Oral Presentations

Aging Workforce

O-114 EFFECTS OF CHANGES IN EARLY RETIREMENT POLICIES ON LABOR FORCE PARTICIPATION: THE DIFFERENTIAL EFFECTS FOR VULNERABLE GROUPS

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Introduction From January 1st 2006 onwards, an early retirement reform was implemented in the Netherlands, in which workers born in 1950 or later were no longer fiscally rewarded to retire early. This reform did not apply to those born in 1949 or earlier.

Objectives This study investigated the effects of a national early retirement reform, which was implemented in 2006 and penalized early retirement, on paid employment and different exit pathways and examined whether these effects differ by gender, income level and health status.

Methods This study included all Dutch individuals in paid employment born six months before (control group) and six months after (intervention group) the cut-off date of the reform (1 January 1950) that fiscally penalized early retirement. A regression discontinuity design combined with restricted mean survival time analysis was applied to evaluate the effect of penalizing early retirement on labor force participation from age 60 until workers reached the retirement age of 65 years. This means that the effects between the intervention and control group were compared, while accounting for secular trends.

Results The intervention group postponed early retirement by 7.41 months (95% confidence interval (CI) 6.11–8.72), and partly replaced this by remaining 4.87 months (95% CI 3.60–6.24) longer in paid employment. Workers born after the threshold, annually earning $\in 25$ 000–40 000, spent 1.24 months (95% CI 0.31–2.18) more in economic inactivity than those born before. The working months lost to unemployment increased by 1.50 months (95% CI 0.30–2.71) for female workers and 1.99 months (95% CI 0.06–3.92) for workers reporting multiple chronic diseases.

Discussion The national reform successfully prolonged working lives of older workers. However, workers with a middle income, female workers, and workers with chronic diseases were more vulnerable to premature exit from the labor market through unemployment or being without any income or benefit.

O-204 THE INFLUENCE OF WORK-RELATED FACTORS ON RETIREMENT DECISIONS IN THE UK. THE HEALTH AND EMPLOYMENT AFTER FIFTY FACTORS INFLUENCING RETIREMENT STUDY (HEAF FIRST), A MIXED-METHODS STUDY

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Introduction Ageing populations (caused by increased longevity and declining birth-rates) have changed workforce demographics in high-income countries, placing strain on pension systems. Recent policy changes have sought to encourage work at older ages. Modifiable work-related factors may present a further opportunity to extend working lives.

Objectives To establish the influence of work-related factors on the decision to retire in a contemporary UK cohort.

Methods The HEAF study is a cohort of English participants aged 50–64 years in 2013–2014. Participants complete annual questionnaires asking about work and health. HEAF FIRST involved qualitative interviews with retirees which informed the design of a nested case-control study. Qualitative - Retirees were sampled by socio-economic status (SES) and sex. Semi-structured telephone interviews were conducted asking about reasons for retirement and were thematically analysed. Questionnaire - Questionnaires were sent to employees in 2013–2014, who had reported retirement by 2018 (cases) or had remained employed (controls), matched on age (+/-2 years) and sex. Logistic regression models adjusted for sex, age, SES, finances, and marital status were used to investigate associations between work-related factors and retirement.

Results Qualitative - Work-related factors both pushed towards retirement and pulled back towards work. Retirement decisions seemed multi-factorial and work-related factors played an important role. Questionnaire - 936 responses were received from workers (n=448) and retirees (n=488). Increased retirement was associated with the following factors: (adjusted as described above): job strain (OR 2.00, 95%CI 1.33,3.01), effort/reward imbalance (OR 1.43, 95%CI 1.26,1.63), longer commutes (OR 1.36, 95%CI 1.02,1.82), lower flexibility (OR 1.25, 95%CI 1.10,1.42), perceived declining standards 2.01 (1.51,2.68), and perceived isolation (OR 1.79, 95%CI 1.18,2.71).

Conclusion In this cohort retirement seemed to be influenced by work-related factors. Later working was more likely where workers perceived appreciation, autonomy or flexibility in their jobs. Employers may be able to encourage later working by implementing interventions based on these findings.

