSCare sector. EU, EFTA, and other countries were included as long as their interventions could be extrapolated to the EU context.

Results: Over 150 sources of information were identified. After screening, 138 reports of workplace interventions and 144 documents with recommendations were selected. Workplace interventions were categorised into three domains: cognitive-behavioural (39.8%), physical and mental relaxation (32.6%), and organisational (27.6%). The scope of the interventions identified was individual primarily (55%), followed by collective approaches (24%), with some combining both, i.e. "mixed interventions" (21%). The most frequent types of interventions identified were counselling (29.7%), mindfulness (17.4%), digital resources (14.5%), resting rooms/hubs (11.6%), organisational adjustments (10.9%), and psychoeducation (10.1%). Most interventions (90%) targeted healthcare workers, compared with social workers with or without accommodation (e.g. elderly or home care). Identified recommendations were analysed and classified according to their level of action. Organisational (56.8%) contemplated group advice on managing resources, communication, leadership and work organisation. Individual interventions (22%) included stress management, peer support and self-care. Outcome-specific recommendations (21.2%) addressed burnout, posttraumatic stress, isolation, and moral injury.

Conclusions: This work aims to offer a detailed compendium of examples of interventions and recommendations based on real-life evidence that institutions, workplaces, and other stakeholders could apply to mitigate the psychosocial burden on HeSCare professionals in future health emergencies and increase the resilience of an essential sector.

Funding:

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Nadia Vilahur, PhD, Research Project Manager, Prevention and Research Unit, European Agency for Safety and Health at Work (EU-OSHA).

Intention to leave the profession for European nurses and physicians: Evidence from the Meteor Survey

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Objective: This study aims to estimate the prevalence of intention to ITL for physicians and nurses in Europe and to investigate the determinants of ITL.

Materials and methods: The METEOR survey is a cross-sectional study conducted on 8 hospitals of Belgium, The Netherlands, Italy, and Poland between May and September 2022. ITL was assessed as agreement with the sentence “I intend to leave my healthcare profession for another job” scored on a 5-point Likert scale⁴. Two multivariable logistic models for ITL were estimated for physicians and nurses, with as covariates job satisfaction, burnout⁵, workers’ individual and hospital characteristics.

Results: The study included 375 physicians and 1350 nurses. ITL was agreed upon by 17% physicians and 13.6% nurses. Multivariable analysis highlighted significant determinants for nurses and physicians: living in the Netherlands (OR=1.78, 95%CI:1.18-2.70 for nurses, OR=3.29, 95%CI:1.28-9.12 for physicians, compared to Belgium), depersonalization (OR=2.58, 95%CI:1.43-4.66 for nurses, OR=3.76, 95%CI:1.01-12.65 for physicians), and job dissatisfaction (OR=2.11, 95%CI:1.2-3.69 for nurses, OR=4.71, 95%CI:1.66-13.19 for physicians). Additional risks for nurses included being young (OR=0.95, 95%CI:0.94-0.97), experiencing emotional exhaustion (OR=3.05, 95%CI:1.88- 4.94), uncertain work prospects (OR=1.84, 95%CI:1.10-3.04), limited use of abilities (OR=2.1, 95%CI:1.33-3.27), work-related health problems (OR=1.49, 95%CI:1.01-2.18), low development opportunities (OR=2.71, 95%CI:1.16-6.05), low salary (OR=1.91, 95%CI:1.29-2.84) and a lower risk for Italy (OR=0.17, 95%CI:0.05-0.44) compared to Belgium. Surgeons’ physicians had the highest ITL (OR=2.82, 95%CI:1.23-6.37).

Conclusions: Our survey highlighted the prevalence of ITL among both nurses and physicians in the EU. Individual, work environment characteristics, depersonalization and job dissatisfaction were found as strong determinants of the intention to leave the profession. Retention policies at the micro/meso/macro levels are necessary.

Funding:

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Modification in Quality of Life and Health in Medical Students across Graduation Objective

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Objective: Medical students experience numerous demands during the education process, determining their quality of life (QoL) and health status. POLLEK (POLski LEKarz, eng. Polish Physician) study aims to identify and evaluate the quality of life, mental health status, and ever-recognized chronic diseases by simultaneously assessing their determinants in Polish medical students during long-term observation.

Material and Methods: The POLLEK is the follow-up cohort study conducted among medical students at the Medical University of Silesia in Katowice. Students were followed during two observation periods: in their first year of studies, the academic year 2021/2022 (T1), and in their second year, the academic year 2022/2023 (T2).

Results: The total number of participants in the first year of observation (T1) was 427 while in the second year (T2) was 335. Obtained results confirmed that the QoL score significantly decreased in their second year of studies mainly in the somatic and psychological domains. Moreover, we observed a significant increase in self-declared scoring of somatic symptoms year by year (from M=4.75 at T1 to M=8.06 at T2, $p<0.001$) in the GHQ-28 questionnaire survey. The determinants of QoL domains common to T1 and T2 remained self-declared health status, frequency of physical activity, and current financial situation. In the first year of evaluation, 56 students (13.10%) were overweight or obese, and 52 (15.8%) in the second. Regardless of the academic year, the increased risk of being overweight or obese was significantly associated with dissatisfaction with personal health, financial deficiencies, and a diet abundant in meat consumption.

Conclusions: The QoL in medical students and selected determinants of their health status deteriorated during the observation period. Our findings suggest that medical schools should actively promote the activity needed to achieve a balance between schoolwork and the personal life of medical students from the beginning of university study.

Navigating Policing: The Impact of Motherhood and Workplace Social Support on the Wellbeing of Female Police Officers and Staff

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Objective: Female officers and staff encounter unique gender-specific challenges in policing, especially during pregnancy and motherhood. This study investigates how motherhood affects mental health outcomes, specifically probable depression and anxiety, as well as duration of sickness absence, while also considering the impact of workplace social support.

Methods: We employed logistic regression to analyse probable depression and anxiety using data from the Airwave Health Monitoring Study (AHMS). Additionally, Cox proportional hazards models were used to evaluate return-to-work after sickness absence, utilising AHMS data linked with sickness absence records from 26 police forces over a decade. Exposure variables were determined by the interaction of motherhood status and workplace social support, with covariates including sociodemographic, lifestyle, and work-related factors.

Results: In fully adjusted models, mothers with low total workplace social support (i.e. from superiors and colleagues combined) exhibited higher odds of probable depression (OR: 1.56, 95%CI: 1.07-2.27) and anxiety (OR:1.58, 95%CI: 1.14-2.2) compared to non-mothers. Moderate and high social support decreased the odds of depression (Moderate: OR:1.08, 95%CI: 0.95-1.22; High: OR:0.85, 95%CI: 0.73-0.98) and anxiety (Moderate: OR:1.29, 95%CI: 1.18-1.41; High: OR:0.99, 95%CI: 0.9-1.09) among mothers. However, increased total workplace social support correlated with longer sickness absence episodes for mothers (Low: HR: 0.84, 95%CI: 0.71-0.99; Moderate: HR: 0.96, 95%CI: 0.92-1.00; High: HR:1.03, 95%CI: 0.99-1.08). These patterns held true across different sources of social support i.e. social support individually from superiors and colleagues.

Conclusions: This study highlights the critical role of workplace social support for female police officers and staff in balancing their professional and maternal responsibilities. Enhanced social support can improve mental health, job retention, job satisfaction, and organisational effectiveness, ultimately benefiting public safety.

Laughing at work: what does evidence say?

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Objective: The aim of this review was to explore the components of laughter therapy used in the workplace and their effectiveness.

Material and Methods: A scoping review was conducted. A structured search strategy was applied to 6 databases. Pairs of independent reviewers screened, assessed eligibility, extracted data, and critically appraised the articles, ensuring that two junior reviewers were never paired. To be included, studies had to be performed among workers using an interventional design and evaluating laughter therapy. Quality appraisal was conducted using the Mixed Methods Appraisal Tool. Thematic analysis of extracted data allowed to answer the research questions.

Results: 25 original studies were included with samples of varying sizes (n=7-200 participants) and professions. The procedure of the intervention included introduction (background, rationale of laughter therapy) (n=7), laughter exercises (n=19), breathing, deep breathing or diaphragmatic breathing (n=15), warm-up including clapping and/or stretching (n=10), vocalization or chanting (n=8), meditation or relaxation (n=7), body movements (n=6), childish games (n=3), and expression of feelings and/or feedback (n=4). The number of sessions varied

between 1 and 28, the duration of each session between 10-15 minutes and 90 minutes, the total duration of the intervention between 1 and 90 days, and the frequency between once a day and once a month. The most frequent outcome

investigated was stress (n=16) with results generally statistically significant (n=12) but sometimes not (n=4). The quality appraisal revealed a poor quality among the included studies, due for example to important risks of selection and/or confusion

bias (n=17/17 non-randomized studies) and to risks of information and/or selection bias (n=5/6 randomized studies).

Conclusions: Laughter therapy seems promising in the workplace to help reduce stress. New research is required regarding its effectiveness, as the available studies are methodologically heterogeneous, have significant limitations, and some mixed results were observed.

Funding:

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November 5, Parallel morning oral sessions

Oral Session 3B

Title: Precarious employment and health disparities. Time: 11:30-13:00. Location: RAMON Y CAJAL.

Chairs: Nuria Matilla and Julio César Hernando Rodríguez

Presentation Title: Degrees of Decline: Race and Gender Disparities in Early Career Precarious Employment and Mid-Life Depression for College-Educated Americans

Presentation Author: Anita Minh

Presentation Title: Community-Engaged Epidemiology and Abolitional Possibility: The case of aluminum worker health

Presentation Author: Elizabeth McClure

Presentation Title: The Impact of In-Work Poverty on Mental Health: A Cohort Study of the Swedish Population

Presentation Author: Kathryn Badarin

Presentation Title: Parental precarious employment and the mental health of their adolescent children: a Swedish registry study

Presentation Author: Lluís Mangot-Sala

Presentation Title: Characterising Australian migrant workers in silica exposed jobs

Presentation Author: Stella Gwini

Presentation Title: A Job Exposure Matrix for Precarious Employment in Europe

Presentation Author: Julio César Hernando Rodríguez

Degrees of Decline: Race and Gender Disparities in Early Career Precarious Employment and Mid-Life Depression for College-Educated Americans

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Objective: This study examines how exposure to precarious employment (PE) in the early careers of college-educated Americans differs by race and gender, having implications for mental health disparities in mid-life. Studies show that racialized Americans receive fewer economic returns for higher education than their white counterparts. However, less is known about how PE—characterized by a combination of low wages, instability, and limited benefits, opportunities and protections—drives these inequities, or about its relationship to depression in the long term.

Methods: Data came from respondents of the National Longitudinal Survey of Youth 1979 with tertiary education (1979-2018; n=2,751). Using multichannel sequence analysis, we identified trajectories of employment across five domains of PE (material rewards, working time, employment instability, workers' rights and protections, and collective organization), following participants for 20-years from their college graduation. We described the prevalence of depression (Centre for Epidemiological Studies Depression Scale score ≥ 8) at age 50 across trajectories. All analyses were stratified by race and gender.

Results: Unique trajectories were identified by race and gender. A '*caretaking with income penalty*' trajectory comprised 9.5% of racialized women and 7.0% of white women; no such trajectories were observed among men. A '*stable low-income employment with benefits*' trajectory was the most common among white women (56.8%), racialized women (46.6%), and racialized men (54.2%), but not white men. Among white men, a '*stable high-income employment with benefits*' trajectory was the most common (43.5%); this trajectory group was not observed among women. Racialized women with employment trajectories characterized by greater instability, lower-income, and labour force drop-out had the highest rates of depression.

Conclusions: Education produces unequal returns, with greater PE in the early careers of women and racialized populations. Interventions addressing PE should supplement education-based solutions to race- and gender-based disparities in mental health.

Funding:

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Community-Engaged Epidemiology and Abolitional Possibility: The case of aluminum worker health

Elizabeth (Libby) S. McClure, Pavithra Vasudevan, Cherrell Manley

Objective: This collaborative project addresses the possibilities and limits of occupational epidemiology in supporting struggles for environmental justice through a case study of aluminium smelting. We focus on illness and toxic exposure among Black workers and their families in Badin, North Carolina, a primary aluminum smelting plant site for Alcoa, in operation from 1915 to 2007.

Material and Methods: We conducted two quantitative analyses—one documenting disparities in work exposure trajectories, and one comparing mortality rates among workers to those in the general population. Supplementing these conventional epidemiological methods, we developed a third approach in collaboration with community members: an open-ended household survey designed to gather qualitative data regarding former workers’ job histories, medical histories, and concerns related to toxic exposures and discrimination at the smelting plant. This approach was conceived in response to residents’ questions about disparate health outcomes of toxic exposure in the workplace.

Results: The current occupational epidemiology literature published about aluminum smelting does not reflect concerns voiced by community collaborators regarding the extent of harm caused by occupational exposure to toxins, nor does it include analyses of race or gender disparities due to discriminate labor divisions.

Conclusions: We argue that despite the discipline’s history of efforts to address health inequities, published epidemiology literature on aluminium smelting functions as a white methodology in collusion with racial capitalism. We illustrate how such a method may both broaden the scientific knowledge base and support organizing towards developing an abolitional approach to epidemiology.

The Impact of In-Work Poverty on Mental Health: A Cohort Study of the Swedish Population

Kathryn Badarin¹, Jessie Gevaert², Gun Johansson^{1,3}, Melody Almroth¹, Nuria Matilla Santander¹, Sherry Baron⁴, Theo Bodin^{1,3}, Rod Hick⁵

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Objective: This study investigates the effect of In-Work Poverty (IWP) on diagnosed mental health disorders among the Swedish population.

Material and Methods: This cohort study uses a sample of 2,079,176 individuals, aged 18 to 60 at the 2013 baseline, from the register-based Swedish work, illness, and labor-market participation (SWIP) cohort. Baseline IWP is assessed through employment status and the poverty line, defined as an equivalized disposable household income below 60% of Sweden's median. Employment status is determined through data from the Swedish Tax Agency. The five exposure categories are: i) long term unemployment, ii) IWP working < 12 months, iii) IWP working 12 months, iv) working < 12 months above the poverty line, and v) working 12 months above the poverty line (reference group). Outcomes include mental health disorders (ICD-10 F3/F4) and Selective Serotonin Reuptake Inhibitors (SSRI) prescriptions. Survival analysis estimated sex-specific Hazard Ratios (HR) and 95% Confidence Intervals (95%CI) during the follow-up (2014-2019).

Results: Adjusted preliminary results indicate that, compared to the reference group, all exposure categories had an increased risk of mental disorders and SSRI prescriptions. Men in IWP working < 12 months (HR 1.49, 95%CI: 1.34-1.66) and long-term unemployed women (HR 1.25, 95%CI: 1.10-1.42) had the highest risks for mental disorders. Compared to the reference group, men in long-term unemployment or IWP working < 12 months had similar risks of being prescribed SSRIs. Among women, those in IWP working either 12 months (HR 1.22, 95%CI: 1.19-1.26) or < 12 months (HR 1.26, 95%CI: 1.18-1.35) had a higher risk of SSRI prescription than long-term unemployed women.

Conclusions: Our findings underscore the impact of IWP on mental health in Sweden, emphasizing the need for targeted interventions to address the health implications of economic instability among workers. Addressing poverty and health inequalities requires looking beyond labor market inclusion or exclusion.

Funding:

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Parental precarious employment and the mental health of their adolescent children: a Swedish registry study

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Objective: The adverse effects of precarious employment (PE) on workers' health are well documented, ranging from depression and anxiety to cardiovascular disease and work-related injuries. However, it is cogent to look beyond the impact PE has on worker health and investigate how PE may impact the family unit, particularly children's health. Currently, little is known about the impact of parental PE on children's mental health. This study responds to this gap by examining the effects of parental PE on the mental health of their adolescent children. Moreover, we explore how this association varies depending on whether it is the mother or the father who are in PE.

Materials and Methods: This register-based study uses the Swedish Work, Illness, and Labour-market Participation (SWIP) cohort. A sample of n=117,453 children aged 15 years at baseline (2005) were followed-up until the age of 19 (2009). A multidimensional construct of PE (SWE-ROPE 2.0) was used to classify parental employment conditions into three groups "precarious", "substandard" and "standard employment". The outcome, *adolescents' mental health*, was measured as a diagnosis of a common mental disorder using ICD-10 codes. Crude and adjusted Cox regression models produced Hazard Ratios (HR) with (95%CI) to estimate the effect of parental PE on adolescents' mental health.

Results: Preliminary results show an increased risk of mental disorders among adolescents whose parents were in PE. A stronger association is observed for paternal PE compared to maternal PE. The associations remain after accounting for confounders, including parental mental health.

Conclusions: Our longitudinal study-design aims to fill a large research gap on parental PE and adolescents' mental health. As PE is growing more common in many countries, this study provides relevant insights on the role that insecure and unstable employment may have in terms of mental health within families.

Characterising Australian migrant workers in silica exposed jobs

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Objective: The story about migrants working in dirty, dusty and demeaning jobs has been told for many decades, but little is understood about migrants in jobs that may expose them to silica dust. In a recent Australian stone-benchtop workers' study, half of workers were born overseas, which is higher than the Australian migrant workers' statistic. This study aimed to characterise migrant workers employed in jobs with the potential for silica dust exposure (SDE).

Material and Methods: Aggregated data were extracted from the Australian 2021 Census. Migrant workers were defined using country of birth (born in vs outside Australia), and SDE jobs were Australian and New Zealand Standard Classification of Occupations (ANZSCO) codes listed by WorkSafe ACT as requiring training to reduce exposure to crystalline silica.

Results: Of the 12million workers included, 9.5% worked in SDE jobs, with more among Australian-born (9.9%) vs overseas-born (8.6%) workers ($p < 0.001$). The most common SDE job for overseas-born workers was commercial cleaner (183/10000 persons vs 175/10000 among Australian-born), followed by electrician(general) and carpenter. Younger workers (20-24 years old) born overseas were more often employed in SDE jobs (16.4%) than the same age group of workers Australian-born (10.8%, $p < 0.001$). The proportion of workers over 60 years who were in SDE jobs was higher among those born overseas than Australian-born workers (9.8% vs 8.9%). A tenth of SDE jobs among Australian-born workers were held by women compared with 18% among those born overseas.

Conclusions: The characteristics of workers in SDE jobs differed significantly between workers born in vs outside Australia. In particular, the age distribution of workers in SDE jobs varies, hence further research and understanding of longitudinal health outcomes and interactions between silica exposure and age-related lung function is imperative, particularly for younger and older migrant workers.

A Job Exposure Matrix for Precarious Employment in Europe

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Background: The global economy has seen an increase in non-standard and precarious employment (PE) driven by technological and financial changes. Recent studies indicate that PE is linked to unsafe working conditions and adverse health outcomes. Therefore, it's crucial for epidemiological studies to consider PE. This study aims to create a European Job Exposure Matrix (JEM) for use in occupational epidemiology.

Methods: We utilized register-based working-age cohorts (18-65 years) from Sweden (2017), Denmark and Norway (2018). To be eligible, participants had to reside in the study country during the year studied and have a work-related income of at least 100 SEK/NOK or 1 hour of work in Denmark. We excluded those long-term unemployed, on long-term sick leave, self-employed, students, receiving disability or old-age pensions (Denmark N=1,579,705; Norway N=1,689,941; Sweden N=1,952,303). We developed a harmonised European JEM to assess PE on three dimensions: employment insecurity, income inadequacy, and lack of rights and social protection. Exposure was measured as the proportion of PE for ISCO-08 occupations (3-digit level). National JEMs were created, and a unified Nordic JEM was subsequently derived through weighted mean calculations.

Results: This initial version of the JEM provides PE proportions for 100 (Sweden), 118 (Norway), and 123 (Denmark) out of 130 ISCO-08 occupations. Missing data, primarily due to crosswalk limitations, affected included occupations. In general, Sweden exhibited the highest PE proportion followed closely by Norway and Denmark. The largest differences across countries were observed in services and sales workers (33% in Sweden, 17% in Norway and 8% in Denmark) and transport and storage labourers (19% in Norway, 14% in Denmark and 4% in Sweden).

Conclusions: The development of this Nordic JEM provides an initial crude estimation of PE in Western European countries lacking national PE data. Future enhancements could include other European countries to better represent the region's diversity.

Funding:

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November 5, Parallel morning oral sessions

Oral Session 3C

Title: Split session: Musculoskeletal outcomes & Interventions. Time: 11:30-13:00. Location: CHARLES DARWIN.

Chairs: Bruce Alexander and SukhDev Mishra

Presentation Title: Risk of lumbar injury from whole-body vibration exposure: epidemiological insights from field studies on dumper operators

Presentation Author: Amit Sharma

Presentation Title: Carpal tunnel syndrome in a diverse workforce: findings from the Occupational Disease Surveillance System in Ontario, Canada

Presentation Author: Jeavana Sritharan

Presentation Title: Work-related musculoskeletal disorders among various occupational workers in India: a meta-analysis

Presentation Author: SukhDev Mishra

Presentation Title: Evaluating the effectiveness of preventing interventions in OSH: the use of leading and lagging indicators

Presentation Author: Mena Gallo

Presentation Title: Effectiveness of INTEVAL_Plus in reducing Musculoskeletal Pain among Nursing Staff in four Catalan Hospitals: A Cluster-Randomised Clinical Trial

Presentation Author: Leire Agirre Garrido

Presentation Title: Education and training program in sleep habits and health promotion in an agricultural company in Piura, Peru

Presentation Author: Norvil Antonio Mera Chu

Presentation Title: Low Back Pain in Nurses and Caregivers of Patients with Neurodegenerative Diseases

Presentation Author: Jihen Hsinet

Risk of lumbar injury from whole-body vibration exposure: epidemiological insights from field studies on dumper operators

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Aim: Work-related musculoskeletal disorders (WMSDs) are significant contributors to occupational injuries and disability, especially in developing nations. Among them, back injuries are the most prevalent in various industries. This study aims to assess the likelihood of lumbar injury in dumper operators with occupational exposure to whole-body vibration (WBV).

Methods: A cross-sectional study was conducted among 61 dumper operators exposed to WBV. Low back pain (LBP) was assessed using the Standardised Nordic Questionnaire for musculoskeletal disorders. Comprehensive occupational histories were recorded detailing age at first exposure to WBV, current lifetime exposure, and exposure per day and per year. Vibration levels were measured on the seat of the dumper using a tri-axial accelerometer (Nor 1286, Norsonic) according to ISO 2631-5:2018. Biomechanical models, incorporating anatomical, postural, and anthropometric factors, were used to predict the risk of lumbar injury following ISO 2631-5:2018 guidelines.

Results: The overall prevalence of LBP in the previous 7 days and 12 months was approximately 33% and 46%, respectively. Equivalent daily compressive dose (SdA) and risk of injury factor (RA) were calculated for six spinal levels ranging from T12/L1 to L5/S1. SdA values ranged from 0.29 to 0.73 MPa, and RA factor values ranged from 0.27 to 0.93. The long-term health risk assessment according to ISO 2631-5:2018 revealed that most operators (98.4%, n=60) fell into the low health risk category based on RA values, despite the presence of self-reported LBP in the study population. A two-sample t-test revealed a statistically significant difference in mean RA values between individuals with and without LBP ($p < 0.001$), highlighting the potential association between the risk of lumbar injury and the presence of self-reported LBP.

Conclusions: The discrepancy between biomechanical and epidemiological findings warrant further large-scale studies to refine the boundary limits associated with RA values, enhancing their application in industry settings.

Carpal tunnel syndrome in a diverse workforce: findings from the Occupational Disease Surveillance System in Ontario, Canada

Background: Carpal tunnel syndrome (CTS) is a cumulative strain injury associated with occupational risk factors such as vibration, repetitive and forceful wrist movements, and awkward wrist postures. This study aimed to examine the incidence of CTS among male and female workers in a large cohort.

Methods: Workers were identified in the Occupational Disease Surveillance System (ODSS), a system linking 2.3 million workers' compensation claims to health administrative records. CTS cases were identified in physician billing records from 2002 to 2020. Cases were defined as having at least one health record for a CTS surgery. A 3-year washout period and a restricted follow-up period of 3 years were applied. Cox proportional hazard models were used to estimate hazard ratios (HR) and 95% confidence intervals (CI) for diagnosis of CTS, adjusted for age and birth year.

Results: A total of 2,992 cases among males (m) and 3,224 cases among females (f) were identified. Elevated risks in both sexes were observed in several manual labour occupations such as welding and flame cutting (HRf=1.83, 95% CI=1.01-3.32; HRm=1.65, 95% CI=1.35-2.01), motor vehicle fabricating and assembling (HRf=2.14, 95% CI=1.74-2.62; HRm=2.43, 95% CI=2.04-2.89), slaughtering and meat cutting (HRf=2.28, 95% CI=1.42-3.68; HRm=1.95, 95% CI=1.33-2.85), packaging (HRf=2.06, 95% CI=1.43-2.97; HRm=1.82, 95% CI=1.12-2.98). Sex differences were also observed across various occupations. For example, females in metal processing, baking and confectionery making, textile weaving, as well as males in nursing aide and orderly work, mining and quarrying, and construction, had elevated risks of CTS.

Conclusions: These findings provide evidence of the risk of CTS among various occupations, particularly those involved in highly repetitive and forceful manual work. This study highlights the need to investigate potential workplace hazards among identified occupational groups and to gain a deeper understanding of sex-specific risks.

Work-related musculoskeletal disorders among various occupational workers in India: a meta-analysis

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Objective: Work-related musculoskeletal disorders (WMSDs) are one of the most common occupational diseases, affecting various sectors such as agriculture, small-scale industries, handicrafts, construction, and banking. These disorders, caused by overexertion and repetitive motion, lead to work absenteeism, productivity loss, and economic impacts. The aim of the study is to determine the magnitude of musculoskeletal disorders among different occupational workers in India.

Material and Methods: We identified studies reporting the prevalence of MSDs using the Nordic Musculoskeletal Questionnaire in different databases between 2005 and 2023 through searches on SCOPUS, PubMed Central, and Google Scholar. The required information was then extracted. A random effect model was used to pool estimates of prevalence with 95% CI. Publication bias was assessed by applying funnel plots.

Results: The 12-months prevalence of work-related musculoskeletal disorders (WRMSDs) were reported across several occupational groups, the meta or the pooled prevalence was estimated as 0.77 (95% CI: 0.70 to 0.83, $I^2 = 97%$) which suggest substantial variability in the prevalence estimates between different industries and studies. The agriculture sector shows a sector-pooled prevalence of 0.87 (95% CI: 0.78 to 0.93), indicating widespread condition. The healthcare and mining industries also report high pooled prevalence rates of 0.82 (95% CI: 0.72 to 0.89) and 0.81 (95% CI: 0.76 to 0.85), respectively. In the IT and textile industries, the prevalence is 0.71 (95% CI: 0.60 to 0.79) and 0.74 (95% CI: 0.50 to 0.89), respectively.

Conclusions: WRMSDs are prevalent across various Indian industries in significant proportion, particularly in agriculture, healthcare, and mining, leading to significant productivity loss and economic impact. The variation in prevalence highlights the need for sector-specific interventions. Addressing WRMSDs requires comprehensive ergonomic and policy measures. Effective strategies are essential to mitigate these disorders' widespread impact.

Evaluating the effectiveness of preventing interventions in OSH: the use of leading and lagging indicators

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Keywords: leading indicators, lagging indicators, occupational safety and health, preventive interventions

Objective: Understanding and differentiating the roles of leading and lagging indicators is important for evaluating the effectiveness of preventive interventions in occupational safety and health (OSH). Proactive approach focuses on leading indicators to prevent incidents before they happen, while reactive approach focuses on lagging indicators to learn from past incidents. The aim of the study is to develop a framework for defining indicators for evaluating the effectiveness of OSH interventions.

Material and Methods: The project BRiC 2022–ID01 (funded by the National Institute for Insurance against Accidents at Work) is aimed at developing a dashboard of indicators that can be applied in small, medium and large enterprises to assess the effectiveness of OSH interventions. We performed a literature search on PubMed/Scopus encompassing academic journal articles, reviews and grey literature including reports from agencies and conference proceedings. We categorized indicators according to type and predefined dimensions.

Results: Leading indicators targeting to safety training and education included the proportion of employees attending required safety training sessions along with the proportion of employees who successfully complete safety training programs. Safety audits and inspections comprised number of audits, proportion of scheduled inspections and number/types of hazards identified. Lagging indicators included a variety of indicators like number/rate of injuries/fatalities, total number of workers' compensation claims filed, and proportion of workdays lost due to occupational injuries/illnesses. Regulatory compliance can be assessed using lagging indicators such as number of citations/violations issued by OSH regulatory bodies and the monetary value of fines/penalties due to non-compliance with safety regulations.

Conclusions: Incorporating leading and lagging indicators is a key step for developing a framework for evaluating the effectiveness of OSH interventions. A balance between proactive and reactive approach helps identifying specific areas in need of intervention and defining key factors/determinants for monitoring the effectiveness of OSH interventions.

Effectiveness of INTEVAL_Plus in reducing Musculoskeletal Pain among Nursing Staff in four Catalan Hospitals: A Cluster-Randomised Clinical Trial

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Objective: Evaluate the effectiveness of a multicomponent intervention for reducing musculoskeletal pain (MSP) among nursing staff in four hospitals in Catalonia at 6 and 12 months compared to the control group.

Methods: A pragmatic cluster-randomised clinical trial (cRCT) was conducted in four hospitals in Catalonia. The INTEVAL_plus intervention consisted of a multilevel approach with components of primary, secondary and tertiary prevention. This included participatory ergonomics, Nordic walking, stress-based mindfulness, and case management. Data was collected through self-reported questionnaires at baseline, 6 months, and 12 months. The included variables were sociodemographic and occupational, and MSP variables, collected through the Nordic Musculoskeletal Questionnaire. The analysis was performed on an intention-to-treat basis, including descriptive analysis of the sociodemographic and occupational variables of the sample. Additionally, prevalences were estimated, associations were measured using Odds Ratios (OR), and Generalised Estimating Equations (GEE) adjustment models were conducted, with stratification by sex.

Results: A total of 11 clusters included 779 observations of nurses and nursing assistants, predominantly women in both the intervention and control groups, aged 31-50 years. There was a statistically significant reduction in MSP among nursing staff at 12 months in the neck, shoulders, upper back, and lumbar regions in the intervention group compared to the control group (OR: 0.48, 95% CI: 0.24-0.95; and OR: 0.55, 95% CI: 0.30-1.00, respectively). Additionally, the model showed that being female and being a nursing assistant were strongly associated with having MSP in various anatomical areas. The models stratified by sex showed a greater statistical significance in the association of having MSP at different time periods (pre-post intervention) and for being a nursing assistant among women.

Conclusions: This intervention was effective in reducing MSP in the cervical/dorsal and lumbar regions at 12 months. However, the difficulties of implementing interventions in the workplace should not be overlooked.

Funding:

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Education and training program in sleep habits and health promotion in an agricultural company in Piura, Peru.

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Objective: The purpose of the study was to describe good practices on education and training (ET) in sleep habits and health promotion in workers at an agricultural company in the city of Piura and its impact in their health status.

Material and Methods: This research was a case report study in an agricultural company which had 925 workers. Unit of analysis was the indicators of ET program as characteristics of participants (demographic, level of education), education methods used, questionnaires solved, and clinical parameters. The instruments used were Data collection sheet, Sleep Hygiene Index, and Epworth Sleepiness Scale. The instruments and clinical parameters were assessed at the beginning of the study and after 2 years.

Results: 287 workers participated, of which 68% were between the age of 30 and 50 years old. 75% lived in a rural area. 31% finished a professional career, 24% had finished a short-technical program and 45% had only finished high school. The ET practices implemented were Case discussion, Role games, Performance-feedback and game workshops. The topics of the ET program were Sleep habits, Prevention of Fatigue, Strategies for dealing with stress, and Cardiovascular and metabolic diseases. The frequency of sleep habits reported as poor was reduced in 21%. Poor sleep habits that were more reduced included: going to bed at different hours, going to sleep feeling stressed, upset, sad or nervous; using alcohol, tobacco or coffee within 4 hours before sleeping, and eating within 2 hours before sleeping. The frequency of excessive daytime sleepiness was reduced in 16%. Body mass index and blood pressure levels improved after 2 years of ET practices.

Conclusions: ET program in Sleep Habits and health promotion had good results in reducing poor sleep habits, excessive daytime sleepiness and improving health status in workers in an agricultural company.

Title: Low back pain in nurses and caregivers responsible for the care of neurodegenerative diseases

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Objective: To evaluate the prevalence of low back pain among nurses and caregivers working in neurodegenerative diseases specialized center, to determine occupational and extra occupational risk factors for this morbidity and to assess the impact of low back pain on ability to work.

Materials and methods: cross-sectional descriptive study of all nurses and caregivers working in a private clinic specializing in neurodegenerative diseases. Clinical data were collected from the employees' medical files.

Results: A total of 110 workers were included. They were caregivers (75%) and nurses (25%). The prevalence of low back pain was 51.3%. This pathology was statistically associated with occupational factors such as the caregiver job ($p < 0.0001$) and seniority ($p = 0.009$). Daytime work ($p = 0.014$) was significantly associated with this morbidity too. Similarly, for psychosocial factors including lack of social support ($p = 0.038$) negative perception of professional future ($p < 0.001$) and relationship problems ($p = 0.001$). The extra-occupational risk factors for low back pain were age ($p = 0.023$), history of chronic disease ($p = 0.05$), thoraco-abdominal surgery ($p = 0.019$), overweight ($p = 0.05$) and the presence of a metabolic syndrome ($p = 0.02$). Of the low back pain patients, 26.1% had at least one sick leave and 24.5% benefited from a modification of the workplace.

Conclusion: This study highlights the high prevalence of low back pain among nurses and caregivers in this clinic. Certain professional factors can be mastered through staff training, organization and improvement of working conditions.

Funding: Low back pain is a real occupational health problem, particularly in care settings. It is evidently more common among nurses and caregivers due to biomechanical, organizational and psychosocial constraints associated with care activities.

November 5, Parallel Afternoon Oral Sessions

Oral Session 4A

Title: Specific exposures: Pesticides & Ionizing radiation. Time: 14:00-15:30. Location: MARIE CURIE

Chairs: Nathan DeBono and Leslie Stayner

Presentation Title: Umbilical cord plasma cholinesterase activity and birth weight in babies delivered by mothers engaged in horticulture activities in Northern Tanzania

Presentation Author: Baldwina Tita Olik

Presentation Title: Prenatal Pesticide Exposure Impairs Social-emotional and Executive Function Performance in Children Aged 4-6 Years

Presentation Author: William Nelson Mwakalasya

Presentation Title: Glyphosate use and mosaic loss of chromosome Y in male pesticide applicators

Presentation Author: Vicky Chang

Presentation Title: Which pesticides should be monitored in Latvian citizens? Hanlon method adaptation for chemical prioritization in HBM4LV study

Presentation Author: Lāsma Akūlova

Presentation Title: Study of knowledge, attitudes, and practices regarding ionizing radiation in the operating rooms in Tunisian hospitals.

Presentation Author: Emna Bechirfa

Presentation Title: Exposure to ionizing radiation and dementia mortality among nuclear power plant workers in the Canadian National Dose Registry

Presentation Author: Brianna Frangione

Umbilical cord plasma cholinesterase activity and birth weight in babies delivered by mothers engaged in horticulture activities in Northern Tanzania

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Key words: Pesticide, prenatal exposure, horticulture, low birth weight, cholinesterase

Objective: Little is known about potential adverse health effects on newborn babies caused by prenatal exposure to pesticides, for instance organophosphates that have cholinesterase inhibiting effects. We aimed to investigate if maternal exposure to pesticides during pregnancy affected umbilical cord plasma cholinesterase activity and birth weight in delivered babies among women engaged in horticulture activities in Northern Tanzania.

Material and Methods: We investigated 250 newborns of women anticipated to be exposed to pesticides or actively involved in horticulture (occupationally exposed) and 250 newborns of women not involved in horticultural activities (not occupationally exposed) from Northern Tanzania. Based on interviews, using a questionnaire, data on occupational history and pesticide exposure from pregnant women was collected. Additionally, data on birth weight was collected from the medical records, and cord blood samples were collected at delivery. Cholinesterase activity in the umbilical cord plasma was assessed by plasma cholinesterase assay kits (Model 470 EQM Research, Cincinnati). Statistical analysis was done by SPSS version 23, including comparisons of groups by the use of t-tests and correlation tests, p values < 0.05 were considered significant.

Results: Both mean cholinesterase activity in umbilical cord plasma (1.338 vs 1.916, p<0.0001), and mean birth weight (2.82 vs 3.27, p<0.0001) were lower in newborn babies delivered by occupationally exposed mothers compared to babies from mothers with no occupational exposure. There was a positive correlation between plasma cholinesterase levels and birth weight of the babies (r=0.553, p<0.0001).

Conclusions: Babies delivered by mothers exposed to pesticides or actively involved in horticulture during pregnancy had lower plasma cholinesterase activity in their umbilical cord plasma and lower birth weight than babies delivered by mothers not involved in horticultural activities. This raises concern for reproductive health and prenatal exposure in areas where pesticides like organophosphates are much used.

Acknowledgement: We are grateful to NORAD through the NORHED program (Norwegian Program for Capacity Development in Higher Education and Research for Development) via the NORHED II SAFE WORKERS PROJECT for funding this project. We also appreciate the support by management of the Hospitals and pregnant women who spared their precious time to participate in our study.

Prenatal Pesticide Exposure Impairs Social-emotional and Executive Function performance in Children Aged 4-6 Years

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Objective: Some pesticides are neurotoxic and may influence the neurodevelopment of children born by mothers exposed to these pesticides during pregnancy. However, the epidemiological evidence about this relationship is conflicting and few studies have been performed in African countries. This study examined the impact of early-life exposure to pesticides on the neurodevelopment of children aged 4-6 years from eastern and southern Tanzania.

Material and Methods: This cross-sectional, descriptive and analytical study involved women working in small-scale horticulture and their children from Mbeya, Morogoro and Pwani regions. Pesticide exposure was assessed by interviewing mothers about pesticide-related tasks they performed during pregnancy using a questionnaire. Children's neurodevelopment was tested using the International Development and Early Learning Assessment tool. Neurodevelopment scores were categorized as struggling (<25%), emerging (25-74%), and mastering (≥75%). Multinomial logistic regression examined the relationship between pesticide exposure and neurodevelopment score categories.

Results: Data was collected from 432 mother-child pairs, comprising 53% boys and 47% girls. The children were aged 4 years (24.6%), 5 years (31.1%), and 6 years (44.3%). Most children (87.8%) had normal weight-for-height Z scores. Mean neurodevelopment scores varied, with the lowest in emergent literacy (45.7±20.5) and the highest in fine and gross motor (67.1±18.3) domains, totalling 57.4±18.0 for all domains. Multinomial logistic regression analysis revealed that children of mothers who reported engaging in weeding, washing clothes and equipment used for pesticide spray or eating horticultural crops within 24 hours of pesticide spraying during pregnancy had a significantly higher likelihood ($p<0.05$) of struggling in social-emotional and executive function tests.

Conclusions: Certain maternal horticultural practices during pregnancy are associated with lower social-emotional and executive function scores in children aged 4-6 years. These findings underscore the need for robust studies to further explain this relationship and inform effective interventions.

Glyphosate use and mosaic loss of chromosome Y in male pesticide applicators

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Objective: Glyphosate, the most widely applied herbicide worldwide, has been linked to certain hematologic malignancies; however, the underlying biological mechanisms remain poorly understood. We previously reported an association between high lifetime glyphosate use and mosaic loss of chromosome Y (mLOY), a marker of genotoxicity and genomic instability, in circulating blood of male farmers from a subcohort of the Agricultural Health Study (AHS). Here, we further investigated glyphosate use in relation to mLOY in buccal cell-derived DNA among pesticide applicators in an independent AHS sub-study.

Material and Methods: This investigation included 1,868 male pesticide applicators who were cancer-free controls from a case-control study nested within the AHS and scanned with the Illumina OncoArray. mLOY was detected using genotyping array intensity data (median log-R ratio [mLRR]) in the male-specific region of chromosome Y. Total lifetime days and intensity-weighted lifetime days (lifetime days multiplied by an exposure intensity score) of glyphosate use were derived from questionnaires. Logistic regression was used to estimate associations between glyphosate use and any mLOY (mLRR \leq -0.15) and mLOY affecting a high fraction of cells (\geq median [27.55%]), adjusted for potential confounders (e.g., age, smoking).

Results: mLOY was detected among 16% of pesticide applicators, with a frequency that increased with age ($P < 0.0001$). Approximately 86% of all applicators reported using glyphosate during their lifetime. High intensity-weighted lifetime days of glyphosate use (highest vs. lowest quartile) was associated with increased odds of any mLOY (OR=1.54, 95%CI=1.01-2.37), in particular mLOY affecting a high fraction of cells (OR=1.99, 95%CI=1.11-3.57), although exposure-response trends were not statistically significant (P -trend=0.40 and P -trend=0.15, respectively).

Conclusions: Our results from buccal cell-derived DNA provide additional evidence supporting the previously observed association between glyphosate use and mLOY, especially mLOY affecting higher cell fractions. Together, these findings can help inform our understanding of the genotoxicity of glyphosate and its potential role in carcinogenesis.

Funding:

This work was supported by the Intramural Research Program of the National Institutes of Health, National Cancer Institute (Z01 CP 010119) and the National Institute of Environmental Health Sciences (Z01 ES 049030).

Which pesticides should be monitored in Latvian citizens? Hanlon method adaptation for chemical prioritization in HBM4LV study.

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Key words: human biomonitoring, pesticides, Hanlon method, chemical prioritization

Objective: Human biomonitoring is a tool used for the assessment of total exposure to chemicals. This approach considers exposure from any pathway and measures the detection or concentration of pesticides directly in human samples, mainly urine. It is not feasible to measure all chemicals in the human body; therefore, a prioritization strategy is crucial to determine which chemicals will be measured and evaluated in the study.

Materials and Methods: In the HBM4LV project, an adaptation of the Hanlon method is used to score and categorize pesticides. Information on problem size (max 60 points), characteristics of hazardousness (max 30 points), exposure (max 30 points), national importance (max 15 points), and societal concern (max 15 points) are the components of the adapted Hanlon equation. Additionally, weights are applied. The substances are then ranked and discussed with experts from the Human Biomonitoring Council to reach a consensus on the chemicals that should be monitored in Latvian citizens.

Results: Seven pesticides have been evaluated so far. Previous research focused on Latvian citizens' exposure to halogen-containing pesticides suggests that Acetamiprid, Chlorpropham, Boscalid, and Triclosan were detected in at least 15% of all samples. Additionally, the three most distributed pesticides are Glyphosate, Chlormequat chloride, and MCPA, so they were evaluated as well. After evaluation, Glyphosate (129.3 points), Acetamiprid (103.5 points), and MCPA (79.8 points) are of the highest priority for inclusion in the Latvian human biomonitoring program.

Conclusions: Our approach suggests a modified Hanlon method that takes into account national importance and thus could be used by other countries for a chemical prioritization strategy of a nationwide study/program.

Acknowledgements: This study is funded by the State Research Program "Development of Human Biomonitoring Program for Latvia - HBM4LV", project nr. VPP-VM-Sabiedrības_Veselība-2023/4- 0001.

Study of knowledge, attitudes, and practices regarding ionizing radiation in the operating rooms in Tunisian hospitals

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Objective: To evaluate the knowledge, attitudes, and practices of operating room (OR) staff regarding ionizing radiation (IR).

Materials and methods: This was a descriptive, cross-sectional, multicenter study of OR staff working in Tunisian Hospitals who were involved in radioguided surgical procedures from January to March 2024, using an anonymous self-administered questionnaire.

Results: The study included 160 participants, predominantly female (62.5%), with a median age of 31 years and a work seniority of 7 years. Regarding low-dose radiation, 83% perceived it as harmful. Key organs perceived as most radiosensitive included the gonads (58.8%), skin (34.4%), bone marrow (33.1%), and lenses (28.7%). Reported deterministic effects included sterility (85%), acute radiodermatitis (34.4%), hypothyroidism (21.3%), anemia (13.1%), and eye damage (10.6%). Regarding stochastic effects, 56.9% answered incorrectly or were uncertain. Approximately 50.6% were aware of the correct annual total dose limit for radiation-exposed workers, and 15.6% knew the correct effective dose for categorizing workers as Class A. Concerning dosimetry, 63.1% knew that the dosimeter should be worn under lead aprons and 18.1% knew its proper reading frequency. Participants reported never using their dosimeters in 96.3% of cases, mainly due to unavailability. Collective protective equipment was used by 4.4% of participants, while 10% consistently used individual protective equipment (IPE). Participants reported that they never used personal protective equipment (PPE) in 39.4% of cases, for whom the reasons for this behavior were unavailability of PPE (97.9%), poor condition of PPE (57.9%), or perceived IR risk as low (14.5%). Additionally, 96.3% of the participants did not undergo regular medical monitoring at work, primarily because of their lack of interest (82.9%). Training in radiation protection was reported by 55% of the participants, of whom 5.6% received training at their workplace.

Conclusions: Given the evolving landscape of interventional radiology, continuous training of OR staff is crucial to enhance awareness of radiation risks. This will promote adherence to radiation protection protocols and ensure personnel safety.

Exposure to ionizing radiation and dementia mortality among nuclear power plant workers in the Canadian National Dose Registry

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11 Radiation Protection Bureau, Health Canada, Ottawa, Canada

Objective: There is emerging evidence that ionizing radiation increases the risk of dementia. However, few studies have considered workers chronically exposed to levels less than 100 millisieverts (mSv). To address this gap, we investigated the association between low-dose radiation exposure and dementia mortality within a cohort of Nuclear Power Plant (NPP) workers in the Canadian National Dose Registry (NDR).