0-331 UNDERSTANDING AGE DIFFERENCES IN RETIREMENT EXPECTATIONS USING DATA FROM THE CANADIAN LONGITUDINAL STUDY ON AGING

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Introduction The proportion of the labour market comprised of older-aged workers has increased in many high-income countries. In this changing arena of aging and work, retirement expectations are of renewed interest because they can impact organizational planning and potential worker health and well-being. However, large variations in retirement outcomes have been noted across age groups.

Objectives This study aimed to examine: 1) the overall association between age and retirement expectations using a large population health survey; 2) the degree of variation in functional, psychosocial, organizational and life-stage factors across age groups; 3) the extent to which these factors explain the overall association between age and retirement expectations;

and 4) whether there is a remaining association not mediated by these factors.

Methods We used cross-sectional data from the Canadian Longitudinal Study on Aging (N= 17,938), focusing on working, non-retired adults aged 45–64 years. Data were collected via telephone and in-person interview over the 2011–2015 period. Functional, psychosocial, organizational and life-stage factors were measured using existing variables to create composite index scores. Path models examined the relationship between age and retirement expectations, and the proportion of the relationship explained via each factor.

Results Age was associated with functional, psychosocial, organizational and life-stage scores in expected directions. Older age also was associated with earlier retirement expectations. Path models found that 25–30% of the total relationship between older age and retirement expectations was mediated through life-stage and organizational factors.

Conclusion Our study demonstrates the feasibility of measuring functional, psychosocial, organizational and life-stage concepts via existing data to better understand age-related inequalities in retirement expectations. Future research should focus on measuring additional items for psychosocial and organizational factors, followed by validation of the extent to which each item explains age differences in other work outcomes.

O-439 THE COMPLEX ASSOCIATION OF PERCEIVED WORKPLACE SAFETY, WORK ENVIRONMENT, AND NATIONAL FACTORS WITH THE MENTAL HEALTH OF AGING WORKERS IN EUROPE DURING THE COVID-19 PANDEMIC

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Introduction The widespread COVID-19 contagion in workplaces has created a new workplace hazard, albeit investigated mainly among health care workers. Work-environment factors are related to workplace infection risks and individual vulnerability factors, like older age, predispose workers to severe illness. The stress and anxiety associated with the concerns regarding workplace safety and COVID-19 repercussions are jeopardizing aging workers' mental health (MH).

Objectives We aimed at investigating the individual and macro-level factors associated with declines in the MH of aging workers from different industry sectors. We hypothesize that higher perceived workplace safety is crucial in protecting their MH and mediates the work-environment influences.

Methods Using the Health, Ageing and Retirement in Europe (SHARE) data from COVID-19 survey (summer 2020) from 27 countries in Europe and Israel and additional data collected from pre-pandemic waves, we performed multi-level and mediation analyses to characterize work-environment, safety perception, socio-demographic, clinical, and national-level factors associated with MH among workers aged 50–70. Results Multi-level analyses demonstrated that 24% of the aging workers experience MH declines characterized by East-West geographical European gradient associated with disease burden. The perceived workplace safety, which is low among 10% of the workers, is the strongest predictor- explaining 30% of their MH status and mediates the effects of work-environment aspects, such as workplace contagion risk. Being a woman, having financial difficulties, a higher vulnerability

index (comorbidities and age>60), pre-existing mental morbidity, and the national high burden of COVID-19 are associated with declines in MH, whereas exclusively working on-site is protective.

Conclusion Evaluating workplace conditions and screening vulnerable sub-groups among the aging workers who are more prone to MH declines are imperative. Workplace interventions, integrated with individual targeted approaches to reduce the influence of work-environment factors on infection risks and mental distress, hence elevating workplace safety perception, are recommended.

O-447 ASSOCIATION OF PERCEIVED JOB SECURITY AND CHRONIC HEALTH CONDITIONS WITH RETIREMENT IN OLDER UK AND U.S WORKERS

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Background The relationship between job insecurity, chronic health conditions (CHCs), and retirement among older workers are likely to differ between countries that have different labor markets and health and social safety nets. To date, there are no epidemiological studies that have prospectively assessed the role of job insecurity in retirement incidence, while accounting for CHCs in two countries with vastly different welfare systems. We investigated the strength of the association baseline job insecurity and retirement incidence over an 11-year period while accounting for CHCs, among workers aged 50 and above in the UK and U.S.