Materials and methods: We assembled a retrospective cohort using the recently updated linkage of the Canadian NDR to national death registry data. Analyses included NPP workers exposed between 1945 and 2018, with mortality follow-up extending through 2020. We considered underlying and contributing causes of death from 2000 onwards to identify dementia mortality. We compared the observed number of dementia deaths in the NPP workers to that expected in the Canadian population using standardized mortality ratios (SMR). Internal cohort analyses are ongoing to characterize the exposure-response relationship.

Results: Among 98,735 linked NPP workers, there were approximately 2 million person-years of follow-up. The mean whole-body Hp(10) lifetime accumulated exposure was 9.63 (SD = 28.5) mSv. Between 2000 and 2020, we identified 155 workers with dementia coded as the underlying cause of death and 345 deaths when ascertainment was expanded to include dementia as a contributing cause. Relative to the Canadian population, NPP workers had a lower risk of dementia mortality based on the underlying cause of death (SMR = 0.73; 95% CI: 0.62 – 0.85), but when contributing causes were also considered a higher risk was found (SMR = 1.30; 95% CI: 1.17 – 1.45).

Conclusions: Our findings suggest ionizing radiation within workers with cumulative exposures predominantly below 100 mSv may increase the risk of dementia. More importantly, this study highlights the inherent challenges of using death data in occupational studies of dementia and calls attention to the possible advantages of including contributing causes of death.

November 5, Parallel Afternoon Oral Sessions

Oral Session 4B

Title: Future perspectives: Climate change (heat) and algorithmic management. Time: 14:00-15:30.

Location: RAMON Y CAJAL.

Chairs: Kurt Straif and Theo Bodin

Presentation Title: The Effects of Heat Stress on Heat-Related Symptoms among Sugarcane Workers in Thailand

Presentation Author: Tadpong Tantipanjaporn

Presentation Title: Climate Change and Occupational Exposure to High Temperatures: A Survey on Workers' Risk Awareness and Preventive Measures

Presentation Author: Francesca Sellaro

Presentation Title: Job exposure matrix for estimating occupational heat exposure: the EU EPHOR project EURO-JEM

Presentation Author: Tosca de Crom

Presentation Title: Algorithmic Management and Occupational Safety and Health in the Logistics Sector

Presentation Author: Karin Nilsson

Presentation Title: Effects of algorithmic management on occupational safety and health: a case study of a Swedish logistics company

Presentation Author: Ruben Lind

Presentation Title: Measuring workers' exposure to algorithmic management within the healthcare system: Examining barriers and possible solutions

Presentation Author: Virginia Gunn

The Effects of Heat Stress on Heat-Related Symptoms among Sugarcane Workers in Thailand

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Objective: Climate change-induced temperature increases may aggravate heat stress among agricultural workers, affecting their health and safety. This study examines the effects of heat exposure on heat-related symptoms in Thai sugarcane workers.

Material and Methods: This study recruited 295 sugarcane workers in Nakhon Sawan Province, Thailand. Information on demographics, working conditions, and the occurrence of 21 heat-related symptoms in the last 7 days was collected by a questionnaire. Heat stress was measured using Wet Bulb Globe Temperature (WBGT). WBGT measurements for a full work shift in the sugarcane fields were obtained in both the cool and hot harvesting seasons. Effective WBGT represented the measured WBGT adjusted for clothing factors, and effective time-weighted average WBGT (WBGT_{eff-TWA}) estimates were determined. Negative binomial regression explored the effects of this heat stress on the number of heat-related symptoms experienced by workers.

Results: Effective WBGT levels exceeded the safe work conditions for heavy workload set by American Conference of Governmental Industrial Hygienists for 72.7% of the working time in the cooler months and 90.9% in the hotter months, respectively. Nearly all participants (98.3%) experienced one or more heat-related symptoms, with the five most reported symptoms being heavy sweating (86.0%), weakness/fatigue (71.3%), thirst (66.0%), elevated body temperature (58.3%), and rapid pulse (45.3%). Participants exposed to a WBGT_{eff-TWA} higher than 34 °C, 32 - 34 °C, and 30 - 32 °C are expected to have a rate of number of heat-related symptoms 2.65 (95%CI: 1.89, 3.70), 1.97 (1.44, 2.69), and 1.85 (1.32, 2.60) times greater than those with a WBGT_{eff-TWA} of 26 °C or lower, respectively.

Conclusions: The high prevalence of heat-related symptoms among these workers highlights the need for urgent action to reduce the risk of heat-related health outcomes in Thai sugarcane workers.

Funding:

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Climate Change and Occupational Exposure to High Temperatures: A Survey on Workers' Risk Awareness and Preventive Measures

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Objective: Climate change is increasingly contributing to higher workplace temperatures, posing significant occupational risks. This study aims to assess the level of perception and knowledge regarding heat-related risks among a sample of workers, evaluating the effectiveness of training on heat risk and identifying perceived obstacles by workers in risk prevention and management.

Material and methods: Within the Italian Worklinate-2.0 project (BRIC-INAIL 2022), coordinated by CNR and INAIL, a questionnaire was developed and applied in national surveys. For this case-report, the questionnaire was administered both in paper form and online to a sample of 225 workers from three companies in Northern Italy, and to a control group of office workers at University of Pavia (35). The questionnaire consists of 38 questions organized in general data, risk perception and knowledge, accidents prevention and policies. The companies involved operate in chemical, industrial constructions, and building products.

Results: The control group, although exposed to a lower level of risk, presents higher awareness of the potential health outcomes due to heat exposure. Most of the samples (66%) did not receive an adequate training on injury prevention despite the level of exposure and is not informed in case of heat waves (62%). Half of Vulnerable Workers (VW, i.e. with chronic diseases) are not aware of their additional risks, while only 28% of VW receive specific information during health surveillance. 74% have easy access to water, but workers do not know the risks linked to dehydration. Finally, 81% of exposed workers declared that temperature increase negatively affect their productivity.

Conclusions: Although heat-related risks are generally known by workers, and specific national guidelines are available, a general lack of training and specific preventive measures was observed. An additional effort is needed by public health agencies and policy makers to improve the implementation of mitigation measures to tackle this risk on workplaces.

Job exposure matrix for estimating occupational heat exposure: the EU EPHOR project EURO-JEM

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Objective: With climate change exacerbating occupational heat stress, there is a growing need for objective systematic assessment of its health effects in epidemiological studies. Within the European Exposome Project for Health and Occupational Research (EPHOR), we aimed to develop a job exposure matrix (JEM) to assign indoor and outdoor occupational heat exposure.

Material and Methods: Framed within the International Organization for Standardization (ISO) 7243, 8996 and 9920, the heat JEM accounts for meteorological and work conditions such as clothing, physical activity and local heat sources. Output is total annual working hours above the wet bulb globe temperature (WBGT) reference value by job title, coded according to the European version of the International Standard Classification of Occupations 1988 (ISCO-88(COM)). WBGT reference values are determined based on job title-specific metabolic rates. WBGT effective values are determined using region-specific hourly outdoor and indoor WBGT values across Europe, from 1970 onwards. These values are modeled based on historical meteorological data (temperature, radiation, humidity, wind speed) and adjusted for job-specific clothing, local heat sources, and cooling sources, as determined by expert judgment. The assumption is made that individuals work 8 hours a day for 250 days a year.

Results: The number of annual working hours exceeding WBGT reference levels is substantially higher in southern compared to northern European regions. Occupations involving outdoor work experience particularly high levels of heat stress, due to the combination of weather parameters, relatively high metabolic rates and clothing. The occupations that most frequently exceed WBGT reference levels are firefighters, followed by labourers in the construction, forestry, fishing, hunting and trapping industries.

Conclusions: Incorporating regional and occupational specific factors, the heat JEM provides a valuable tool for studying the health effects of occupational heat exposures. The JEM's transparent modular framework allows for updates with new data and extension to other regions.

Acknowledgments: Funding sources: EU EPHOR project (Grant agreement No 874703), Dutch Ministry of Social Affairs and Wellbeing.

Algorithmic Management and Occupational Safety and Health in the Logistics Sector

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Objective: Algorithmic Management (AM), defined as the use of software algorithms to automate organizational functions traditionally carried out by human managers (Wood et al 2021) is being implemented at a rapid pace in a vast array of sectors. While scholars point to the detrimental effects of these technologies on the quality of the jobs, less is known about the health effects for the exposed workers. We investigate a potential association between AM and adverse health outcomes, such as psychological distress, injuries, pain, and sleep disorders among logistics workers in Sweden.

Methods: This cross-sectional study, based on a national survey targeting workers in the logistics sector was distributed through social media outlets between February – June 2024. The survey contained items to identify workers' exposure to AM practices, categorized into low, moderate, and high exposure groups. Health outcomes were measured through self-reported items on sleep quality, psychological well-being, injuries, and pain. A logistic regression analysis, controlling for gender and education, was performed using STATA.

Results: Preliminary analysis of the data (n=740) shows significant associations between moderate and high exposure to AM and adverse health effects on all measured outcomes. The effects of AM are most pronounced in psychological distress (CI95%: 1.2;2.91) and injuries (CI95%: 1.38;3.86). The associations between AM and sleep disorders (CI95%: 1.01;2.13) and pain (CI95%: 1.03;2.25) were more modest, but still significant.

Conclusions: The association between AM exposure and adverse health outcomes in self-reported psychological distress, injuries, sleep, and pain suggests that AM poses risks to workers' safety and health. These results, even though more research is needed, call for caution when implementing AM technologies in the logistics sector, and a systematic occupational safety and health management should be in place to investigate and rectify potential risk factors to workers exposed to AM.

Funding:

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Effects of algorithmic management on occupational safety and health: a case study of a Swedish logistics company

Ruben Lind ¹, Pille Strauss Raats ¹, Karin Nilsson ¹, Carin Håkansta ¹, Virginia Gunn ^{1,2}, Lluís Mangot-Sala ¹, Nuria Matilla Santander ¹, Theo Bodin ¹

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Algorithms are changing the ‘world of work’, including the tasks that constitute work and how work is organized and governed. Lack of knowledge about the impacts of algorithmic management (AM) on work and workers pose a societal challenge today, as digitalization and artificial intelligence increasingly permeate economic sectors and occupations. This deficit is particularly pronounced outside of platform work, in sectors such as logistics where the use of AM is growing rapidly.

Objective: A key objective of this study is to examine the effects of AM on occupational safety and health within a prominent Swedish logistics company in the process of implementing two new algorithmic management systems. Specifically, the study seeks to understand how workers, managers and safety representatives experience the implications of AM on the physical and psychosocial work environment.

Materials and Methods: This multi-phase case study (2024-2026) includes an explorative phase, currently underway, which relies on qualitative evidence from on-site observations and 30 semi-structured interviews with workers, managers, and safety representatives, to gather data on the specific algorithmic systems introduced and their perceived effects on worker safety, health, and wellbeing. These qualitative findings will be used to inform the development and implementation of next phases, including an employee survey.

Results: This presentation will share the results of the qualitative study component, which will be finalized in September 2024. Preliminary findings indicate complex self-rated physical and psychosocial health implications related to the use of AM, possibly contributing to an increase in health disparities.

Conclusions: This study addresses a knowledge gap and will shed light on the links between AM practices and the physical and psychosocial work environment in a large Swedish logistics organization. Additionally, it will provide valuable insights for suitable workplace-level survey designs to operationalize AM practices and outcomes in further quantitative research.

Funding:

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Measuring workers' exposure to algorithmic management within the healthcare system: Examining barriers and possible solutions

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Objective: Background: Healthcare settings are undergoing swift transformation, with novel digital technologies being increasingly used, including (i) artificial intelligence- augmented work coordination, data sharing, and medical assistance software; & (ii) electronic records integrated systems. While data-driven innovations aim to improve care quality and efficiencies, for health workers they may alter physical, psychosocial, and cognitive working conditions. However, several barriers impact the ability to measure workers' exposure to data-driven technologies and possible effects on employment quality, health, wellbeing, and occupational health and safety. This study focuses on algorithmic management, or the application of digital technologies to augment/automate managerial decision-making in the organization of work. Key presentation objectives are to (i) review barriers (e.g., lack of established exposure and outcome indicators, and inconsistent terminologies) to measuring health workers' exposure to algorithmic management and related outcomes, and (ii) engage in dialogue regarding solutions.

Materials and Methods: Barriers discussed have been identified through a critical literature review. Session attendees will be engaged in solution-focused discussions through targeted questions administered via the Miro Collaborative Platform.

Results: Consultation results will be analyzed and synthesized following the conference and shared with participants. The results will inform the development of interview and survey questions for an exploratory, pilot study in healthcare facilities in Canada, Finland, The Netherlands, and Sweden. The study intends to (i) gauge health workers' exposure to algorithmic management, (ii) explore suitable measurement approaches, and (iii) identify relevant health, wellbeing, and occupational health and safety outcome indicators.

Conclusions: Given the pervasive use of algorithmic management in healthcare, despite its unrecognized presence, we must examine workers' exposure to it and possible effects. This knowledge will inform interventions to eliminate/decrease negative and maximize positive effects of algorithmic management. Persistent health worker shortages reinforce the need for a comprehensive understanding of factors affecting workers' employment quality to inform sustainable interventions.

Keywords: healthcare system; algorithmic management; digital technologies; health and safety outcomes; barriers and facilitators to measuring exposure; workforce; worker exposure to algorithmic management and related outcomes.

Funding and Acknowledgment:

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November 5, Parallel Afternoon Oral Sessions

Oral Session 4C

Title: Miscellaneous topics in occupational health and safety. Time: 14:00-15:30. Location: CHARLES DARWIN.

Chairs: Juan Alguacil and Oladeji Ojo Oladipo

Presentation Title: A Work and Health Research Data (AWAHRD) platform

Presentation Author: Theocharis Kromydas

Presentation Title: Assessment of the effect of safety climate on employees' safety behaviour and safety commitment in the Nigerian maritime sector.

Presentation Author: Oladeji Ojo Oladipo

Presentation Title: Occupational Hazards in Dentistry: Chemical Exposures and Compensation Claims Analysis

Presentation Author: Sabrina Gravel

Presentation Title: Data-driven approaches to study maternal occupational multi-exposures during pregnancy and intrauterine growth: analysis of the ELFE study

Presentation Author: Marie Tartaglia

Presentation Title: Changes in alcohol consumption according to the duration of unemployment: prospective findings from the French CONSTANCES cohort

Presentation Author: Rita El Haddad

Presentation Title: What is known about the occupational safety and health of digital labour platform workers? A scoping review of the literature

Presentation Author: Nuria Matilla-Santander

Presentation Title: The voices of Swedish platform workers - Participatory Action Research

Presentation Author: Filippa Lundh

Presentation Title: Children's personal exposure to fungal contamination in Portuguese elementary school – A concern to be addressed?

Presentation Author: Renata Cervantes

A Work and Health Research Data (AWAHRD) platform

Dr Theocharis Kromydas¹, Dr Rheanna Pereira², Dr Ioannis Binasas², Ms Anne Clayson², Dr Matthew Gittins³, Mr Andy Boyd⁴, Dr Sharon Stevelink⁵, Dr Anna Verey⁵, Mrs Kirsteen Campbell⁶, Ms Robin Flaig⁶, Professor Martie van Tongeren², Dr Evangelia Demou¹

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Introduction: The availability and accessibility of occupational health data remains a challenge in the UK for research to inform and support policies and practices to reduce work-related ill-health. One of the challenges is that occupational data is not collected systematically with routine health data. Even when occupational data is collected, comparability of measures across datasets is often challenging. However, advances in the UK data science landscape, such as 'Trusted Research Environments' (TRE) for secure analysis, are offering novel opportunities for data sharing of sensitive data. The emergence of electronic health care and administrative records and novel methods for record linkage and analyses provides an opportunity to advance the work and health research landscape.

Objective: This project aimed to lay the groundwork for the development of an online work and health research data platform and to facilitate the harmonisation of future data collection across the UK.

Methods: We evaluated the breadth of available UK occupational, work and health data. Occupational data covered a breadth of occupational exposures, including psychosocial, environmental, physical, and chemical.

Results: As part of this development project, we created an inventory of UK occupational and general population cohorts, surveys that capture data on occupation, occupational health, and/or occupational exposures, and an array of Job Exposure Matrices (JEMs). Using this information, we developed a prototype of A Work and Health Research Data (AWAHRD) platform to showcase the basic functions and utility of such a tool for research.

Conclusions: Important new data opportunities for occupational health research in the UK have been identified as well as a number of barriers in terms of availability and harmonisation of data across studies. We next plan to further develop the data platform to facilitate occupational health research in the UK.

Funding:

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Assessing the effect of safety climate on employees' safety behaviour and safety commitment in the Nigerian maritime sector

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Objective: Currently, little or no study has been conducted on the topic of safety culture/ climate in the Nigerian maritime sector. The study assessed the effect of safety climate on employees' safety behaviour and safety commitment, also, it evaluated the relationship between employees' safety commitment and employees' safety behaviour in the Nigerian maritime sector.

Materials and Methods: An online survey was conducted among seafarers and sea pilots across various maritime organisations in Nigeria using a purposive sampling method and previously validated questionnaires. A total of 182 complete questionnaires were received via Qualtrics. Multiple linear regression analysis was performed.

Results: Safety climate has a positive effect on employees' safety behaviour. Also, the following safety climate factors have a statistically significant positive effect on employees' safety behaviour: supervisor safety practice, coworker safety practice, and supportive environment. In addition, there is a positive relationship between safety climate and employees' safety commitment. Coworker safety practice and supportive environment are safety climate factors with a statistically significant positive effect on employees' safety commitment. Interestingly, safety policy is the main safety climate factor with a statistically significant relationship with employees' calculative safety commitment. Regarding the relationship between employees' safety commitment and safety behaviour, the result revealed that employees' safety commitment is positively related to employees' safety behaviour. Moreover, employees' safety behaviour is more driven by employees' passionate safety commitment and normative safety commitment, than calculative safety commitment.

Conclusions: The safety climate in the Nigerian maritime sector has a significant positive effect on employees' safety behaviour and commitment. Also, there is a strong positive relationship between employees' safety commitment and employees' safety behaviour. However, employees' calculative safety commitment is mainly promoted by safety policy. Lastly, management safety commitment was not associated with employees' safety behaviours or commitment. The management of maritime organisations in Nigeria should review their policy and be more committed to safety priorities to enhance positive safety behaviours and non- calculative safety commitment among the workers.

Funding:

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Occupational Hazards in Dentistry: Chemical Exposures and Compensation Claims Analysis

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Background: The dental workforce includes dentists, dental hygienists, assistants, technicians, and denturists. They work in a rapidly evolving medical field, in which they may face many occupational hazards such as bioaerosols, chemicals, sharp instruments, noise, and stress.

Objective: The project aim is to document the evidence on chemical exposures in dentistry and to analyze compensation claims from dental workers.

Methods: First, a structured literature review was conducted using three concepts: Occupational exposure, Dentistry, and Chemicals. Inclusion criteria were publication year between 2000 and 2022, in French or English, and comprising quantitative measurements of chemical exposures in dentistry from a high-income country. Next, compensated claims from dental workers in the Quebec Workers' Compensation database were analyzed for years 2005 to 2019. Claims were stratified by occupation, sex, age, and type of injury. Annual rates were calculated for injuries potentially associated with chemical exposures.

Results: Twenty-eight articles were included in the literature review. Chemicals measured were mercury (57% of articles), nitrous oxide (18%), methacrylates (14%), and silica (11%). Exposures to mercury up to 3.3 mg/m³ were measured in a dental school. In the compensation claims database, 2229 claims were filed by dental workers over a 15-year period, 96% of them coming from women. While there were no explicit cases of poisoning, there were 331 needlestick injuries and 70 claims for exposures to caustic substances, including phosphoric acids and peroxides. Furthermore, there were 11 claims for contact dermatitis, 4 for allergic dermatitis, and 6 for respiratory illnesses. The annual claim rates for injuries potentially associated with chemical exposures remained relatively stable over the 15 years, averaging 4.0 claims per 1000 workers (95%CI: 3.0-5.0).

Conclusions: The variety of chemical hazards highlighted in our study, together with technical developments such as 3D printing, confirm the growing need for updated data on actual exposures in dentistry.

Data-driven approaches to study maternal occupational multi-exposures during pregnancy and intrauterine growth: analysis of the ELFE study

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Objective: The objectives were to select the most important occupational exposures related to intrauterine growth and investigate if there were interactions between occupational exposures selected.

Material and Methods: Analyses were conducted within the ELFE cohort (n=12,851). Occupational exposures during pregnancy to 29 factors (chemical, physical, biological, arduousness, organizational and psychosocial), were identified using job-exposure matrices. Mothers were classified as occupationally exposed or unexposed depending on their probability of exposure. Outcomes of interest were birthweight (BW), small for gestational age (SGA) and head circumference (HC). Occupational exposures associated with these outcomes were selected using different approaches: EWAS, LASSO, random forest. Occupational factors were ranked by variable importance scores attributed by each method, and median ranks were calculated across these scores to identify the most important exposures. These exposures and significant second-degrees interactions were included in a regression model.

Results: The most consistent occupational factors associated with SGA were endocrine disruptor, job strain, kneeling or squatting, job demands, and physical effort. Final regression model found no significant results. For BW, the selected variables were leaning forward or sideways, using a computer screen, ultrafine particles, physical effort, airborne germs, and repeating the same actions. Final regression model showed a significant association with leaning forward or sideways, using a computer screen and a significant interaction between leaning forward or sideways and airborne germs. For HC, the selected variables were repeating the same actions, oxygenated solvents, kneeling or squatting, airborne germs, and work outdoors. Final regression model found a significant association with repeating the same actions, oxygenated solvents, work outdoors, and a significant interaction between oxygenated solvents and airborne germs.

Conclusions: The results highlight potential roles of arduousness, as well as certain chemical and biological factors for intrauterine growth. Also, we observed significant association that underly the need to consider multi-exposures in this area.

Funding:

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Changes in alcohol consumption according to the duration of unemployment: prospective findings from the CONSTANCES cohort.

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Objective: To prospectively examine the association between the duration of unemployment among job seekers and changes in alcohol use over the course of a year.

Methods: We selected 84 943 participants from the French population based CONSTANCES cohort included between 2012 and 2019 who, at baseline and 1-year follow-up, were either employed or job-seeking. Multinomial logistic regression models computed the odds of reporting continuous no alcohol use, at-risk alcohol use, increased or decreased alcohol use compared with being continuously at low risk use and according to employment status. The duration of unemployment was self-reported at baseline; thus, the employment status at 1-year follow-up was categorised as follows: (1) employed, (2) return to employment since less than a year, (3) unemployed for less than 1 year, (4) unemployed for 1 to 3 years and (5) unemployed for 3 years or more. Analyses were adjusted for age, gender, education, household monthly income, marital status, self-rated health, smoking status and depressive state.

Results: Compared with being continuously at low risk (ie, ≤ 10 drinks per week), the unemployment categories were associated in a dose-dependent manner with an increased likelihood of reporting continuous no alcohol use (OR: 1.74-2.50), being continuously at-risk (OR: 1.21-1.83), experiencing an increase in alcohol use (OR: 1.21-1.51) and a decrease in alcohol use (OR: 1.17-1.84).

Conclusions: Although our results suggested an association between the duration of unemployment and a decrease in alcohol use, they also revealed associations between at-risk and increased alcohol use. Thus, screening for alcohol use among unemployed job seekers must be reinforced, especially among those with long-term unemployment.

What is known about the occupational safety and health of digital labour platform workers? A scoping review of the literature

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Objective: Digital platform work is generally understood as a matching of demand and supply of paid work, involving: a digital labour platform, a client, and a digital platform worker. Digital labour platforms can be classified as online web-based platforms (i.e., programming, graphic design) and location-based platforms (i.e., delivering of goods, taxi). The objective of this scoping review is to examine current empirical studies investigating the health effects of working via digital labour platforms, aiming to (i) summarise the existing evidence, (ii) pinpoint knowledge gaps, and (iii) identify areas for methodological enhancements.

Materials and Methods: We searched for peer-reviewed studies published until May 2024 from Web of Science and PubMed, alongside grey literature. Inclusion criteria covered papers with original data, using qualitative, quantitative, or mixed methods, resulting in 26 included studies. A pre-established theoretical framework guided result reporting, emphasising three characteristics affecting worker health: (i) business practices, (ii) employment conditions, and (iii) work environment hazards.

Results: In summary, literature shows a link between digital platform work and poor health. The current evidence, mainly focused on mental health and location-based platform workers, highlights factors contributing to poor physical and mental health, including low-quality employment conditions and psychosocial work environment hazards. Limited evidence suggests a correlation between business practices - algorithmic management and rating systems - and poor mental health. Knowledge gaps include the health impact of web-based platforms, domestic and care services platforms, and less-explored outcomes like musculoskeletal pain and occupational injuries. Methodological limitations, such as low sample size and lack of control groups, were noted.

Conclusions: This review identifies methodological improvements and knowledge gaps, guiding future research to comprehend the impact of digital platform work on health. As legislation evolves to enhance platform workers' job conditions, researching their health is crucial for offering practical recommendations and shaping evidence-based policies.

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The voices of Swedish platform workers - participatory action research

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Objective: In recent years, Sweden's platform-based economy has grown, driven by digital platforms in sectors such as transportation and freelance work. In 2018, 7.2% of the Swedish workforce engaged in platform work, slightly below the EU average. Research shows that platform workers tend to be younger, more educated, and predominantly male, with migrant workers overrepresented, suggesting that platform work offers accessible employment options for vulnerable groups. This study employs a thematic analysis of the data generated through a photovoice study to understand the working lives of Swedish platform workers and their impact on health and well-being.

Materials and methods: Seventeen workers, divided into delivery, taxi, and freelancing groups, collectively took 105 photos over the study period. The groups met weekly for five weeks to discuss their work's positive and negative aspects as illustrated by the photos, focusing on health implications.

Results: The groups had varied experiences of their working conditions. Delivery workers expressed concerns about poor working environments, safety and health risks, and lack of control over their work. Taxi drivers discussed the impact of digital applications and technology on their work and the challenges of balancing income and expenses. Freelancers described the duality of freelance work, highlighting the freedom to choose when and how to work, but with this the struggle to maintain a work-life balance. They also raised issues related to employment conditions and an increasingly competitive environment. Each group provided recommendations for improving working conditions, resulting in 23 recommendations aimed towards the digital platforms, Swedish agencies and departments and government.

Conclusions: This study suggests that Swedish platform workers face various challenges connected to their type of work, and that factors like quality of employment, level of income, control over their work and the impact of technology affects the workers' health and well-being.

Funding:

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Children's personal exposure to fungal contamination in Portuguese elementary school – A concern to be addressed?

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Objective: The assessment of Microbial Indoor Air Quality in elementary schools is essential to create healthier school environments and improve children's health outcomes. As this study is a spin-off of a European research project InChildHealth, it aims to assess children's personal exposure to fungal contamination in schools located in Lisbon Metropolitan area.

Materials and methods: A passive sampling method was applied by placing an EDCT (electrostatic dust cloth - T-shirts) in one child's t-shirt, per classroom, during the whole school day (6h). Sampling took place in 2 seasons (warm and cold) and a total of 36 EDCT were collected from the 10 schools assessed in both seasons. After extraction, all the samples were inoculated onto MEA, DG18 incubated at 27°C for 5-7 days, and DG18 incubated at 37°C for 5-7 days to assess the pathogenic potential. Fungal contamination was quantified, and identification was made based on macroscopic and microscopic characteristics.

Results: Cold season contamination (MEA 1.41×10^{-1} CFU/m² /day; DG18 1.20×10^{-1} CFU/m² /day; DG18 (37°C) 4.23×10^{-2} CFU/m² /day) was higher than warm season (MEA 4.88×10^{-2} CFU/m² /day; DG18 5.89×10^{-2} CFU/m² /day; DG18 (37°C) 6.93×10^{-3} CFU/m² /day). Critical species such as *Aspergillus* sections *Fumigati*, *Nigri*, *Flavi*, *Nidulantes*, and *Circumdati* were present in these EDCT samples from MEA and DG18 at 27°C, while only the sections *Fumigati* and *Nigri* were present in DG18 at 37°C.

Conclusions: These preliminary results of children's exposure to fungal contamination highlight the urgent need for a comprehensive approach to address schools' contamination. Further analyses will ensure comparison with the results obtained in other sampling methods, and correlation with data from the walkthrough surveys employed.

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November 5, Early Career Keynotes

Time: 17:00-18:00. Location: Auditorium.

Chairs: Laura Beane-Freeman and Barbara Harding

Early Career Keynote 1: Vanessa Oddo. Precarious Employment and Cardiometabolic Health in the United States

Early Career Keynote 2: Nathan DeBono. The use of a large language model to identify industry-funded research in carcinogenic hazard evaluations

Precarious Employment and Cardiometabolic Health in the United States

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Objective: Precarious employment, commonly characterized by job instability, low wages, few fringe benefits and limited rights and protections, may adversely affect health and contribute to health disparities. This study aimed to test the association between multidimensional precarious employment and cardiometabolic health in the United States.

Materials and Methods: We used data from waves 4 (2008-2009, n=3735) and 5 (2016-2018, n= 2138) of the National Longitudinal Study of Adolescent to Adult Health. Eight indicators were identified to operationalize five dimensions of precarious employment (precarious employment score, PES, range:0–5): material rewards, working-time arrangements, stability, workers’ rights, and interpersonal relationships. We measured cardiometabolic risk via the Framingham Risk Score (FRS), a composite indicator, which includes the following: age, gender, smoking status, blood pressure, antihypertensive medication use, diabetes, and BMI. Given variability in data collection used between waves, we treated wave 4 and 5 as separate cross-sectional samples. We first employed separate adjusted regression models to estimate whether precarious employment was associated with the FRS. We then tested whether the association varied by race/ethnicity using an interaction term.

Results: The average PES was similar by gender and race/ethnicity but was inversely related to educational attainment. Average FRS was 2.8% (IQR=1.4, 3.6) in wave 4 and 4.5% (IQR=1.9, 5.6) in wave 5. Overall, the PES was associated with a higher FRS in wave 4 ($\beta= 0.13$; 95% CI=0.05, 0.21). Results were in the same direction but not significant in wave 5 ($\beta=0.25$; 95% CI=-0.06, 0.55). Results differed by race/ethnicity with the largest effect of precarious employment observed among Black individuals in both waves 4 ($\beta =0.28$; 95% CI=0.07, 0.48) and wave 5 ($\beta=1.03$; 95% CI=0.32, 1.74).

Conclusions: Given that heart disease is the leading cause of death in the United States, policies to reduce precarious employment warrant consideration.

Funding. This work was supported by the National Institute on Minority Health and Health Disparities (R01MD012807)

The use of a large language model to identify industry-funded research in carcinogenic hazard evaluations

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Objective: Conflicts of interest in research threaten the validity of scientific inference. Evidence synthesis efforts for cancer hazard identification by the International Agency for Research on Cancer's (IARC) Monographs Programme are vulnerable to bias introduced by industry funded studies, particularly for epidemiological evidence of occupational exposures. We sought to demonstrate a proof of concept for using a large language model (LLM) to identify industry-funded studies reviewed by the IARC Monographs for the carcinogenicity of occupational agents.

Materials and Methods: We extracted text from a convenience sample of studies reviewed for the evaluation of the carcinogenicity of cobalt metal. We used a novel tool called InfluenceMapper, which uses a LLM (GPT-4), to read study text, extract conflict of interest disclosures, funding sources, and author names and affiliations, and classify reported information according to relationships to private industry. Any reported entity was classified as industry or non-industry funded. For studies reporting an industry funded entity, author-entity and study-entity relationships were classified as receiving direct payments, grants, materials (i.e., data), academic benefits, or involvement in legal testimony. The tool's output was inspected for measurement error.

Results: Preliminary results from the convenience sample indicated high sensitivity and specificity in correctly identifying industry entities and classifying relationships to industry from extracted study text. The tool identified the International Tungsten Industry Association and the Freeport Cobalt company as industry entities that funded epidemiology studies reviewed for the monograph. The tool correctly classified authors of these studies as having received grants and material support from the industry entity.

Conclusion: InfluenceMapper is a viable tool for rapidly identifying and describing industry funded entities, studies, and authors. Characterizing the nature of industry-funded research may support the IARC Monographs in their efforts to reduce bias in scientific reviews of the carcinogenicity of occupational exposures.

November 4, Poster session

Group 1, moderator: Michelle Turner

Presentation Title: Assessing the impact of urban pollution on human exposome: an analysis of early biological effects in urban outdoor workers
Presentation Author: Sellaro Francesca

Presentation Title: New quantitative job exposure matrices (JEMs) and occupational measurements of heat, cold, and solar UV radiation in EU INTERCAMBIO project
Presentation Author: Karin Grahn

Presentation Title: Does eco-driving assistance have an impact on bus driver's health and well-being? A pseudo-randomized controlled trial within the INTERCAMBIO project
Presentation Author: Maryline Krummenacher

Presentation Title: Promoting physical and mental well-being in renewable energy sector: A co-creation, intervention, and quasi-experimental study in European wind-turbine blade manufacturing.
Presentation Author: Maxime Turban

Presentation Title: Human health effects of Indoor Environmental Quality, a scoping review
Presentation Author: Jet Opbroek

Presentation Title: Association of Some Personal and Occupational Factors with Occupational Injury in an Aluminum Smelter: A Case Study
Presentation Author: Ashish Kumar

Presentation Title: Quality of life in the group of medical students with ever-recognized chronic disease during two years of observation
Presentation Author: Joanna Kowalska

Assessing the impact of urban pollution on human exposome: an analysis of early biological effects in urban outdoor workers.

Francesca Sellaro ¹, Roberta Perneti ¹, Stefano Massino Candura ^{1,2}, Enrico Oddone ^{1,2}

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Objective: The project investigates the association between air pollution and biological alterations in urban police officers engaged in outdoor activities during their working shift, compared to office workers, whose exposure to urban environment is limited to leisure time. The project aims to define, according to a *one health* approach, the association between lifestyle, major air pollutants in the urban context, (i.e. the professional exposures of urban outdoor workers), and the biological effects.

Material and methods: Recruitment of 200 workers, equally divided in the two subgroups, will start in September 2024 in Pavia, a northern Italian city of 70,000 inhabitants. General external exposome will be measured through direct inhalation exposure and estimates from fixed air quality monitoring stations. For specific external exposome, detailed information on lifestyle and work-related habits will be collected through questionnaires and interviews. Internal exposome will be determined by analyzing biological samples (blood, saliva, urine) to assess levels of inflammatory chemokines and oxidative stress markers, as well as studying epigenetic variations such as DNA methylation, all of which can contribute to changes in the human biological age.

Results: The implementation of the project is expected to generate the following results: 1. Recruitment of a cohort of outdoor workers for comparative analyses with international cohorts. 2.

Integrated database linking personal exposure and environmental data to assess the reliability of monitoring station measurements in Pavia. 3. Development of a predictive model correlating specific life and work conditions in urban environments with levels of exposure and potential health effects, estimating biological age.

Conclusions: The research identifies biomarkers linked to oxidative stress, inflammation, and epigenetic changes, offering insights into how environmental exposures impact health. Estimating biological age quantifies cumulative environmental impacts on aging, informing strategies to mitigate health disparities. This multi-method approach provides actionable insights for occupational health and environmental management stakeholders.

Funding:

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New quantitative job exposure matrices (JEMs) and occupational measurements of heat, cold, and solar UV radiation in EU INTERCAMBIO project

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Objective: The aim is to develop new quantitative job exposure matrices (JEMs) to better characterize occupational heat, cold, and solar UV radiation exposures in different occupational settings in Europe.

Material and methods: We will conduct occupational measurement campaigns through personal sampling of workers in seven European countries, recruiting participants from Denmark, Spain, Sweden, Switzerland, Belgium, the Netherlands, and Portugal. For each worker, measurements of air temperature, solar UV (when relevant), and physical activity will be performed. Wet-bulb globe temperature (WBGT) will be captured in a subset of workplaces. A selected sample of the workers will undergo repeated sampling. All workers will receive a questionnaire with questions on work tasks, body positions, working cloths, and occupational history.

Based on these measurements and existing JEMs, we will develop new gender-specific quantitative JEMs for occupational heat, cold, and solar UV radiation exposure for European occupations (ISCO 08-COM). The JEMs will provide an estimate of exposure intensity (i.e. number of days per year of heat, cold exposure above/below a WBGT threshold and Standard Erythral Dose (SED)). The JEMs' construction will be a combination of: 1) measurements of indoor or outdoor WBGT, personal air temperature, solar UV radiation, and metabolic rate; 2) expert ratings; 3) modeled indoor and outdoor thermal environment based on historical meteorological data, 4) structured observations, and questionnaires on personal characteristics. The thermal environment/UV exposure, metabolic rate, and clothing will be estimated by region, and gender per job code.

Conclusions: The construction of new JEMs for occupational exposure to heat, cold, and solar UV radiation enables investigating associations between these climate change related exposures and various health effects.

Funding:

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Does eco-driving assistance influence bus drivers' work and well-being? The protocol of a pragmatic pseudo-randomized controlled trial within the INTERCAMBIO project

Maryline Krummenacher ¹, Viviane Remy ¹, Thomas Charreau ¹, Irina Guseva Canu ¹

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Objective: The development of eco-driving assistance (EDA) is rapidly expanding and becoming a tool for reducing the ecological impact of public transport by lowering energy consumption and reducing air pollution. However, the effects of EDA on professional bus drivers' health, well-being and work conditions remain unknown. Understanding the impact of EDA on bus driver work conditions is crucial to ensure a sustainable implementation of this technology.

Material and methods: We reviewed existing literature on EDA to understand their functionality and define the outcomes and variables to be measured. We identified as a partner a Swiss transport public company who has developed and installed EDA on ~10% of its bus fleet. Company managers and bus drivers' representatives will be involved in the co-creation process while developing the study design, documents, plan and logistics.

Results: To assess the effect of EDA on bus drivers, we will conduct a pragmatic pseudo-randomized controlled trial. The within-subject design was chosen due to practical constraints of bus allocation. Involving a large array of parameters enables a pseudo-randomization of the intervention (driving- shifts with EDA-equipped buses) and the control (driving-shifts with non-EDA-equipped buses) periods. Based on a sample size power calculation, we will recruit 50 bus drivers. The primary outcome is heart rate variability (HRV), measured continuously throughout the working day. HRV reflects the activity of the autonomous nervous system and serves as an indicator of stress and overall health. The secondary outcome includes an evaluation of perceived stress collected through the visual analog scale included in a daily questionnaire.

Conclusions: Findings will be integrated with other ongoing work on climate change, occupational health and the green transition as part of the EU funded INTERCAMBIO project.

Promoting physical and mental well-being in renewable energy sector: A co-creation, intervention, and quasi-experimental study in European wind-turbine blade manufacturing.

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The critical need for global shifts away from fossil fuels towards sustainable energy alternatives calls for an expansion of wind-power generation capacities. However, the production of windmill blades is labor-intensive, and poses potential health risks. Workers are notably exposed to epoxy resins, increasing their risks of skin sensitization and allergic contact dermatitis (ACD). For workers, this can lead to a significant reduction in quality of life and job loss. For employers, this can lead to workforce attrition and losses in productivity.

As part of the EU-funded INTERCAMBIO project, we aim to address work-related hazards in the wind turbine blade manufacturing (WTBM) industry by co-creating, implementing and evaluating workplace interventions across four phases. Using an iterative co-creation process (Phase I) we will work with WTBM industry stakeholders in Denmark, Spain and Portugal to identify potential hazards and sources and routes of exposure. We will then develop a multi-faceted intervention to reduce epoxy resin exposure, such as through the visualization of contamination, improvements in work processes and in adjustments of personal protective equipment use. Identified interventions will be implemented and assessed for effectiveness using a quasi-experimental study design (Phase II). Feedback from study participants and stakeholders will be obtained by means of focus-group discussions (Phase III). Findings will also be integrated with those of intervention studies in other relevant industries in the project related to climate change and the green transition (Phase IV).

Overall, we aim to improve the physical and mental well-being of workers in the WTBM industry and reduce the burden of disease arising from ACD.

Funding:

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Human health effects of Indoor Environmental Quality, a scoping review

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Background: Ambient environmental exposures like air pollution or noise impact human health. Indoor environmental quality (IEQ) indicators such as air pollution, noise, temperature, humidity, light, crowding, biological pathogens, etc., also affect health. Studying IEQ indicators is challenging due to varying compositions and exposure levels, requiring multi-disciplinary approaches to understand their impacts, monitoring, and improvement. People in a rapidly urbanizing world spend nearly 90% of their time indoors – whether for work, transport, or leisure - making it essential to understand IEQ indicators' impact on health and wellbeing. This review outlines IEQ indicators' impacts on human health by scoping the existing evidence on IEQ indicators, associated health outcomes, and the risk estimates/exposure-response functions (ERFs) that describe these associations.

Methods and Results: We conduct a comprehensive scoping review following PRISMA-ScR guidelines, exploring the literature on IEQ-health outcomes links. Database searches cover PubMed and Scopus (n=7158, n=762 included post-abstract screening), facilitated through open-source reference management software Rayyan. We include studies investigating the association between IEQ indicators and health outcomes through measures of quantified risk estimates/ERFs. Descriptive analyses involving comprehensive exposure assessments or incidence/prevalence rates will also be considered depending on the study design. If possible, a meta-analysis of incidence studies will be performed. Study selection based on predefined inclusion criteria is ongoing. Anticipated health outcomes evident in the literature include respiratory symptoms, "Sick Building Syndrome," mental health indicators, and productivity, as well as key pollutants such as Particulate Matter, Nitrogen dioxide, and Carbon Monoxide, and indicators such as lighting, temperature, noise, and humidity.

Conclusions: By synthesizing evidence on quantified associations between IEQ indicators and health effects, we will enhance understanding of links between indoor environments and health. This review's findings can inform health impact assessment (HIA) studies and provide policymakers with data for public health advocacy and policies promoting good IEQ in indoor spaces.

Funding:

This work is partly funded through the European TwinAIR project (funded through the EU's Horizon Europe program under grant agreement No101057779) that aims to improve urban life by tackling the challenge of indoor air quality (IAQ) improvement by understating its complex interrelationship with external factors.

Association of Some Personal and Occupational Factors with Occupational Injury in an Aluminum Smelter: A Case Study

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Objective: Injury prevention in high-risk industries, such as aluminum smelting, is crucial for ensuring worker safety and operational efficiency. Aluminum smelters present a complex environment with numerous hazards. These factors along with some personnel factors significantly increase the risk of injuries.

Materials and methods: Data was collected from shop floor workers of aluminum smelters. A total of 600 workers were interviewed for this study. Among them, 120 workers had experienced injuries in the last three years. This setup established a 1:4 case-control study design, allowing for a comparative analysis between the injured and non-injured groups. Additionally, the work was observed to identify the exposure of workers to different hazards.

The data collection focused on the following risk factors: Age, Education, no. of dependents, hand tools hazard, manual handling hazard, machine-related hazard, and electrical hazard.

To identify the association between the collected injury risk factors and the occurrence of injuries, Pearson Chi-Square tests were conducted. Additionally, the Phi coefficient and crude odds ratio were used to measure the strength of the association between the risk factors and injury incidence.

Results: The following factors were found to be statistically significantly associated with injury: age (OR = 0.59, 95%CI = 0.37-0.92, phi = -0.095), no. of dependents (OR = 1.60, 95%CI = 1.05-2.45, phi = 0.090), hand tool hazard (OR = 5.55, 95%CI = 3.62-8.47, phi = 0.341), manual handling hazard (OR = 5.10, 95%CI = 3.34-8.33, phi = 0.325), machine-related hazard (OR = 7.63, 95%CI = 4.85-12.04, phi = 0.389), electrical hazard (OR = 4.54, 95%CI = 2.92-7.09, phi = 0.289).

Conclusions: The identification of injury risk factors in high-risk industries like aluminum smelting is vital for developing effective safety intervention programs. The inference drawn from this study can help plant management to reduce occupational injuries and promote a safer workplace.

Quality of life in the group of medical students with ever-recognized chronic disease during two years of observation

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Objective: In developed countries, chronic diseases are increasingly diagnosed in young people, including students. Quality of life (QoL) is strongly related to the current state of health. It is interesting to determine whether a worse QoL in medical students is related to recognized chronic diseases. The aim of the study was to evaluate medical students' QoL and its relationship with declared chronic diseases as well as changes in two years of follow-up.

Materials and methods: The study included students from the Medical University of Silesia (427 during the first year, and 335 during the second one). The observation was based on questionnaire surveys collected during the first and second years of studies.

Results: Obtained results showed that 22.9 % of respondents declared at least one chronic disease, 4.2 % - multimorbidity during the first year, and 23.3 % and 4.2 % respectively during the second year of studies. Endocrinopathies, allergies and depression dominated among the declared diseases. The total scoring of QoL was a bit higher in the second year (respectively 68.6 ± 17.9 and 69.0 ± 17.0). In both years of observation, the average score was significantly lower among respondents with declared chronic disease in both, the first and second year ($p < 0.001$). Interestingly, the social domain remains similar in groups of students with and without chronic disease in both years of observation. However, better somatic and psychological QoL were related to better health status (students without chronic diseases) during the first year, in the case of second-year students – chronic disease influenced only the environmental domain ($p < 0.005$).

Conclusions: The obtained results confirm that the quality of life in medical students was determined by the occurrence of chronic diseases. Better QoL depends on better health status.