Methods We performed Cox proportional hazards regression analysis, using data from the Health and Retirement Study (HRS [U.S. cohort, n=491]) and English Longitudinal Study on Aging (ELSA [UK cohort n=821]).

Results We found evidence of reduced likelihood of retirement among job insecure adults in both cohorts, and a significant association between CHCs and retirement in the U.S cohort only. In the UK cohort, the association between job insecurity and decreased retirement incidence (HR=0.69, 95% CI =0.50-0.95) was attenuated after adjustment for CHCs and covariates. In the U.S cohort, adjustment for CHCs and other social and health factors significantly decreased this association (HR=0.60, 95%CI = 0.36-0.99), indicating that CHCs, social, and health factors are contributing mechanistic factors underpinning retirement incidence in the U.S.

Conclusions The country level differences we observed may be driven by macro level factors operating latently, which may affect the work environment, health outcomes, and retirement decisions uniquely in different settings.

Biomarkers

0-123 DNA DAMAGE IN LYMPHOCYTES OF FEMALE FARMERS MEASURED USING THE ALKALINE COMET ASSAY.

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10.1136/OEM-2021-EPI.6

Introduction Many studies have shown a link between exposure to pesticides and a higher level of DNA damage. However, longitudinal studies are rare and little is known about long term DNA damage and cancer risk in exposed subjects.

Objectives i) Quantify DNA damage for the women included in a French agricultural cohort at two time points, ii) study the relationship between DNA damage and agricultural tasks, and iii) between DNA damage and cancer incidence.

Methods 320 female agricultural workers were enrolled from 1997 to 2000 and completed a face-to-face questionnaire. 245 gave a blood sample at enrolment (T0). Ten years later, 104 donated another sample (T10). Using the comet assay with an internal historical negative control, we quantified DNA damage in PBMC on 200 nuclei using a 4-category visual scoring system.

Results At enrolment, there were no differences in DNA damage for farm owners/co-owners (n=135, 55%, p=0.84), or participants in livestock tasks within our study population (n=159, 65%, p=0.23). Pesticide exposure through application of anti-parasites to livestock (n=138, 56%, p=0.25) and disinfection of milking equipment (n=117, 48%, p=0.78) did not influence DNA damage. However, damage tended to be higher for those implicated in milking (n=109, 44%, p=0.18). Women who carried out administrative (n=180, 73%) and domestic tasks (n=213, 87%) tended to have lower damage scores (p=0.08 and p=0.07, respectively), as well as women who undertook other tasks had significantly lower damage (p=0.04) than those not involved. From enrolment to end of 2017, 37 incident cancer cases were diagnosed, of which 21 were breast cancer cases. No association was found between DNA damage and cancer incidence (p=0.45).

Conclusion Occupational exposure in the agricultural field could be evaluated using the comet assay. Women's involvement to tasks not related to farm upkeep show a lower level of DNA damage than those not undertaking these tasks.

O-198 ALTERED LEVELS OF IMMUNE MARKERS AMONG MALE ROTATING NIGHT SHIFT WORKERS IN SPAIN – THE HORMONIT STUDY

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10.1136/OEM-2021-EPI.7

Introduction Few preliminary studies suggest that night shift work is associated with a desynchronization of rhythmic immune parameters, which may explain in part the increased risk for infection, cardiometabolic disorders, and cancer in shift workers.

Objectives To examine how night shift work alters cellular immune markers.

Methods This study included 46 male rotating shift workers from a car industry in Barcelona, Spain, sampled twice toward the end of a 3-week night shift (22:00–06:00 hrs) and a 3week day shift (06:00–14:00 hrs) rotation. We collected four blood samples per worker; before and after during each shift (night shift at 06:00 and 14:00, day shift at 22:00 and 6:00). We measured 30 cytokines, chemokines and growth factors using Luminex technology and examined within-person variations in analytes between sampling time-points and shifts. We applied linear mixed models to examine within-person associations between shift and analytes, comparing samples taken at 6:00am during each shift. We also conducted a factor analysis using analyte levels from all 4 time points for each individual to identify common factors and determine if these factors were altered by shift work.