November 4, Poster session

Group 2, moderator: Kaitlin Kelly-Rief

Presentation Title: Cardiac amyloidosis and silica exposure : A case report
Presentation Author: Ayadi Abir

Presentation Title: Case reports of occupational tuberculosis among workers with direct animal contact
Presentation Author: Ayadi Abir

Presentation Title: Occupational disparities in all-cause mortality, United States, 2020-2021
Presentation Author: Devan Hawkins

Presentation Title: Vaccination and serological profile of hepatitis B among healthcare workers at a University Hospital in Tunis Capital, Tunisia
Presentation Author: Emna Baraketi

Presentation Title: Epidemiological profile of work-related shoulder tendinopathy
Presentation Author: Wiem Ayed

Presentation Title: « Tobacco-Free company » : a public company's experience in the fight against tobacco
Presentation Author: Dallagi Amani

Presentation Title: Evaluation Of Occupational Exposure To Metallic Pigments And The Health Status Of Workers In The Ceramics Industry
Presentation Author: Dallagi Amani

Cardiac amyloidosis and silica exposure: A case report

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Keywords: Exposure, occupational, Silica, Amylose

Objective: To describe a case of cardiac amyloidosis in a worker who had been exposed to silica dust.

Methods: The data were collected from the medical records with bibliographic research.

Results: A 51-year-old man, who worked in a marble factory for 28 years and had a 30 pack-year smoking history, presented with recently worsening exertional dyspnea. A chest CT scan revealed alveolar hemorrhage and mediastinal lymphadenopathy. Spirometry indicated a tendency towards restriction, and DLCO was reduced to 50%. An immunological workup showed positive antinuclear antibodies with a speckled pattern at 1/400. The CT scan appearance and additional test results did not support a diagnosis of silicosis. Due to worsening dyspnea, an echocardiogram was performed, which showed a non-dilated, hypertrophied left ventricle with preserved ejection fraction at 60%, a good right ventricle, and a bull's-eye appearance. Given this appearance, a cardiac MRI confirmed the diagnosis of cardiac amyloidosis with a left ventricular ejection fraction of 30%.

Conclusions: Prolonged exposure to silica in the environment, as well as silica deposition, may contribute to the development of monoclonal gammopathy and amyloidosis due to chronic stimulation and dysregulation of the immune system. However, the relationship between silica exposure and amyloidosis is not yet well elucidated. This relationship needs to be studied further in the future.

Case reports of occupational tuberculosis among workers with direct animal contact

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Objective: To describe case reports of occupational tuberculosis among workers in direct contact with animals.

Materials and methods: Data were collected from medical records and bibliographic research.

Results: Two case studies were analyzed. The first case involved a 44-year-old female with a history of type 2 diabetes, hypertension, allergic rhinitis, conjunctivitis, and morbid obesity. She had worked as an assistant in a veterinary school for 11 years. Her professional tasks included performing animal examinations (sheep, cows, camels, and horses) and collecting samples. The history of her illness began one month prior, marked by the appearance of a left mandibular mass. Further exploration via cervical ultrasound revealed adenomegaly in the maxillary and jugulo-carotid regions. Lymph node tuberculosis was confirmed through the detection of the *Mycobacterium tuberculosis* complex in an adenomegaly biopsy and PCR for BK. The second case involved a 29-year-old female with a history of allergic rhinitis and conjunctivitis. She had worked as a technician at the Agricultural Development Office for three years, responsible for vaccinating animals (sheep, cattle, dogs, and cats). After developing a dry cough, exertional dyspnea, and wheezing, further investigations were performed, leading to a diagnosis of pulmonary tuberculosis, with *Mycobacterium tuberculosis* identified via a BK test. Both cases were declared as occupational diseases under Table No. 63 "Tuberculosis bacilli."

Conclusions: These case reports highlight occupational tuberculosis linked to direct animal contact, underscoring the importance of workplace safety and early diagnosis to prevent such infections. *Mycobacterium tuberculosis* can be transmitted from animals to humans, emphasizing the occupational hazards in animal-handling professions.

Funding:

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Occupational disparities in all-cause mortality, United States, 2020-2021

Devan Hawkins

Introduction: Over the past two decades there have been increases in all mortality rates among working-age adults in the United States. These increases in mortality rates have contributed to life expectancy declines. Many of these changes in mortality rates are driven by increases in drug overdoses and suicides and plateauing mortality from cardiovascular disease. Because these mortality changes have impacted working-age people in the United States most acutely, there is reason to explore whether workplace factors are contributing to them. The objective of this study was to calculate mortality rates in all-cause mortality in the United States.

Methods: Death certificate data for most states was obtained from the United States National Center for Health Statistics. We calculated mortality rates for working age by occupation.

Univariable and multivariable mortality rate ratios (controlling for age, sex, race/ethnicity, and education) were calculated.

Results: Workers in the following occupations had all-cause mortality rates higher than the average for all workers among workers in construction and extraction; building and ground cleaning/maintenance; installation, maintenance and repair; farming, fishing, and forestry; production; transportation and material moving; food preparation and serving; personal care and service; and protective service occupations. In the multivariable model, workers in the following occupations had significantly elevated mortality rate ratios: management; life, physical, and social science; community and social services; legal; arts, design, entertainment, sports, and media; and healthcare practitioners.

Discussion: More research is needed to determine how work-related factors are contributing to changes in all-cause mortality in the United States.

Vaccination and serological profile of hepatitis B among healthcare workers at a University Hospital in Tunis Capital, Tunisia

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Objective: To describe the vaccination and serological profile of hepatitis B among healthcare workers at the Rabta University Hospital.

Materials and methods: This descriptive cross-sectional study involved 700 healthcare workers (HCW) at Rabta University Hospital over a 3-month period from February 21st to April 29, 2024.

Results: A total of 700 healthcare workers participated, with a median age of 43 years, sex ratio of 0.49 and median professional seniority of 13 years. The most common positions were as follows: nurses (30%) and support staff (12.3%). HCW had a history of a blood exposure accident (14.1%). The hepatitis B vaccination profiles showed that 3.3% were not vaccinated, 14.3% had incomplete vaccination, 16.4% had an unspecified vaccination schedule, and 56% were fully vaccinated. Completed vaccination was noted in 72.2% of women and 56.2% of men. The highest rates of complete vaccination were recorded in HCW aged < 30 years (86.2%) and those with professional seniority < 5 years (81.8%). Nurses had the highest vaccination rate among all HCW, with 87.1% fully vaccinated. Serological profiles were recorded in 78.5% of the patients (n=550). Of these, 47% (n=259) were immune to hepatitis B, including 4.9% naturally immune, 2.9% partially vaccinated, and 39.2% fully vaccinated. Among those immunized against hepatitis B virus, 70.2% (n=182) had anti-HBs antibody levels greater than 100 IU/L. The serology records also showed that 1.6% were infected with hepatitis B and 2.1% of HCW were non-responders to the vaccine. Higher immunization rates were observed in women (53%), HCW under 30 (80.4%), professional seniority under 5 years (80%), and technicians (70.7%).

Conclusions: The best measure to prevent hepatitis B is to ensure widespread vaccination, which is both effective and well tolerated, for all HCW, along with systematic serological screening and adherence to universal care precautions.

Epidemiological profile of work-related shoulder tendinopathy

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Findings: Musculoskeletal disorders are one of the leading work-related illnesses eligible for compensation in Tunisia. Shoulder tendonitis is often a multi-factorial pathology whose occupational origin has long been proven.

Objective: To demonstrate the socio-professional characteristics of patients with work-related shoulder tendinopathy and to study the impact on fitness for work.

Material and methods: A retrospective descriptive study of patients with work-related shoulder tendinopathy who consulted an occupational medicine department in Tunisia for a medical assessment of fitness for work during the period from January 2016 to December 2023.

Results: We have collected 40 cases of patients with work-related shoulder tendinopathy. The average age was 46±10 years. The predominance of women was 60,7%. cases. The most common sectors represented were textile (35%), health (15%), electrical industry (15%) and food industry (12,5%). The most occupied posts were stitchers (30%), machine operator (22%) and meat slaughterer (10%). The average duration of exposure to high-risk gestures was 19±10 years. Work involving repetitive shoulder movements was observed in all patients. In the majority of cases (80%), shoulder tendinopathy was isolated. It was associated with carpal tunnel syndrome in 7 cases and with epicondylitis in one case. On ultrasound examination of the shoulder, the damage involved the supraspinatus (92,5%), subscapularis (12,1%), infraspinatus (4,9%) and long biceps muscles (4,9%).

Conclusions: According to our study, work-related shoulder tendinopathy occurs in several occupational sectors. Adequate and rigorous prevention is imperative to reduce the prevalence of this pathology and its distressing consequences.

«Tobacco-Free company»: a public company's experience in the fight against tobacco

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Findings: Smoking is a public health concern as well as a workplace health concern. Therefore, implementing a smoking prevention policy within an establishment constitutes a perspective for promoting health.

Objective: Our aim was to implement an in-house smoking prevention policy and evaluate the program.

Materials and Methods: We conducted a cross-sectional survey in a Tunisian administrative company, using questionnaires in two phases over a 6-month period. The first was a study of smoking prevalence in the company, and the second was an evaluation of the tobacco control program.

Results: Of the 97 employees included in the study, 87 completed the questionnaire (89.7%). Smoking prevalence was 36.7%. The average age of smokers, who were mainly administrative staff (84.4%), was 41.84 ± 8.1 years. In terms of motivation to quit, 40.6% of employees were at the decision stage. The majority of employees (91.9%) wanted a smoke-free company. Smoking cessation assistance consisted of a consultation conducted by a tobaccologist. Fifteen smokers attended the consultation, i.e. 46.8% of all smokers, ten of whom were strongly motivated to quit. Evaluation of the effectiveness of the smoking cessation program showed a success rate of 53.4% at six months. Smoking bans in the workplace were not always respected by employees. 76% of employees thought that smoking bans would be better respected if the company provided a smoking room for smokers.

Conclusions: With a well-thought-out, multi-disciplinary in-house smoking prevention policy, we can achieve results equivalent to those achieved by tobacco treatment centers.

Evaluation of occupational exposure to metallic pigments and the health status of workers in the ceramics industry

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Objective: To assess qualitatively and quantitatively the exposure to metallic pigments in the ceramics industry and to evaluate the impact of metal exposure on the health of workers.

Materials and Methods: Descriptive cross-sectional survey, conducted in 2010 with 200 employees from a ceramics company, involving a qualitative and quantitative environmental study of metallic pigments and a medical study assessing respiratory, skin, and neuropsychic effects.

Results: A total of 200 workers participated, with a mean age of 40.46 ± 9.38 years, a sex ratio of 5 and a mean professional seniority of 15.64 ± 11.88 years. The most common job positions were enameling and screen printing (20%), kiln operation (15%), and sorting and packaging (13,5%). Only 14% of the population were directly exposed to metallic pigments, and 21.5% had indirect exposure. Working conditions were very unsatisfactory: collective and individual protective means were absent, and general hygiene rules were not respected. Quantitative evaluation involved measuring respirable dust at two positions: P1 (screen printing paste preparation) with 2.37 mg/m^3 and P2 (craft workshop) with 3.15 mg/m^3 , using a precision balance and thois atmospheric metrology of metallic elements (cadmium, cobalt, chromium, nickel, lead, aluminum) in pigment-exposed positions revealed concentrations below recommended limits. ENT and respiratory manifestations were reported in 30.5% of employees, particularly allergic rhinitis (72.13%). The study of the frequency of these manifestations according to the levels of pigment exposure revealed that the higher the risk, the more frequent these manifestations. Additionally, 11.26% of exposed employees report skin manifestations, including 2 cases of allergic contact dermatitis. Furthermore, 8.22% of employees report fertility disorders, including 2 cases of oligospermia. Finally, neuropsychic manifestations were noted in 52% of the studied population.

Conclusions: Despite safe atmospheric levels, co-exposure to metallic pigments in ceramics appears to harm workers' health, highlighting the need for preventive measures in this sector.

November 4, Poster session

Group 3, moderator: Anja Stajnko

Presentation Title: Employment trajectories and health: insights from the CONSTANCES Cohort
Presentation Author: Hanifa Bouziri

Presentation Title: Evaluation of Initial Medical Certificates for Work Accidents Issued in the
Emergency Department
Presentation Author: Jihen Hsinet

Presentation Title: Skin symptoms among workers in the Norwegian salmon processing industry
Presentation Author: Kaja Irgens-Hansen

Presentation Title: Shift work among healthcare workers: impact on health and socio-
professional well-being
Presentation Author: Emna Baraketi

Presentation Title: The effect of night shift work on microbiome composition
Presentation Author: Raquel Galán Espinosa

Presentation Title: Detailed assessment of night shift work aspects and potential mediators of its
health effects: the contribution of cross-sectional studies
Presentation Author: Tara van der Grinten

Presentation Title: Validated risk scores to explore health effect of shift work in the Klokwerk
cross-sectional study
Presentation Author: Antonio d'Errico

Employment trajectories and health: insights from the CONSTANCES Cohort

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Context: Policymakers in many countries are considering delaying the statutory retirement age. Understanding the determinants and correlations of working career duration and employment interruptions is important for developing workforce policies that optimise societal goals and workers' welfare.

Objective: To identify profiles of employment trajectories and assess whether health status varies according to these profiles.

Methods: This analysis included a subsample of 70,920 participants over 45 from the French CONSTANCES population-based cohort. Available data included ages at career start and end, number of employment episodes, ages of and reasons for interruptions, longest employment episode and longest interruption duration. Using finite mixture models optimised by the Expectation-Maximization algorithm, we identified employment trajectories describing the duration of the working lifetime, considering temporary interruptions and early retirement.

Results: Six mutually exclusive career clusters were identified. Cluster 1 included blue-collar workers with early career starts (ages 15-18). Cluster 2 comprised public sector employees starting careers between ages 15-21, with frequent interruptions. Cluster 3 featured diverse intermediate professions with varying career starts. Cluster 4 consisted of teaching, health, and public sector professionals, Cluster 5 was a mix of transitions between lower and mid-level employees, starting careers between ages 15-21, with frequent interruptions. Cluster 6 included executives and higher-income employees starting careers after age 21, with later retirement ages.

Despite earlier retirement, blue-collar workers and lower—and mid-level employees had longer total work durations than executives. Even in executive roles, women experienced longer career interruptions and later retirement ages. Health-related interruptions and poorer perceived health were more common among male workers and public sector employees with past commercial roles, while higher depression symptoms were found in administrative intermediate and public sector professionals.

Conclusions: Retirement policies should consider not only retirement age but also overall career duration and health characteristics specific to each activity sector.

Evaluation of Initial Medical Certificates for Work Accidents Issued in the Emergency Department

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Objectives: To evaluate the initial medical certificates delivered after a work-related accident in the emergency department of La Rabta University Hospital.

Materials and methods: A one-year retrospective descriptive study at Rabta Hospital's Emergency Department analyzed the initial medical certificates issued after work accidents. We examined form errors and errors in estimating temporary work incapacity.

Results: A total of 262 initial medical certificates were collected and analyzed. In terms of form, the majority of the initial medical certificates included unconventional abbreviations (82%). However, all initial medical certificates (100%) were clear, legible, and only contained objective findings. The victims' profession has never been specified. In addition, the date of the accidental event, as well as the date of the initial examination, was specified on all initial medical certificates. The exact mechanisms and circumstances of the accident have not been specified. Spontaneous complaints were only reported in 24.4% of the initial medical certificates without being interpreted in connection with the work accident. Indeed, pain and its location were mentioned in only 23.3% of the cases. The nature of the physical injuries was specified on all initial medical certificates without any mention of the psychological impact of the accident. The description of physical injuries lacked precision in all the initial medical certificates, and there was always an omission of one of the characteristics of the injuries. Finally, all initial medical certificates included a period of temporary incapacity for work, estimated in days. The comparison of the means of temporary work incapacity determined by the emergency physician and forensic doctor revealed a statistically significant difference ($p = 0.004$).

Conclusions: All initial medical certificates in our study had editorial shortcomings that could have hindered the repair process. Improving this requires better training for doctors in medicolegal practices.

Skin symptoms among workers in the Norwegian salmon processing industry

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Objective: Salmon processing workers have various occupational dermal exposures including wet work (frequent contact with water, hand wash and prolonged use of gloves), contact with fish products, disinfectants, and detergents. However, knowledge regarding whether work within this industry may cause skin symptoms is limited. In this study, we aimed to investigate the prevalence of skin symptoms among workers in the salmon processing industry.

Material and methods: A total of 738 workers (664 processing workers and 74 office workers) from nine Norwegian salmon processing plants were included in a cross-sectional study. All completed a questionnaire comprising questions regarding work tasks and skin symptoms on hands during the past 12 months. Chi-squared tests or Fisher's exact tests were used to identify significant difference in skin symptoms between the groups.

Results: Processing workers had a higher prevalence of skin symptoms compared to office workers. We found a significant difference in prevalence of skin symptoms between processing workers and office workers for 'redness' (15% vs. 5%, $p=0.03$), 'dry skin with scaling/flaking' (21% vs. 8%, $p=0.01$), 'tiny water blisters (vesicles)' (7% vs. 0%, $p=0.01$), 'burning, pricking, or stinging' (8% vs. 1%, $p=0.03$) and 'aching or pain' (12% vs. 0%, $p<0.001$).

We observed a non-significant elevated prevalence of skin symptoms among processing workers compared to office workers for: 'fissures or cracks' (19% vs. 10%), 'weeping or crusts' (5% vs. 1%), 'papules' (4% vs. 0%), 'rapidly appearing itchy wheals/welts (urticaria)' (7% vs. 1%), 'itching' (16% vs. 10%), and 'tenderness' (8% vs. 4%).

Conclusions: Salmon processing workers had higher prevalence of skin symptoms on hands compared to office workers in the same industry. The study contributes to increased knowledge on skin symptoms among workers in the salmon processing industry.

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Shift work among healthcare workers: impact on health and socio-professional well-being

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Objective: To evaluate the consequences of shift work on physical and mental health among healthcare workers (HCWs)

Material and Methods: Descriptive, cross-sectional, multicenter study conducted among HCWs in Tunisian hospitals between February and May 2024 using an anonymous self-administered questionnaire that included the Leeds Sleep Evaluation Questionnaire for sleep quality and the Perceived Stress Scale for stress levels.

Results: There were 127 HCW, predominantly women (57.5%) with a median age of 29 years and work seniority of 4 years. They were mainly nurses (43.9%) and surgical instrument technicians (15.4%). Participants reported that they had a rotating three-shift schedule in 44.1% of cases. HCW reported that due to their work schedules, 88.4% felt tired while 45.9% experienced psychological disorders.

Quality of sleep assessed by Leeds scale indicated that following night shifts, HCW showed difficulties falling asleep, their sleep was less restful and more fragmented. Waking up was more difficult and slower. They felt more tired both upon waking and throughout the day. They also reported a disturbance in their balance and coordination upon waking.

Results of the Perceived Stress Scale evaluation showed that our population had moderate to high stress levels in 59.7% and 39.5% of cases respectively. They reported that shift work affected their quality of work (69.8%), influenced work efficiency (65.1%) and their ability to make quick decisions (59.5%).

In terms of socio-family relationships, 85.6% felt that shift work disrupted their family life, and 81.7% reported that irregular schedules directly affected their ability to manage family responsibilities. Participants reported in 87.2% of cases disruptions in their social life due to their work schedules.

Conclusions: Shift work affect HCWs' physical and mental health, sleep quality and socio-family relations. To mitigate these effects, implementing a preventive strategy is crucial, including organizing working conditions effectively and ensuring regular medical monitoring of HCW.

The effect of night shift work on microbiome composition

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Keywords: shift work, night shift, gut microbiome

Objective: Circadian disruption can alter the gut microbiome composition, which can lead to metabolic dysregulation and affect inflammatory pathways. This study aims to evaluate how night shift work affects the gut microbiome composition.

Material and methods: 249 healthcare workers in Spain (119 day, 131 night shift workers) were included in this study. Stool samples were taken on a workday. Microbiome DNA from stool samples was extracted using the PureLink Microbiome DNA Purification kit (Invitrogen; CarlsBad, MA, USA) and V3-V4 16S rRNA region was amplified and sequenced using the Illumina MiSeq platform. We examined alpha and beta diversity, and relative and differential abundance in microbial families comparing night shift workers to day shift workers.

Results: Variation in differential abundances of specific microbial families were found. Bacteroidaceae and Clostridiaceae were more abundant among day shift workers whereas Atopobiaceae was more abundant among night shift workers (Linear discriminant analysis effect size scores of 4.2, 2.6 and 2.2 respectively). There were no differences in alpha nor in beta diversity between day shift and night shift workers overall.

Conclusions: Our study identified differentially abundant families between day and night shift workers, however no differences where Gut microbiome alterations may impact metabolic health and immune function, and therefore increase the risk of adverse health outcomes caused by microbiome imbalance, underlining the need for strategies to mitigate these effects on shift workers. To build on these findings, further analysis on night shift work is needed, specifically stratifying by night shift work history (number of years working night shifts) and intensity (number of nights worked per week).

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Detailed assessment of night shift work aspects and potential mediators of its health effects: the contribution of cross-sectional studies

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There is a general lack of consistency in the findings from the epidemiological literature with regards to the pathways through which the ‘exposure’ night shift work exerts its effects on health. In addition to the schedule of night shift work (e.g., duration and intensity of night shift work) and exposure to light during the night shift that have been described before, we propose that assessment of ten key aspects directly associated with shift work could enhance our comprehension of its nature and its health implications. For these additional aspects, we make a distinction between aspects that should be considered part of the exposure ‘night shift work’ (“meal timing and composition during the night shift”, “degree of physical activity during the night shift”), potential mediators of the effect of night shift work on health (“supplements and medication use”, “social disruption”, “exposure to sunlight”, “meal timing and dietary patterns while not in the night shift”, “physical activity”, “sleep quality”, and “substance use”), and factors for which night shift work is a potential effect modifier (“occupational co-exposures”). Cross-sectional studies offer the opportunity to employ various tools, including objective measurements, to assess these aspects of night shift work. Here we highlight novel methods that are available to assess shift work-related factors in cross-sectional studies, including the use of mobile phone apps, sensors, and biomarkers. We argue that well-designed cross-sectional studies focusing on high-quality exposure assessment and incorporating a suite of advanced exposure assessment tools can contribute to a better understanding of the exposure to night shift work. Such insights will be hypothesis-generating and informative for the design of a new generation of well-designed cohort and case-control studies.

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Validated risk scores to explore health effect of shift work in the Klokwerk cross-sectional study

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Objective: Using validated risk scores based on metabolic profiles could offer insights into the work-related factors, in this case among nurses, that contribute to health issues associated with shift work.

Materials and methods: In our study, which included female nurses and paramedic staff aged 18-65 of the Dutch Klokwerk cross-sectional study, comprised 54 workers who worked night shifts and 90 workers who worked night shifts four times or fewer per month, defined as 'day workers'. Metabolite markers were analyzed using NMR spectroscopy, providing information on lipid metabolism, fatty acid metabolism, glycolysis, fluid balance, and inflammation. The R package MIMiR was used to perform the computation of risk scores (e.g., mortality, CVDs, type-2 diabetes, and metabolic age). Pearson correlation and linear regression models were used to assess the relationship between risk scores and the effect of night shifts across these scores, with coefficients presented as β and standard deviation (SD) changes.

Results: Mortality ($\beta = 1.11$, 95% CI 0.97 to 1.25), CVDs ($\beta = 1.12$, 95% CI 0.41 to 3.03), and type-2 diabetes ($\beta = 1.11$, 95% CI 0.38 to 3.25) scores were higher among night shift workers compared to day workers, although with low precision. In contrast, metabolic age was lower among night shift workers ($\beta = -2.79$, 95% CI -0.88 to 1.11). The correlations between the scores were relatively low. The type-2 diabetes score showed the highest correlations with other scores, ranging from $r = 0.23$ to 0.47.

Conclusions: Our preliminary findings suggest that these validated risk scores could provide insights into the health effects of night shifts on workers. However, further testing in other study settings is needed, and additional aspects of shift work that may impact health, such as diet, physical activity, and habits, still need to be assessed.

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November 4, Poster session

Group 4, moderator: Maria Albin

Presentation Title: Hematological patients' clinical epidemiology and exposure profile to genotoxic substances

Presentation Author: Nathália Gonçalves de Oliveira

Presentation Title: Towards the implementation of a literature matrix to enhance the identification of occupational cancer in different working sectors

Presentation Author: Luca D'Amato

Presentation Title: BOCCA - the Belgian Occupational Cancer (BOCCA) cohort construction

Presentation Author: Janne Goossens

Presentation Title: Investigating parental occupational exposures and the risk of childhood cancer in their offspring

Presentation Author: Sylvia Jochems

Presentation Title: Occupational exposure survey on cancer risk factors in the human health and social work activities sector in Europe

Presentation Author: Muhammad Waseem Khan

Presentation Title: Cancer incidence and mortality among healthcare workers: literature review

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Presentation Author: Jo S. Stenehjem

Presentation Title: Indirect adjustment of tobacco smoking in occupational lung cancer studies: A systematic review of the available methods and their applications

Presentation Author: Jo S. Stenehjem

Hematological patients' clinical epidemiology and exposure profile to genotoxic substances

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Objective: Myelodysplastic neoplasia (MDS) is one of the malignancies that primarily affects the elderly. It is characterized by ineffective hematopoiesis due to DNA damage in hematopoietic cells over time. Exposure to hazardous chemicals and old age are the primary risk factors. A screening-level risk assessment is required because there are many products and various settings in which patients may be exposed. This study aims to evaluate the clinical epidemiological and exposure profile to genotoxic agents in hematological patients.

Material and methods: Observational study conducted through interviews and application of a questionnaire developed to patients at a hematology outpatient clinic in a city in Northeast Brazil.

Results: The majority of the interviewed was female (51%). The mean age was 71,1 years ($\pm 14,70$). The main declared race is multiracial (62,3%), followed by white (22,6%), black (9,4%), asian (3,8%), indigenous (1,9%). The mean hemoglobin (HB) is 8,08g/dL ($\pm 3,1$). 83 patients (81,37%) were exposed to some genotoxic agent, of those 45 patients (44,12%) was diagnosed with MDS. The products of exposure were oil and its derivatives (31,4%), household poisons (18,3%), cosmetics (13,1%), pesticides (10,5%), mothballs (8,1%), industrial chemicals (6,5%), radiotherapy and illicit drugs (0,8% each), and patients didn't remember the name or brand of the product (10,5%).

Conclusions: These findings demonstrate that hematological patients are more frequently exposed to genotoxic exposure than is generally reported in the literature. In addition to helping to increase awareness among patients who are exposed to these risk factors, a thorough history of exposure to genotoxic chemicals and effective monitoring of individuals with suspected MDS become critical for treating the disease. Further investigation is needed to correlate the type of exposure and its influence in the development of hematological diseases, such as MDS.

Funding:

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Towards the implementation of a literature matrix to enhance the identification of occupational cancer in different working sectors

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Objective: The national project BEST (Big data and deep learning in health surveillance for occupational cancer), financed by the Italian Institute for Safety at Work, aims to improve prevention practices in occupational medicine. Among all, the revamp and update of the literature matrix (LM), developed within the Occupational Cancer Monitoring project, is presented. LM is a consolidated repository of scientific research, from national and international peer-reviewed journals, highlighting correlations between cancer sites and different occupational sectors. Rather than a literature review, LM enhances the understanding of occupational hazards and assist general practitioners and public health physicians in identifying potential cases of occupational neoplasms with robust scientific evidence, accessible and clear information. This work presents the methodology and state of progress of the LM update.

Materials and Methods: The collection of studies for LM was conducted through PubMed, employing a validated search string for the selection of relevant contents. Results from cohorts, cross-sectional and case-control studies, and meta-analyses published between 2010 and 2024 were considered. Moreover, only studies accounting for statistical estimates greater than 1.00 and with the lower value of the 95% CI greater than 1.00 were included.

Results: Currently, 4 neoplastic sites were analyzed. A total of 1129 articles were examined, of which 145 were included in the matrix: 68 for the bladder, 50 for the hematopoietic and lymphoid system, 20 for the larynx and 7 for the nasopharynx. LM presents for each study the key information including the increased risk of each cancer site for any occupational sector (i.e. SMR, OR, RR).

Conclusions: LM will be available on a website and will support the practitioners in recognizing occupational cancer. Stated the relevance of the tool and the effort for keeping it updated, as future development LM will be integrated with AI to support the source analysis.

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BOCCA - the Belgian Occupational Cancer (BOCCA) cohort construction

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Objective: Understanding cancer risks associated with occupational exposure is crucial for implementing preventive measures in the working population. This project aims to construct a cohort based on occupational health data collected by IDEWE, one of Belgium's largest Services for Prevention and Protection at Work, to study occupational cancer through a unique coupling with the Belgian Cancer Registry (BCR). The resulting Belgian Occupational Cancer (BOCCA) dataset will be the first of its kind in Belgium, enabling exploration of associations between occupational exposures, sectors, and cancer risk.

Material and methods: This retrospective analysis includes data from BCR from 2004 to 2020 and IDEWE data from 1992 to 2020. The longitudinal BOCCA cohort was constructed by linking data of IDEWE and BCR using the Social Security Identification Number. Specifically, the linking of the datasets started with data of IDEWE and this cohort was linked to data of BCR to identify individuals who received a cancer diagnosis. Preliminary results of this cohort are presented.

Results: The BOCCA dataset includes 3.7 million observations, on 775,004 unique subjects. The median number of observations per individual is 3 (IQR: 1-6). Occupational information was categorized into sectors: healthcare (35%), manufacturing (18%), distributive trade (12%), government (10%), education (5%), construction (5%), services (5%), transport (4%), other (4%), unknown (1%) and food (1%), respectively. Exposure information was classified into 21 binary variables. Additionally, lifestyle related risk factors were included: BMI (numeric), physical activity (yes/no) and smoking status (ex-/no/yes). A total of 21,314 incident cancer cases are identified with average age of 50 years (SD: 11). Most common are breast cancer (n=6300), prostate cancer (n=2392), malignant melanoma (n=2163), lung cancer (n=1548) and colon cancer (n=1194).

Conclusions: The BOCCA dataset provides a comprehensive resource for investigating relationships between occupational exposures and cancer incidence in a Belgium working cohort. Further analyses are ongoing.

Funding:

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Investigating parental occupational exposures and the risk of childhood cancer in the offspring

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Objective: The causes of childhood cancer remain poorly understood, and while many children survive cancer, they often suffer from late effects, underscoring the importance of primary prevention strategies. The aim of this project is to investigate whether parental exposure to occupational factors in the prenatal period increases the risk of childhood cancer in the offspring.

Material and methods: We will link approximately 6,4 million individuals in the Danish Occupational Cohort with Exposure data (DOC*X) to national registers. The DOC*X-Generation includes data on the offspring of all DOC*X members, totaling 2,5 million children, with detailed information on birth and health outcomes. We will assess the occupational exposures of prospective mothers and fathers using job-exposure matrices (JEMs) by converting job titles into exposure estimates to evaluate exposures to occupational hazards. We will use Cox regression to calculate hazard ratios for childhood cancers in relation to JEM-based parental occupational exposures around time of conception and during pregnancy.

Results: Our research will determine which parental occupational exposures prior to conception and during pregnancy are associated with the risk of common types of childhood cancer.

Conclusions: By using leading epidemiological methods and large-scale data from Danish national registries and the DOC*X database, which has no counterparts in other countries in terms of its coverage and quality of occupational history, we will make high-impact contributions to the field of childhood cancer. Our efforts will help understand its etiology and should underpin the development of prevention strategies aimed at reducing the incidence of childhood cancer.

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Occupational exposure survey on cancer risk factors in the human health and social work activities sector in Europe

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Objective: The European Agency for Safety and Health at Work (EU-OSHA) is conducting a multiannual research activity focusing on the health and social care sector (HeSCare), one of the largest in the European Union (EU). The Workers' Exposure Survey (WES) conducted by EU-OSHA estimated workers' exposure to 24 known cancer risk factors in all sectors of occupation across six EU countries (Finland, France, Germany, Hungary, Ireland and Spain) in 2022-23.

Material and methods: Using WES data, we investigated in detail the probability and level of exposure, estimated using the OccIDEAS tool (<https://www.occideas.org/>), as well as multiple exposures, specific circumstances of exposure and prevention measures at work in the HeSCare sector.

Results: From a total of 24,402 telephone interviews, 3,041 respondents worked in the HeSCare sector, the majority in human health activities (NACEQ86: 81.5%). Overall, almost two thirds (65.3%) were female workers. In the human health activities sector, male respondents were predominant (91.3%). Most of the participants (86.8%) were born in the reporting country. A total of 21.7% of the respondents were exposed to at least one cancer risk factor during the last working week (reference interview period), and 7.8% were exposed to two or more cancer risk factors. The five most frequent assessed occupational exposures in the sector were ionizing radiation, diesel engine exhaust, solar ultraviolet radiation, formaldehyde and benzene. The most common co-exposures were solar ultraviolet radiation and diesel engine exhaust.

Conclusions: WES provides valuable sector-specific data on the most common cancer risk factors, where and under which specific circumstances the highest exposures occur and will contribute to targeted cancer prevention. The survey results will also be useful to support future policies concerning these risk factors in specific occupational settings across the EU.

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Cancer incidence and mortality among healthcare workers

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Objective: Healthcare workers are exposed to known or suspected carcinogenic agents: ionizing radiation, cytotoxic, formaldehyde, ethylene oxide, virus, night work. The aim of this review is to estimate and compare cancer incidence and mortality among healthcare workers with the rest of the working population.

Materials and methods: A search was conducted on Pubmed using the PRISMA method in February 2024 to identify epidemiological studies looking at cancer incidence or mortality among caregivers, in comparison with the rest of the general population. Nineteen studies were included.

Results: Half the studies looked at incidence alone, and a third at both incidence and mortality. Doctors, laboratory staff and healthcare professionals as a whole each accounted for 26% of the populations studied. Significant increased incidence and mortality were found for breast, skin, nervous system, colorectal, hematological malignancies, prostate. The incidence was reduced for lung and bladder cancer.

Discussion: Despite discrepancies, trends are emerging for several locations. Some results could be explained by extra-professional factors: for example, the lower smoking rates among healthcare professionals and the lower incidence of lung cancer. Also, breast and skin cancer are more common in higher socio-professional classes.

Conclusions: To our knowledge, this is the first literature review on this topic. More data is needed to understand the role of occupational or non-occupational exposures. We are currently performing a study on the cancer incidence and mortality among healthcare workers and on their cancer, screening practices, based on major French national databases.

Occupational exposures to metals and risk of lung cancers and head and neck cancers

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Objective: To investigate the relationship between occupational exposures to metals and risk of lung cancers and head and neck cancers (HNC).

Materials and methods: In a multi-centre population-based case-control study conducted in 10 geographical areas in France (2001-2007), information was collected on sociodemographic characteristics, lifetime tobacco and alcohol consumption, and lifetime occupational history for 2,771 lung cancer cases, 2,113 HNC cases, and 3,514 population controls. Each job held by a participant was coded by trained coders and linked to the Canadian job-exposure matrix to generate exposure level estimates. The relationship between ever and cumulative exposure to 17 metals and risk of lung cancer and HNC was evaluated. Odds ratios (OR) and 95% confidence intervals (CI) for associations with cancer risk were estimated using logistic regression models, adjusting for smoking, alcohol consumption and other covariates. Associations were also assessed according to histological subtype of lung cancer and subsite of HNC.

Results: Positive associations with risk of lung cancer and HNC cancer, with ORs above 1.37, were observed in participants with the highest tertile of cumulative exposure vs. unexposed participants for iron, manganese, and zinc. Elevated ORs for HNC were additionally observed for the highest tertile of cumulative exposure to nickel (OR=1.52, 95%: 1.06-2.19) and ever exposure to tungsten (OR=1.97, 95% CI: 1.06-3.64). Among the histological subtypes of lung cancer, ever exposure to manganese and tin were associated with squamous cell carcinomas, and chromium (VI) with small cell carcinomas. In the subsite analysis, oral cavity cancers were positively associated with ever exposure to manganese and zinc, and increased ORs for laryngeal cancers were seen for ever exposure to magnesium and tungsten.

Conclusions: Our findings provide further support for occupational exposure to metals as a lung cancer risk factor and suggest that exposures to several metals may increase HNC risk, including specific subsites.

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Benzene exposure and risk of colorectal cancer by anatomical subsite in the Norwegian Offshore Petroleum Workers cohort

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Objective: The association between benzene and colorectal cancer (CRC) is unclear. Although positive associations have been observed, existing studies lack high-quality exposure assessment and adjustment for potential confounding factors. In the present study, we investigated the risk of CRC according to low average levels of benzene exposure (<0.05 parts per million) in the Norwegian Offshore Petroleum Workers (NOPW) cohort, using an industry-specific benzene job-exposure matrix (JEM), and adjusting for potential confounding from lifestyle factors.

Material and methods: Among 25,347 male workers in the NOPW cohort with offshore work history between 1965 and 1998, 469 CRC cases were diagnosed 1999–2021. We compared these with 2031 non-cases drawn from the same cohort. Work histories were linked to the benzene JEM. Weighted Cox regression for case-cohort analyses was used to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for overall CRC and by anatomical subtypes (right [RCC]- and left-sided [LCC] colon cancer and rectal cancer), adjusted for age (time scale), body mass index, smoking, alcohol intake, red/processed meat intake, and physical activity.

Results: Risks of all anatomical subsites of CRC increased with increasing cumulative, duration and average intensity of benzene exposure, with the clearest pattern for exposure duration and RCC (HR=2.25, 95% CI: 1.34–3.80, for quartile 4 vs. unexposed; P-trend=0.007).

Conclusions: We found positive dose-response associations between low-level benzene exposure and CRC risk in male offshore workers. This was particularly evident for RCC, which increased with increasing duration of benzene exposure in a dose-dependent manner. To our knowledge, this is the first study with support of an association between occupational benzene exposure and CRC risk, overall and by anatomical subsite.

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Indirect adjustment of tobacco smoking in occupational lung cancer studies: A systematic review of the available methods and their applications

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Objective: To provide an overview of the indirect adjustment methods for smoking in studies of occupational exposures and lung cancer risk.

Material and Methods: We conducted a systematic search of relevant studies that applied statistical methods for indirect adjustment of tobacco smoking in studies on occupational exposures and lung cancer and were published between 2000 and 2024 to capture developments in recent decades. Studies were retrieved from Embase, MEDLINE, and Web of Science. The protocol was registered prospectively in the PROSPERO (International Prospective Register of Systematic Reviews: registration no. CRD42023448802).

Results: We identified 53 studies on lung cancer in occupational settings. Of those, 15 studies fulfilled our inclusion criteria and were included in the review. In total, there were seven categories of methods of indirect smoking adjustment: (1) standardization techniques; (2) sensitivity analysis; (3) factor analysis models; (4) regression with external or partial smoking information; (5) imputation; (6) negative control outcomes; and (7) other techniques. For studies with an external comparison group, percentage change in risk estimates from before to after indirect adjustment ranged -36.1%–17.3%, while the corresponding range for those with internal comparison was -13.8%–47.8%.

Conclusions: Percentage change from unadjusted to indirectly adjusted risk estimates showed that both positive and negative confounding are present in occupational lung cancer studies. The choice of indirect adjustment method for studies of occupational lung cancer risk will depend on the use of reference group (external vs. internal) and the data available. Our review may guide researchers in search for an indirect adjustment method for occupational studies when no individual level on the potential confounding factor is available, and may inform on the validity of such studies when no adjustment method was applied.

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November 5, Poster session

Group 5, moderator: Annette Leclerc

Presentation Title: Human Biomonitoring of Hexavalent Chromium: The Potential Role of Epigenetics within Chemical Risk Management in the Workplace

Presentation Author: Jelle Verdonck

Presentation Title: Mitigating Health Risks in Wastewater Treatment Plants: Identifying Key Microbial Contaminants and Protocol Needs

Presentation Author: Renata Cervantes

Presentation Title: Uncovering fungal contamination in poultry farms: An occupational hazard with global health implications

Presentation Author: Bianca Gomes

Presentation Title: Overview of historical occupational exposure to trichloroethylene in China

Presentation Author: Jia Nie

Presentation Title: An interactive tool for occupational exposure prevalence in Europe

Presentation Author: Sander Ruiter

Presentation Title: Comparative Analysis of Accident Investigation Methods and the Impact of Human Factors

Presentation Author: Jelena Lezdkalne

Human Biomonitoring of Hexavalent Chromium: The Potential Role of Epigenetics within Chemical Risk Management in the Workplace

Jelle Verdonck¹, Manosij Ghosh¹, Katrien Poels¹, Lode Godderis^{1,2}, Beata Janasik³, Wojciech Wasowicz³, Paul T. J. Scheepers⁴, Sophie Ndaw⁵, Radia Bousoumah⁵, An Van Nieuwenhuyse^{1,6}, Radu Corneliu Duca^{1,6}, Susana Viegas⁷, Henriqueta Louro⁸, Maria João Silva⁸, Simo P. Porras⁹, Tiina Santonen⁹, HBM4EU Chromates Study Team

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Objective: Approximately 900,000 workers in the European Union are exposed to carcinogenic hexavalent chromium (Cr(VI)). Genotoxic effects, such as oxidative stress and DNA lesions, have been recognized as crucial events in the carcinogenic process of Cr(VI) compounds. Moreover, it has been suggested that, in addition to the induced genotoxic effects, epigenetic mechanisms like DNA methylation may contribute to the carcinogenicity of Cr(VI) compounds. Therefore, we investigated the epigenetic effects induced by occupational exposure to Cr(VI).

Material and methods: We applied a cross-sectional study design and used chromium in urine as the primary biomonitoring method for Cr(VI) exposure. Furthermore, the effect of occupational Cr(VI) exposure on 8-Hydroxydeoxyguanosine (8-OHdG), global DNA methylation and global DNA hydroxymethylation in blood was investigated. Workers with potential exposure to Cr(VI) were included (n=254). As controls (n=114), healthy adult (18–70 years) office workers from the same companies as the exposed workers (referred to “within-company controls”) or from other companies with no activities that were associated with Cr(VI) exposure (referred to “outwith- company controls”) were recruited.

Results: Overall, each exposed subgroup displayed significantly higher mean urinary Cr levels than the total controls, the within-company controls, or the outwith-company controls ($p < 0.007$, Mann-Whitney test). The within-company controls had significantly higher internal exposure levels than the outwith-company controls ($p < 0.001$, Mann-Whitney test). The outwith- company controls exhibited significantly higher global DNA methylation levels and lower levels of 8-OHdG than all other exposure subgroups ($p < 0.01$, Mann-Whitney test).

Conclusions: Overall, these findings reinforce the results of exposure biomarkers, highlighting that in Cr-related industries, (office) workers' exposure to Cr is associated with detectable alterations in biological effect markers. Furthermore, characterizing epigenetic effects like global DNA methylation could improve risk management.

Funding:

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Mitigating Health Risks in Wastewater Treatment Plants: Identifying Key Microbial Contaminants and Protocol Needs

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Keywords: wastewater treatment plants; sampling methods; assays; microbial contamination assessment; bacteria; fungi

Objective: Wastewater treatment plants (WWTPs) are integral to the European Commission's circular economy initiatives. However, the production of bioaerosols at these facilities poses potential health risks to workers and the public. This study provides a scoping review of microbial contamination exposure assessments in WWTPs.

Methods: A systematic review following the PRISMA methodology was conducted using PubMed, Scopus, and Web of Science.

Results: A total of 28 papers were selected for data extraction. The most commonly sampled sites in WWTPs were the aeration tank (42.86%), sludge dewatering basin (21.43%), and grit chamber. Air sampling was the preferred method, with culture-based techniques being the most frequently used for microbial analysis. The most commonly isolated bacteria were *Staphylococcus* sp. (21.43%), *Bacillus* sp. (7.14%), *Clostridium* sp. (3.57%), *Escherichia* sp. (7.14%), and *Legionella* sp. (3.57%). Among fungi, *Aspergillus* sp. (17.86%), *Cladosporium* sp. (10.71%), and *Alternaria* sp. (10.71%) were predominant.

Conclusions: The review highlighted several key needs: (a) the establishment of a common protocol for field sampling and laboratory assays; (b) standardized collection of contextual information to enable effective risk control and management; and (c) the identification of the most appropriate microbial indicators for harmful exposure. Addressing these gaps through future research will provide valuable data for policy makers and stakeholders, enhancing the safety and efficiency of WWTP operations.

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Uncovering fungal contamination in poultry farms: An occupational hazard with global health implications

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Objective: Globally, poultry production has been identified as a significant menace to global health due to microbial contamination. When examining the poultry environment, one of the key contributors to both indoor and outdoor air pollution is the bedding material for animals. Currently, there is a lack of information concerning the impact of the bedding material utilized on the growth of fungi and the associated health risks for workers. The preparation of animals' bedding is one of the duties that exposes poultry workers to more dust, as well as fungi and their metabolites (mycotoxins). Indeed, some studies have already pointed out fungal exposure in poultry facilities, thereby jeopardizing farmers with occupational respiratory ailments. This research aims to evaluate fungal exposure within poultry facilities throughout the growth phases of birds, with a specific focus on wood shavings as the animals' bedding material.

Materials and methods: Samples will be collected from each poultry pavilion across three stages of poultry growth (Early-, Middle- and Late-Flock) during both Summer and Winter seasons. Indoor air samples will be obtained at the central point of the poultry pavilion using a MAS-100 air sampling device positioned at a 1m height. A composite sample of bedding material and feed will be compiled from random places of each pavilion. Also, surface swabs on pavilion walls will be performed and electrostatic dust collectors (EDC) will be placed weekly.

Results and Conclusions: The sampling campaign is currently underway. The expected results will enable to delineate the risk of fungal exposure in poultry farms, enhance consciousness, and advocate for workplace strategies that foster a safe working environment. Ultimately, evaluating exposure in the poultry sector will aid in addressing health and environmental threats by pinpointing critical areas for intervention to mitigate microbial exposure, promote a secure atmosphere for workers and animals within poultry facilities, and reduce environmental impact.

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Overview of historical occupational exposure to trichloroethylene in China

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Objective: Trichloroethylene (TCE) is a carcinogen that has been causally linked to kidney cancer and possibly other cancer sites including the liver and lymphatic system. TCE use in China has increased since the early 1990s due to growing metal and electronic industries. We aimed to summarize the major sources of occupational exposure to TCE over time in China.

Materials and methods: Occupational TCE exposure assessments were extracted from both the Chinese and English scientific literature, as well as from occupational health and safety inspections performed in Guangdong, Tianjin, and Hong Kong. Exposure concentrations were pooled by occupation and industry.

Results: We extracted at least 12,412 measurements from 57 industries and 34 occupations. More than half of the measurements were derived from four industries, namely “Manufacture of footwear” (29%), “Manufacture of electronic components and boards” (16%), “Manufacture of games and toys” (14%), and “Manufacture of plastics products” (12%). Several occupations, including “Electronic-equipment assemblers”, “Metal finishing-, plating- and coating-machine operators”, “Precision-instrument makers and repairers”, and “Ore and metal furnace operators” were identified as having high levels of TCE exposure, with either pooled weighted mean task-based or full-shift concentrations over 200 mg/m³. Occupational TCE exposure levels varied over time. TCE pooled weighted mean task-based concentrations were 203 mg/m³, 243 mg/m³, 119 mg/m³, and 216 mg/m³ for the time periods of 1990 and earlier, 1991-2000, 2001-2010, and 2011 and later, respectively.

Conclusions: Over the past few decades, several occupations related to metal degreasing were identified as having high reported levels of TCE exposure in China. The identification of potentially exposed industries and occupations can inform the development of targeted interventions and regulations to mitigate TCE exposure. Furthermore, the presented exposure data can contribute to a better exposure assessment in epidemiological investigations.

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An interactive tool for occupational exposure prevalence in Europe

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Objective: Exposure prevalence information on occupational exposures is important for disease burden calculations and prioritisation of exposure reduction interventions. Currently, this information can be difficult to interpret and is fragmented over different exposure agents, countries and time periods. Our interactive tool shows exposure prevalence estimates by European country and time period for various occupational exposures to provide a clear overview and improve data accessibility.

Materials and methods: To calculate the numbers of workers exposed to various occupational exposures, two sources of information were combined. The first is national labour force surveys from Eurostat, which contains labour force statistics from all EU countries plus Iceland, Norway, Switzerland, and the United Kingdom (up to fall 2020). The second is occupational exposure estimates from the EuroJEM, which is a series of job-exposure matrices produced in the Exposome Project for Health and Occupational Research (EPHOR) project covering occupational exposures that falls within chemical, physical, psychosocial categories.

Results: The online tool allows interactive exploration of exposure prevalence for 12 occupational exposures across 30 European countries for over 300 ISCO-88 COM occupations during the period between 2011 to 2021. Exposure prevalence is shown as total number of workers estimated to be exposed. For instance, for diesel engine exhaust exposure in the Netherlands for year 2011, approximately 402,000 workers were exposed; the occupations with the largest numbers of exposed workers are “heavy truck and lorry drivers” with 98,500 exposed, followed by “messengers, package and luggage porters and deliverers” with 47,000 exposed, and “motor vehicle mechanics and fitters” with 42,500 exposed. Several graphical visualisations can be interactively generated for clear interpretation.

Conclusions: We created an online interactive tool for accessing and visualizing occupational exposure prevalence in Europe by incorporating national labour statistics from Eurostat and exposure estimates from the EuroJEM.

Comparative Analysis of Accident Investigation Methods and the Impact of Human Factors

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Objective: The objective of this study is to compare different accident investigation methodologies to determine their effectiveness in identifying root causes and setting corresponding preventive actions, with a focus on the impact of human factors.

Methods: Literature on various accident investigation methods was reviewed and then applied to existing accident cases from heavy industry. Interviews were conducted with safety professionals to gather qualitative data on their preferences, experiences, and perceived effectiveness of different investigation methods. A set of criteria was developed to evaluate each method's effectiveness, considering factors such as thoroughness, clarity, usability, implementation of preventive measures, efficiency, and professional acceptance. The data analysis involved comparing findings from each method, analysing qualitative data from interviews, and evaluating each method against the developed criteria.

Results: The study improved understanding of the strengths and limitations of various accident investigation methods and showed that human factor plays an important role in choice of occupational accident investigation method. Effectiveness and accuracy of application of these methods is influenced by investigators' skills, knowledge, experience and attitudes. Integrating human factors into the selection and application of investigation methods could lead to a better identification of root causes and sustainable preventive measures, thus enhancing workplace safety.

Conclusions: The study demonstrated that the effectiveness of occupational accident investigation methods is influenced by human factors such as investigators' skills, knowledge, experience, and attitudes. While each method has its strengths and limitations, their success depends on the competence of individuals applying them. Continuous training and professional development are essential for producing reliable results. Integrating human factors into selection and application of investigation methods improves identification of root causes and setting of adequate preventive measures. Organizations should prioritize systematic training and consider human factors in their investigation processes to effectively prevent future incidents.

November 5, Poster session

Group 6, moderator: SukhDev Mishra

Presentation Title: Socio-Health Determinants in the Living and Working Conditions of Female Migrant Berry Agricultural Workers: Methodological Challenges
Presentation Author: Juan Alguacil

Presentation Title: Swiss Transport Personnel Health Cohort (TRAPHEAC): study protocol and current status
Presentation Author: Viviane Remy

Presentation Title: Work-related factors and occupations in relation to the incidence of type 2 diabetes: an exploratory study among 274,716 Dutch workers
Presentation Author: Tosca de Crom

Presentation Title: Evaluation of Occupational Exposure to Pesticides and Workers' Health Status in an Agricultural Area
Presentation Author: Emna Bechrifa

Presentation Title: Developing a Policy Framework for Green Jobs and Climate Resilience with an Occupational Health Perspective
Presentation Author: Oriana Miraka

Presentation Title: The Respiratory Protection Programs in Nigeria's Upstream Oil and Gas Industry: An Approach to Assess Knowledge, Awareness, Behaviour, and Compliance
Presentation Author: Suraiya Mohammed

Presentation Title: Examining the occupational exposome of male agricultural workers in Canada and abroad.
Presentation Author: Christine Barul

Socio-Health determinants in the living and working conditions of female migrant berry agricultural workers. Methodological challenges.

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Objective: To analyze the working conditions and the actual and perceived health status of female migrant agricultural workers as well as the perspective and experience of health professionals, considering cross-sectional sociocultural, economic-labor and environmental factors.

Materials and Methods: We followed an ethnographic methodology and qualitative techniques, with an intersectional gender perspective. We conducted individual and group interviews with female migrant berry agricultural workers, health professionals and key informants in Huelva.

Results: Participants reported the following health problems: muscle pain, skin problems, urinary tract infections, vaginal bleeding, stomach pain, bronchitis, blood pressure problems and anxious-depressive disorders. With respect to barriers to access to health services identified: language, illiteracy, technological deficiency, insufficient records in the User Database, improper use of the appointment and emergency system, cultural barrier, not allowed to miss working hours and non-existence of transportation. The problems related to working conditions were: lack of knowledge of the signed contract working rights, irregularities in medical certificates at origin, anomalies in social security, excess of daily working hours, lack of information on occupational risk prevention, nonexistence of labor contracts, lower wages, irregular housing conditions, unhealthy environmental, no access to basic supplies, abuse of labor and sexual power.

Conclusions: Contrary to the official version of the farmers' associations and the administration with competence on the subject, the participants' stories indicate the existence of serious deficiencies in the living and working conditions of the migrant berry workers in Huelva. Studies with appropriate design are necessary that can evaluate, without the interference of 'structural barriers', the magnitude and real scope of the problem. We have observed a reduction in healthcare and control system assistance and involvement compared to the COVID-19 pandemic. It has been a complex and risky methodological approach, in a hostile terrain, with a significant fear and rejection of migrant workers.

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Swiss Transport Personnel Health Cohort (TRAPHEAC): study protocol and current status

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Objective: In Switzerland, public transport drivers face higher risks of suicide, lung cancer, gastric cancer, and liver disease compared to the general working-age population. These health issues are suspected to be linked to occupational exposures, but precise exposure data are lacking, which restricts research. To address this, a nationwide prospective cohort study, TRAPHEAC, was initiated to investigate the short- and long-term effects of occupational hazards on bus drivers (BDs). The study aims to monitor exposure and health trends over time, providing a foundation for preventive interventions at both individual and organizational levels.

Materials and Methods: All active BDs in Switzerland with a minimum of one year of professional experience are eligible and invited to participate via emails sent by their company managers and/or unions, as well as through study-advertising materials (flyers and press). Enrollment is managed through the TRAPHEAC website, where BDs can access detailed study-related information before providing their individual consent and identifying information. Registered BDs become study participants and can complete a detailed inclusion questionnaire. Using yearly follow-up questionnaires, BDs can update their data and answer additional research questions. The occupational history and buses driven are assessed using a specific questionnaire module, enabling linkage with the Swiss bus-exposure-matrix (BEM). Additional personal, medical, and environmental exposure data available from the Swiss Federal Offices will be linked to the participants' data using predetermined identifiers.

Results: In April 2024, TRAPHEAC received the Swissethics's approval. Recruitment began in June 2024. The BEM contains data on 17 hazards for 705 bus models, with exposure to electromagnetic fields, noise, and ergonomic constraints prioritized for exposure-effect analysis. Wellbeing, stress-related, musculoskeletal, and sleep disorders have been preselected as primary health outcomes.

Conclusions: The first results are expected by Fall 2024. Meanwhile, participation promotion is essential to obtain a sufficiently large and unbiased study sample.

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Work-related factors and occupations in relation to the incidence of type 2 diabetes: an exploratory study among 274,716 Dutch workers

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Objective: The study aimed to explore the association between work-related factors and the risk of developing type 2 diabetes, and to assess occupations at risk of developing type 2 diabetes.

Material and Methods: Data on demographics, work-related factors and occupational status from 274,662 Dutch workers were derived from the annual Netherlands Working Condition survey between 2014-2021. This data was subsequently linked to registry data on the initiation of glucose lowering medication from Statistics Netherlands, which was used as a proxy for type 2 diabetes diagnosis. Cox proportional hazard models were used to determine the associations between work-related factors at baseline and incident type 2 diabetes. We further applied LASSO (least absolute shrinkage and selection operator) with stability selection incorporated in Cox proportional hazard models to explore which occupations are at the highest risk of developing type 2 diabetes.

Results: During a medium follow-up of 2.2 years (person-years: 711,991), 3,044 participants developed type 2 diabetes. Working in night shifts was associated with a higher incidence of type 2 diabetes, irrespective of whether these shifts occur sometimes or often (hazard ratio (HR) [95% confidence interval (CI)]: 1.16 [1.03-1.30] and 1.14 [1.00-1.29], respectively). Low job autonomy (HR [95% CI]: 1.14 [1.06-1.23]) and high emotional job demands (HR [95% CI]: 1.20 [1.07-1.35]) were also associated with a higher incidence of type 2 diabetes, while quantitative job demands or physical work demands were not associated. Occupations with the highest risk to develop type 2 diabetes included professional drivers, security guards, assembling labourers, hand launderers and pressers, and personal care workers. Investigated work-related factors did not explain the relations between identified occupations and the incidence of type 2 diabetes.

Conclusions: These findings provide insights into which occupations could benefit most from interventions to prevent type 2 diabetes and pinpoint towards which work-related factors may be addressed.

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Evaluation of Occupational Exposure to Pesticides and Workers' Health Status in an Agricultural Area

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Objective: To evaluate pesticide exposure qualitatively, assess its impact on workers' health

Materials and methods: Descriptive cross-sectional study from 4 agricultural companies in Jendouba, Tunisia, comprising qualitative environmental assessment and a medical study on respiratory, skin, and neuropsychological effects through a questionnaire administered by the occupational physician.

Results: A total of 54 workers participated, with a mean age of 49.12±7.21 years, mainly males (94 %), and a mean professional seniority of 23.22±9.65 years. The most common job positions were general workers (65 %), drivers (22 %), and control station operators (4 %). Insecticides represented 34% of pesticides, fungicides (38 %), and herbicides (28 %). The agricultural companies using pesticides were an arboriculture company, a seeds and plants company, a two cereal and vegetable farming companies. Pesticide inventory revealed 67 active substances. The exposure matrix included key agricultural chemicals such as organochlorines (e.g., Endosulfan), organophosphates (e.g., Malathion, Dimethoate, Chlorpyrifos-ethyl), and carbamates (e.g., Carbaryl, Aldicarb). In all studied companies, pesticide preparation occurred outdoors with recommended dosage adherence; however, there was no adherence to wind speed recommendations during their application. Exposed employees inconsistently wore protective equipment: gloves were used by 35%, masks by 7%, and no company provided work uniforms. A medical study highlighted the importance of chronic toxic effects related to pesticide exposure: respiratory (43%), skin (35%), ocular (27.7%), and neuropsychological effects (83%). Specifically, organic psychosyndrome was found in seven employees and acute cholinergic syndrome in three. Primary male infertility issues were noted in 7 employees, and further investigation is ongoing. These toxic effects are more frequent and severe with higher levels of risk.

Conclusions: Greater pesticide exposure increases risks worsened by inadequate prevention measures, necessitating a robust strategy to minimize health, environmental, and socioeconomic impacts relate to biomarkers of cardiovascular health among the population to further gain insight on the potential role of miRNA in cardiovascular health among night shift workers.

Developing a Policy Framework for Green Jobs and Climate Resilience with an Occupational Health Perspective

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Objective: As part of the EU INTERCAMBIO project, this paper aims to develop a policy framework that promotes sustainable green jobs while maintaining climate resilience. The goal is to review the literature to create a theoretical model that explains how diverse stakeholder engagement can drive sustainable practices across sectors. This includes analyzing legal pathways and judicial support for the transition while proposing changes in norms and values. Additionally, the research will empirically test the model, contributing to the socio-legal framework necessary for green jobs.

Materials and methods: The paper is based on an extensive systematic review of scientific literature, drawing from databases such as Scopus, Web of Science, and Sociological Abstracts, with bibliographic support from Halmstad University's library. The review focused on peer-reviewed publications from Web of Science's Core Collection, including the Science Citation Index, Social Science Citation Index, and Arts & Humanities Index. Key themes such as stakeholder engagement, occupational health, and sustainability transitions were analyzed using various analytical tools to build the foundational theoretical model. The model's practical implications are suggested through a mixed-methods approach, combining empirical data from surveys and interviews. These data, collected from workers in sectors like construction, healthcare, public transit, renewable energy, and waste management, will further validate the framework in relation to health and sustainability in green job transitions.

Results: The systematic literature review highlighted key gaps in current policy frameworks, particularly regarding the integration of occupational health into climate resilience strategies for green jobs. A recurring theme was the need for a shift in values and norms toward prioritizing worker well-being alongside environmental sustainability. The review also emphasized the importance of multi-level stakeholder engagement, noting that many policies fail to involve workers and other key actors in high-risk sectors, such as renewable energy. These insights underline the necessity for a comprehensive policy framework that aligns legal protections, health and safety standards, and stakeholder collaboration to drive sustainable, climate-resilient employment.

Conclusions: The framework proposed offers a dynamic pathway for promoting sustainable, climate-resilient employment. It emphasizes the need for future employment strategies to account for both environmental changes and worker well-being, contributing to a broader understanding of implementing sustainable work practices.

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The Respiratory Protection Programs in Nigeria's Upstream Oil and Gas Industry: An Approach to Assess Knowledge, Awareness, Behaviour, and Compliance

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Background: Workers in the oil and gas sector face potential exposure to hazardous substances, posing significant health risks. Companies must prioritise workers' health by implementing programs to reduce or prevent inhalation of toxic agents. The United States Occupational Safety and Health Administration (OSHA) has established standards for Respiratory Protection Programs (RPPs) to aid companies in safeguarding employees. Nigeria, a major oil producer in Africa and the thirteenth largest globally, relies heavily on its oil and gas industry for economic stability.

Objective: This study aims to evaluate the efficacy of RPPs in protecting Nigerian oil and gas workers from inhaling harmful substances, using US OSHA Respiratory Protection Standard 29 CFR 1910.134 as a benchmark. The research involves five objectives: (1) Conduct a scoping review of RPP implementation and effectiveness, (2) Assess RPP implementation within the hierarchy of control, (3) Determine knowledge, awareness, behaviour, and compliance of Health and Safety Officers and workers, (4) Compare RPPs in Nigerian-owned and multinational companies, and (5) Develop recommendations to enhance RPP design and implementation in Nigeria.

Materials and Methods: A cross-sectional survey with a mixed-method approach will be used, involving semi-structured interviews with industrial hygienists and questionnaire surveys for health and safety officers and workers potentially exposed to airborne hazards. The COM-B (Capability, Opportunity, and Motivation - Behaviour) model will guide the development of interview and survey questions.

Results: The study will provide insights into the strengths and weaknesses of current RPPs in Nigeria's upstream oil and gas industry.

Conclusions: This research offers significant implications for improving occupational health and safety practices, being the first in Nigeria to use the COM-B model to assess compliance behaviour with respiratory protection among oil and gas workers. The findings will help enhance worker safety and well-being against respiratory hazards.

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Examining the occupational exposome of male agricultural workers in Canada and abroad.

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Keywords: occupational exposome; farmers; epidemiology; occupation

Objective: Limited data document the occupational exposome of agricultural workers. We aimed to characterize the occupational exposome of Canadian men who had worked in agriculture in Canada or abroad.

Materials and Methods: We used data from a population-based case-control study of prostate cancer including 3,925 male participants residing in Montreal, Canada in 2005-2012. Lifetime occupational histories and detailed job descriptions were collected during in-person interviews. Industrial hygienists and an agronomist conducted semi-quantitative evaluations of exposure, including intensity and reliability, to some 300 chemical agents in each job held. Analyses focused on the 156 agricultural jobs ever held.

Results: Agricultural activities had taken place between 1946 and 2012, across small- to large-scale agricultural settings. Many (43%) agricultural jobs took place in Canada, in the province of Quebec. Ten percent were held in Haiti, and some 10% comprised collectively jobs that took place in Italy, Portugal and Greece. Jobs entailed exposure to an average of 10 chemical agents (± 7), and 54% of jobs were exposed to at least two recognized carcinogens. The most common exposures coded with medium or high reliability and classified as definite or probable carcinogens were ultraviolet radiation (92% of jobs), environmental tobacco smoke (39%), diesel engine exhaust (23%), wood dust (20%), lubricating oils and greases (20%) and lead (15%). Pesticide exposures occurred in only 31% of jobs. Most jobs entailed exposure to long working hours, high physical activity levels, and did not provoke stress or anxiety. Few involved early morning shifts. Exposomes varied according to country, agricultural activities (general, crop, vegetable or animal farming, etc.), and types of crops grown.

Conclusions: Findings highlight the heterogeneity of the agricultural exposome based on its setting and activities involved. Future studies on health-related effects of farming should account for numerous occupational agents, beyond the usual focus on pesticides.

November 5, Poster session

Group 7, moderator: Kurt Straif

Presentation Title: The impact of smoking on burnout in healthcare professionals

Presentation Author: Rim Ghariani

Presentation Title: Precarious employment and mental health – moderation by family composition and disposable income? A Swedish register study.

Presentation Author: Signild Kwart

Presentation Title: Association between selected workplace psychoemotional aspects and perception of loneliness and isolation at work in Latvia

Presentation Author: Monta Matisāne

Presentation Title: Validation of a questionnaire encapsulating psychosocial risks at work along with indicators of wellbeing, health, and productivity

Presentation Author: Leonie Matteau

Presentation Title: Systematic Review of Compassion Fatigue Measurement Tools and Their Content Validity in Animal Healthcare Professionals

Presentation Author: May Thet Nu Noe

Presentation Title: Occupational health services provided in academia: A pilot study in Switzerland

Presentation Author: May Thet Nu Noe

Presentation Title: Sleep Disorders During the COVID-19 Pandemic: Work-Life Imbalance and Increased Home Responsibilities Among Latvian Teleworkers

Presentation Author: Linda Paegle

The impact of smoking on burnout in healthcare professionals

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Objective: To describe the prevalence of burnout among smoking healthcare professionals (HCP).

Materials and methods: A descriptive, cross-sectional study was conducted over five months, from May to September 2023, involving HCP from a polyclinic in Grand Tunis. Data were collected using a self-administered questionnaire. Burnout was assessed using the Maslach Burnout Inventory. The collected data were analyzed using SPSS software.

Results: We surveyed 161 HCP (response rate: 80.5%). The average age was 44 ± 9.5 years (range: 24-59). The sex ratio (M/F) was 0.49. Paramedics and non-healthcare staff accounted for 47.8% and 37.9%, respectively. Thirty-two participants were active smokers, with a smoking prevalence of 19.8%. Sixty-five percent of non-healthcare staff were smokers. Burnout was identified in 65.2% of HCP, of whom 18% were smokers (60% experiencing low burnout and 19% experiencing high burnout), compared to 67% of non-smokers. Ex-smokers exhibited significantly higher levels of burnout ($p = 0.014$).

Conclusions: This study highlights a significant prevalence of burnout among polyclinic HCP in Grand Tunis. The findings suggest a notable correlation between smoking and increased levels of burnout, particularly among ex-smokers. Future studies should include other factors such as gender, medical conditions, and occupational characteristics to further explain this relationship.

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Precarious employment and mental health – moderation by family composition and disposable income? A Swedish register study

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Objective: The Swedish labour market is increasingly characterized by precarious employment (PE) conditions and PE has been linked to mental ill-health. Since mental ill-health has increased in prevalence in the last decades, it is important to understand the mechanisms linking the two phenomena. Previous research suggests that household-related factors can buffer or exacerbate the mental health of workers in PE, but evidence is scarce. This study investigates the role of family composition and family disposable income on the association between PE and mental ill-health.

Materials and methods: The study used register data from the Swedish Work, Illness, and Labour-market Participation cohort (SWIP). The study population consisted of all individuals aged between 25-65 years and employed in 2016 (n=2,856,891). PE was assessed based on a precarity score following the Swedish Register-based Operationalization of Precarious Employment (SWE-ROPE). Any mental health disorder during follow-up (2017-2019) was extracted from the National Patient and Prescription Drug Registers. Data on family composition and disposable income in 2016 was collected from nationwide registers. Cox regression models were fitted to estimate the effect of PE on mental health. The moderating effects were measured by adding two-way interaction terms to the main effects models.

Results: 8% of the sample was in precarious employment, 35% in substandard, and 57% in standard employment at baseline. 160,252 individuals (6%) experienced mental ill-health during follow-up. Preliminary adjusted Cox regression models show increased risk of mental ill-health among those in PE compared with standard employment. The impact of PE appears stronger for those with lower disposable income, as well as for single parents compared with those living with a partner.

Conclusions: Family type and disposable income can modify the mental health effects of PE conditions. This longitudinal study provides evidence on the impact of household-related factors on the mental health of workers in PE and can inform targeted policy interventions.

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Association between selected workplace psychoemotional aspects and perception of loneliness and isolation at work in Latvia: Results from an employee survey in 2022

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Objective: The objective of this study was to identify the workplace psychoemotional risk factors that would elevate or decrease levels of loneliness and isolation of workers. It is essential to decrease workplace loneliness and isolation, as it impacts the quality of relationships at work, organizational identification and commitment, and information/resource sharing, which affects performance outcomes as well as psychoemotional aspects of health.

Materials and methods: Cross-sectional survey data with a sample of 2503 employees (mean age 44.7 years, 59.3% females), representative of the working population of Latvia, were used. The associations between workplace hazards and loneliness and isolation at work were analyzed by using logistic regression odds ratios (ORs) with 95% confidence intervals (CIs), adjusted for gender, age, and education.

Results: Conflicts with managers (OR = 3.29), individual ones between co-workers (OR = 2.57), between worker groups (OR = 2.31), and with clients (OR = 1.61) all increased the odds ratio of loneliness and isolation. A significantly high elevation was shown in the results from the employees who had experienced lack of work-life balance (OR = 5.91). Workers with primary school/elementary or secondary/vocational education (OR = 0.29 and OR=0.58, respectively) reported lower levels of loneliness and isolation in comparison to workers that had higher education.

Conclusions: Workers with higher education and salary experience loneliness and isolation more often. Any type of conflict within the workplace environment raises the risk of experiencing loneliness and isolation, so employers should make it a priority to focus on resolving and preventing them, as well as offering support to those who might show signs of insufficient communication or problem-solving skills. Additionally, the results regarding the lack of work-life balance indicate a cause for concern, as it negatively impacts employees' mental health both in and out of workplace environment, as well as work performance.

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Validation of a questionnaire encapsulating psychosocial risks at work along with indicators of wellbeing, health, and productivity

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Objective: To assess the psychometric properties of the Questionnaire on Psychosocial risks, Wellbeing and Health at Work (Questionnaire sur les Risques psychosociaux, le Bien-Être et la Santé au Travail; QRBEST) and to test a conceptual model of occupational health.

Material and methods: The QRBEST assesses 14 psychosocial risks at work, various forms of workplace violence indicators of well-being (5), health (6), and productivity (3). For the validation of the QRBEST, the questionnaire was administered electronically to a sample of healthcare workers in residential and long-term care centres in Canada (Quebec). Construct validity, reliability, internal consistency, convergence validity, and fit of the model were estimated. The conceptual model was tested by conducting structural equation model analyses.

Results: A total of 425 participants (85% women) completed the survey. The mean age was 43.98 (standard deviation 11.98). Cronbach alphas were > 0,75 for all constructs, suggesting a good internal consistency. When compared to gold standard scales most frequently used in occupational health research, convergence validity was confirmed for workload (Spearman correlation coefficient 0.85, $p < .0001$) and burnout (Spearman correlation coefficient 0.71, $p < .0001$). The model showed a good fit (e.g. Goodness of Fit Index 0.99, Root Mean Square Residual 0.07).

Conclusions: The QRBEST is a comprehensive tool covering a wide range of psychosocial risks at work as well as indicators of wellbeing, health, and productivity. As it is planned to become open access, the QRBEST will 1) facilitate and autonomize workplaces in the measurement of psychosocial risks and various indicators of interest, as required by new legislation, as well as 2) facilitate the research of psychosocial risks and their impact on workers' health, well-being, and productivity. The refined conceptual model developed through this work will help inform occupational health strategies and policy decisions aimed at improving the psychosocial work environment.

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Systematic Review of Compassion Fatigue Measurement Tools and Their Content Validity in Animal Healthcare Professionals

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Objective: Animal healthcare professionals experience emotional challenges from exposure to animal suffering, leading to Compassion Fatigue (CF), which can harm their well-being and animal welfare. Despite their high CF risk and potential for suicide, research on CF in this group is limited. This systematic review aimed to assess how CF is currently measured in this population using patient-reported outcome measures (PROMs) and evaluate the content validity of these PROMs.

Materials and Methods: The protocol was registered in PROSPERO (CRD42023433982). The literature search was conducted in PubMed, PsycINFO, and EMBASE databases for studies published between 1973 and 2023. Eligible studies included animal healthcare professionals, employed PROMs to measure CF, and assessed PROM content validity. Three independent reviewers evaluated the content validity of each PROM using Consensus-based Standards for the selection of health Measurement Instruments (COSMIN) methodology and summarized the quality of evidence using a modified GRADE approach.

Results: The literature search yielded 1709 items, with 17 eligible studies identified after thorough evaluation. Six different PROMs for CF assessment were identified, with four PROMs assessed for content validity: CF self-test (CFST), CF short scale (CFSS), Professional Quality of Life- Version 5 (ProQOL-5), and ProQOL-5 Veterinary Medicine Version. Initial assessment revealed questionable quality in PROM development studies for CFST and ProQOL-5. While CFSS underwent content validation, it was rated as insufficient. For all PROMs, the quality of evidence was graded as low due to limited number of validation studies and various methodological shortcomings.

Conclusions: No PROM demonstrated sufficient content validity for recommendation in research or practice. A significant challenge highlighted was the inconsistent and unclear definition and construct of CF across studies, hindering PROM development and validation. Future research should prioritize refining CF's definition, adhering to PROM development guidelines, and ensuring comprehensive content validation to enhance PROM validity.

Funding:

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Occupational health services provided in academia: A pilot study in Switzerland

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Objective: We aimed to assess the availability, accessibility, and utilization of occupational health services (OHS) in Swiss higher education institutions (HEIs), focusing on researchers' awareness and perceptions of these services.

Materials and methods: A comprehensive mapping of OHS across Swiss HEIs was conducted. A pilot qualitative study using semi-structured face-to-face interviews with research staff members was carried out at one of HEIs. Thematic analysis of qualitative data using MAXQDA software was triangulated with OHS inventory data.

Results: The inventory documented OHS types, content, and access conditions at 14 Swiss HEIs. OHS included basic medical consultations, mental health counseling, and legal advice. Over 80% of HEIs provided psychological support, primarily through consultations or advice, with options for referrals to external professionals if necessary. Access to these services varied significantly, often favoring students over staff-members. Interviews with 12 out of 40 randomly sampled researchers at one HEIs identified time pressure, workload, and communication issues as common occupational stressors. This HEI offers access to trust person, mediation by the Personnel Representatives Committee, HR counseling services, and occupational medicine consultations. Less than half of the participants were aware of these services, and even fewer could describe them. Several participants reported experiencing burnout and seeking help outside the institution. Participants expressed low interest and distrust in existing OHS, citing concerns about anonymity and confidentiality within the institutional hierarchy, making them less likely to use internal services.

Conclusions: This study reveals limited awareness and significant confidentiality-related concerns among researchers at the considered HEI regarding available OHS, deterring their use. The findings uncover the need for broader research across Swiss and European HEIs to fully understand OHS accessibility and utility, namely in protecting and promoting researchers' mental health. This study confirmed the relevance and feasibility of the research protocol using mixed methods, which could be replicated in other HEIs.

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Sleep Disorders During the COVID-19 Pandemic: Work-Life Imbalance and Increased Home Responsibilities Among Latvian Teleworkers

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Objective: COVID-19 negatively impacted public mental health, causing fear, anxiety, depression, and sleep disorders. Sleep disturbances during the pandemic were influenced by factors like isolation, stress, fear of infection, reduced physical activity, and telework. Increased home responsibilities and home schooling also contributed to sleep issues.

Materials and methods: Survey participants were recruited using the snowball sampling method and social media advertisements during three restriction waves in Latvia. After data cleaning, the responses of 1008 teleworkers (only from the second and third survey waves) who gave a certain answer about having sleep disorders were included in the analysis. Among them, 211 (20.9%) were teleworkers with experience before COVID-19, and 797 (79.1%) were without it. Data weights were applied by age crossed with gender (in 12 age-gender combinations) and analysed with the statistical software IBM SPSS, v29. The average age of the respondents after weighting was 44.1 ± 12.2 years (min 20, max 74 years), with 48.6% males and 51.4% females.

Results: Overall, 32.2% of all teleworkers reported sleep disorders. Teleworkers without previous experience reported sleep disorders more often (35.5% versus 18.8% with experience). The prevalence increased among females (59.5%), those who admitted that (1) family life affected the performance of work duties (72.7%), (2) balance between work and private life was deteriorated (66.9%), (3) had increased household responsibilities (57.2%), and (4) those with children under 18 years of age (53.5%), ($p < 0.001$ in all cases, except for the presence of children under 18 years of age).

Conclusions: COVID-19 and the associated restrictions led to increased household responsibilities and changes in daily routines, causing sleep disturbances and disrupting work-life balance. Women were particularly affected, experiencing more sleep disorders due to increased household duties. Employers must provide more flexibility to help mitigate these challenges and support employees' mental health and well-being.

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November 5, Poster session

Group 8, moderator: Gemma Castaño-Vinyals

Presentation Title: Using a modified Delphi approach to advance a common definition of algorithmic management

Presentation Author: Pille Strauss-Raats

Presentation Title: Health outcomes of a 20-year cohort study of UK Armed Forces personnel

Presentation Author: Howard Burdett

Presentation Title: Long-COVID by occupation and industry in the UK using the ONS Coronavirus Infection Survey. Does SARS-CoV-2 infection matter?

Presentation Author: Theocharis Kromydas

Presentation Title: Clinical presentation of pain in healthcare professionals infected with SARS Cov2

Presentation Author: Rania Nakhli

Presentation Title: Relevance of the prescription of long-term sick leave for psychiatric pathology in the hospital setting

Presentation Author: Rania Nakhli

Presentation Title: Dehumanisation and Datafication: Key stressors of Algorithmic Management -- A qualitative analysis of Chinese couriers

Presentation Author: Hua Wei

Presentation Title: Preliminary evaluation of arm muscle strength testing for early detection of work-related upper limb disorders

Presentation Author: Marija Burcena

Presentation Title: Assessment of fatigue in workers with multiple sclerosis: 146 cases

Presentation Author: Wiem Ayed

Using a modified Delphi approach to advance a common definition of algorithmic management

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Objectives: Increasing use of algorithmic management (AM) at work, coupled with the lack of data on its impact on workers' health, safety and well-being, is posing a societal challenge. AM is preliminarily associated with adverse impact on job quality, for example in decreased autonomy and increased workload, but little is known of associated health effects in diverse settings. The goal of this research project is to create a common definition of AM that is used consistently to facilitate systematic data collection and enable comparisons over time between industries and occupations, both nationally and internationally.

Materials and methods: As the first stage of the research, we employed a modified Delphi approach to create a definition that captures the essential elements of AM. This iterative process involved multiple survey and discussion consultations with a multidisciplinary group of experts to increase consensus regarding key aspects to be included. The expert feedback was synthesized to refine the proposed definition.

Results: The first round of consultation resulted in a concise definition, accompanied by brief explanations of key concepts such as digital technologies and management functions. The next step of the process involves expanding the expert group to involve statistical experts for operationalizing the elements of the definition, paying attention to needs for adjustment within sectors such as healthcare or logistics.

Conclusions: In the context of increased use of AM across economic sectors, including both platform and regular work settings, this research addresses the need for conceptual consistency. Consistent use of the same definition paves the way for systematic data collection to assess prevalence and impacts on health, well-being, and occupational health consequences of this type of work organization, ensuring comparability across studies. Moving forward, this work will inform the development of survey questions to advance our understanding of AM and its implications on health.

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Health outcomes of a 20-year cohort study of UK Armed Forces personnel

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Objective: Twenty years on since the British involvement in the Iraq and Afghanistan conflicts, the extent to which these deployments impact the long-term health and wellbeing of UK serving (Regulars and Reserves) and ex-serving personnel (veterans) continues to evolve. We present the findings of a 20-year cohort study of UK Armed Forces Personnel.

Materials and Methods: Self-report data was collected in four phases, starting 2004, and with the most recent phase collected 2022-2023. Primary outcome measures included Common Mental Disorders (CMD), Post Traumatic Stress Disorder (PTSD), Complex-PTSD (C-PTSD) and alcohol use.

Results: 4104 participants responded to the most recent data collection phase. CMD was the most prevalent outcome (27.8%), followed by probable PTSD (9.4%) and alcohol misuse (8.4%). The majority of PTSD experienced in the cohort met the criteria for C-PTSD. Ex-serving Regulars compared to serving Regulars reported higher rates of PTSD, C-PTSD, and alcohol misuse. Higher rates of PTSD and C-PTSD were reported in serving and ex-serving Regulars who deployed in a combat role on their last deployment to Iraq or Afghanistan. Rates of CMD and PTSD have increased, and alcohol misuse decreased since the last phase of the cohort study.

Conclusions: The study finds an enduring impact of combat deployment on the rates of PTSD for those who deployed to Iraq and Afghanistan, particularly in ex-serving Regular personnel. Due attention should continue to be directed towards mental health services to support serving and ex-serving personnel.

Long-COVID by occupation and industry in the UK using the ONS Coronavirus Infection Survey. Does SARS-CoV-2 infection matter?

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Objective: High prevalence of long-COVID has been reported in the education, social care and healthcare sector. However, differences in prevalence of long-COVID across industries and occupations and whether any differences are beyond those explained by differential risks in SARS-CoV-2 infection have not been investigated.

Materials and methods: We utilised ONS Coronavirus Infection Survey (CIS) data (February 2021-April 2022) of working-age participants (16-65 years). The CIS began in April 2020 and aimed to be representative of the UK population. Exposures were industry, occupational group and major Standard Occupational Classification (SOC) group. Outcomes were self-reported long-COVID symptoms and reduced function due to long-COVID. We used the first available observation per industry and occupational exposure and other covariates, assuming no change across time. Binary and ordered logistic regression were used to estimate odds ratios (OR) and prevalence (marginal means). Sensitivity analyses were conducted to estimate panel models that allowed for time variation.

Results: Public facing industries, including teaching and education, social care, healthcare, civil service, retail and transport industries and occupations, and those in caring, leisure and other services SOC group had higher likelihood of long-COVID. Long-COVID prevalence by industry ranged from a low of 7.7% in financial services to a high of 11.6% in teaching and education. Severity (i.e. reduced function by 'a lot') ranged from 17.1% in arts, entertainment and recreation to 22-23% in teaching and education and armed forces. OR trends for long-COVID predominantly followed those for SARS-CoV-2 infections, except for professional occupations (ORSARS-CoV-2 <1; ORlong-COVID>1).

Conclusions: Prevalence of long-COVID differs across industries and occupations. The likelihood of developing long-COVID symptoms mostly follows likelihood of SARS-CoV-2 infection, except for professional occupations. Our findings highlight industrial sectors and occupations where further research is needed to understand the occupational factors, beyond infection risk, that may result in long-COVID.

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Clinical presentation of pain in healthcare professionals infected with SARS Cov2

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Objectives: The clinical manifestations of COVID-19 range from mild symptoms to severe pneumonia with multivisceral failure. Although respiratory symptoms are the most common and condition the prognosis of the disease, pain is also one of the most common initial symptoms of COVID-19 infection and has a wide clinical spectrum.

Materials and methods: This was a descriptive cross-sectional study of all healthcare professionals (HCPs) at Charles Nicolle Hospital consulting the Occupational Pathology Department during the period from 1 September to 31 December 2020 for COVID-19 infection confirmed by RT-PCR.

Results: Our population of 494 HCPs was predominantly female (78%). The mean age was 41 +/- 20 years. Nurses represented 32% of cases. They worked in surgical departments in 36% of cases. The average professional seniority of our patients was 14.9 +/- 13 years. The distribution of pain according to its location showed that 345 patients (70%) suffered from headaches; 318 (65%) from arthromyalgia; 176 (36%) from chest pain; 42 (9%) from lumbar pain and 37 (7%) from back pain. The average duration of pain was 10 +/- 9 days. Among patients suffering from pain, the mean value of the Visual Analogue Scale was 5 +/- 4. The most frequent painful locations revealing SARS-COV2 infection were the throat, abdomen, and back, while the head, thorax, and limbs were the most frequently reported locations during the active phase of the infection.

Conclusions: Acute pain is common during COVID-19 infection, with the most current manifestations being headache, arthromyalgia, chest pain, and abdominal pain. However, spinal pain appears to be frequent in SARS-CoV-2 infection.

Relevance of the prescription of long-term sick leave for psychiatric pathology in the hospital setting

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Objectives: Long-term leave for psychiatric illness is the most frequently prescribed patterns and seem on the rise in recent years, particularly in hospitals. Our objective is to describe the socio-professional characteristics of the study group, pinpoint the epidemiological features of long-term psychiatric leave (LTPL), and assess the suitability of prescribing these leaves.

Materials and methods: Retrospective study conducted over seven months (from August 2022 to February 2023) included all personnel who received a long-term psychiatric leave for psychiatric reasons, as examined within the scope of medical expertise. This was done at the request of the relevant regional medical commissions for work stoppage during the study period.

Results: We identified 247 agents who received at least one LTPL during the study period. The mean age was 46.4±10.3 years. The sex ratio M/F was 0.24. The most represented professional category was nurses (36%). The average professional seniority was 18±10.7 years. During the study period, the number of agents in LTPL increased approximately twofold between September and October. In October 2022, the categories most affected by LTPL were nurses and senior technicians. From November onwards, the blue-collar category experienced an increase in the number of staff benefiting from LTPL. The average number of days off work was 66 days. Depression was the most common psychiatric pathology in 75% of cases. The psychiatrist prescribing the leave was in the private sector (90.3%). The reasons for leave were professional in 35.6% of cases. The degree of concordance between the diagnoses of the expert and the treating physician was good (Kappa = -0.083, p<10⁻³).

Conclusions: The reasons for the LTPL are essentially related to professional causes. Almost all the LTPL were considered justified, testifying to the reality of the psychological suffering of these civil servants and the severity of their injuries.

Dehumanisation and Datafication: Key stressors of Algorithmic Management -- A qualitative analysis of Chinese couriers

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Objectives: Existing research about Algorithmic management (AM) has predominantly focused on its functionalities and failed to capture the underlying mechanism of AM as a potential source of work stress. This study aimed to fill the gap and explore how AM change Chinese couriers' work experience.

Materials and methods: We conducted 15 in-depth interviews with couriers in May-June 2021 in China. Thematic analysis was completed using Nvivo12.

Results: AM can introduce new work stressors and interact with existing factors to alleviate or intensify work stress. Couriers' responses to AM and its effects varied as some felt motivated while others frustrated. Key themes emerged from the interviews included 'App the "boss"', 'Unequal exposure to AM and the role of human support', 'New work stressors of AM – Dehumanisation and Datafication', 'Job stressors intensified by AM' and 'Varying individual response to AM'. App 'the boss' described how the couriers felt when managed by algorithms. Employed, gig and agency couriers had different exposure to AM and human support of different quality. Dehumanisation characterizes how algorithmic systems fulfil managerial functions in ways that differ from managers qualitatively or quantitatively. Datafication refers to the conversion of real-world information and user behaviour into data and being input in the system to assist automated decision-making.

Couriers also reported that the use of digital methods could intensify some work stressors, e.g. time pressure and customer behaviour. Nevertheless, some couriers reported that AM provided new job resources, e.g., flexible hours, job opportunities, and pay transparency.

Conclusions: This paper identified key work stressors of AM and explored how AM interacts with existing work stressors to shape Chinese couriers' work experience. Dehumanisation could reduce the quality of support and workers' sense of relatedness to the workplace. Datafication and the lack of transparency led to concerns about potential discrimination, workplace unfairness and power imbalance.

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Preliminary evaluation of arm muscle strength testing for early detection of work-related upper limb disorders

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Keywords: work-related upper limb disorders, dynamometry, electromyography, thermography, trigger points

Objective: This study aims to evaluate arm muscle testing techniques in healthy individuals as a preliminary step towards incorporating these methods into compulsory medical exams (CMEs) for early detection of work-related upper limb disorders (WURLDs).

Methods: Six muscle groups (deltoids, biceps brachii, brachioradialis, triceps brachii, wrist flexors, and extensors) were examined using clinical muscle strength testing, dynamometry and surface electromyography (sEMG) in 26 healthy individuals. BMI was recorded. Thermography was used to detect trigger points. Data analysis was performed using IBM SPSS 27.

Results: Significant correlations were observed between clinical assessments and dynamometry in the deltoids ($p=0.007$, 95% CI [0.02, 0.62]), brachioradialis ($p=0.045$, 95% CI [0.01, 0.57]), and triceps ($p=0.019$, 95% CI [0.03, 0.64]), as well as between dynamometry and sEMG in the deltoids ($p=0.039$, 95% CI [0.01, 0.56]), brachioradialis ($p=0.093$, 95% CI [0.00, 0.52]), and triceps ($p=0.170$, 95% CI [0.02, 0.54]). Correlations were found between BMI and muscle strength in the deltoids (right: $r=0.51$, $p=0.007$, 95% CI [0.15, 0.75]; left: $r=0.45$, $p=0.019$, 95% CI [0.08, 0.71]), biceps (right: $r=0.42$, $p=0.026$, 95% CI [0.05, 0.68]; left: $r=0.40$, $p=0.035$, 95% CI [0.03, 0.66]), and right brachioradialis ($r=0.37$, $p=0.045$, 95% CI [0.01, 0.65]). Overweight individuals were more likely to have detectable brachioradialis trigger points on thermography.

Conclusions: These findings show significant correlations between clinical and instrumental examination methods, supporting the potential integration of these techniques into CMEs for early detection of WURLDs. Future research should focus on larger sample sizes and longitudinal studies to validate these findings.

Assessment of fatigue in workers with multiple sclerosis: About 146 cases

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Findings: Fatigue is one of the most common symptoms of multiple sclerosis (MS) which has a considerable impact on quality of life and employment.

Objective: The aim of our study was to assess fatigue in workers with MS and to study the factors associated with it.

Materials and methods: Bicentric cross-sectional study including patients with MS followed up at the neurology consultations of the Charles Nicolle Hospital and the National Institute of Neurology during the period from 1st January 2022 to 1st January 2023. Fatigue was assessed using the Fatigue Severity Scale (FSS).

Results: We included 146 patients with a mean age of 39.9±9.6 years and a gender-ratio (M/F) of 0.52. The most represented employment sectors were manufacturing (28.1%) and health (17.1%). The most common occupations were manual workers (46.6%) and teachers (13%). The average length of service was 10 years. The patients presented with a relapsing-remitting form of MS in 86% of cases and the mean EDSS score was 2,35±1,81. Assessment of the FSS score showed that 55.5% of patients had severe fatigue (FSS score ≥5). Fatigue was associated with advanced average age (p=0,04), personal history of psychiatric illness (p=0,002), long-term medication for comorbidities (p=0,020), high average EDSS score (p=10-3) and clinical signs of cognitive (p=,009) and motor (p=10-3) impairment. Work requiring physical strength (p=0,018) and manual precision (p=0,046) were associated with fatigue and high absenteeism over the last 12 months (p=0,023).

Conclusions: According to our study, Work demands, cognitive and motor signs and EDSS score may be associated with fatigue. Close collaboration between the neurologist, occupational physician and employer is essential if these patients are to remain in work.

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