Results We observed lower levels of several analytes during the night shift (cytokines IL17, IL12, IL4, TNF α , and cytokine receptors IL1RA, IL2R; chemokines IP10, MIP1 α , MIP1 β , and RANTES; growth factors GCSF, FGF, EGF, HGF, and VEGF) compared to the day shift. In the factor analysis, the main factor (explaining 57% of the variance) was negatively associated with night shift (beta: -0.14, 95%CI -0.25 to -0.03, pvalue less than 0.01), indicating that night shift affects immune marker levels in this pathway. This factor included growth factors (FGF, EGF, HGF), Th1 type cytokines (IL15, IL2) and pro-inflammatory cytokines and chemokines (IL1 β , MIP1 α , MIP1 β).

Conclusion Our results show that night shift is associated with disruption in multiple immune response pathways.

O-242 LITERATURE REVIEW OF BIOLOGICAL MONITORING STUDIES TO ASSESS HEALTHCARE WORKER'S EXPOSURE TO ANTINEOPLASTIC DRUGS

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Introduction Antineoplastic drugs, also known as hazardous drugs, are used to treat cancer. Healthcare workers' exposure to these agents may lead to DNA damage and adverse reproductive effects. Exposure to antineoplastic drugs can be assessed via biological monitoring.

Objectives To conduct a literature review of studies examining biological monitoring of healthcare workers exposed to antineoplastic drugs to identify trends and knowledge gaps.

Methods The literature search was performed on three databases: Proquest, Web of Science and PubMed. For inclusion, an article had to be in English and published between 2005 and 2020. Search terms included 'antineoplastic drugs' or 'hazardous drugs' AND 'occupational' or 'healthcare workers' or 'pharmacist' or 'nurse' AND 'blood' or 'urine' or 'biomarkers'.

Results Overall, the literature review resulted in 70 unique articles - 30 examined urine as the matrix, 31 had non-urine samples and nine papers collected both urine and non-urine samples. Regarding the urine sampling studies, researchers collected either spot samples or 24-hr voids. Cyclophosphamide was the most common analyte (69%) with a detection limit ranging from 0.09 to 0.20 ng/ml. Approximately 75% of the articles reported at least one urine sample had detectable levels of drug. In some instances, urinary drug contamination was found even though workers wore personal protective equipment. For those studies that collected other matrices, blood and exfoliated buccal cells were the most common specimens. A majority (81%) reported that there was a statistically significant difference in results between exposed and non-exposed populations. Many studies reported that safe work practices, which includes the use of personal protective equipment, may not be adequate to protect healthcare workers.

Conclusion There is value in conducting biological monitoring to assess healthcare workers' exposure to antineoplastic drugs. However, because of the variability in sampling and analytical methods, standardization is recommended to ensure biological monitoring results are comparable.

0-355 THE BIOCHEMICAL EFFECTS OF LEAD CONCENTRATION ON OXIDATIVE STRESS PARAMETERS IN WORKERS

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Objective The goal of this study was to determine the blood lead concentration in various occupational workers in Sanandaj and its effects on oxidative stress parameters and other blood parameters.

Methods This descriptive-analytical study was carried out in Sanandaj, Iran. A total of 278 subjects were selected as the sample size for this study, of which 64 did not have exposure to occupational lead, and 214 had occupational exposure to lead. The blood lead levels were measured by the atomic absorption spectrophotometer apparatus AA6800. Oxidative stress parameters and other blood parameters were measured by special devices.

Results and Conclusion There was a significant positive relationship between the blood lead concentration and the oxidative stress parameters including lipid peroxidation, malondialdehyde, glutathione, antioxidant serum, and catalase. There was a significant negative relationship between the blood lead concentration and hematological parameters. Also, there was a significant positive relationship between the blood lead level and the lead concentration in the air.

0-399 URINARY PESTICIDE METABOLITE LEVELS AMONG FARM WORKERS IN MALAYSIA: PILOT RESULTS FROM THE IMPRESS STUDY

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10.1136/OEM-2021-EPI.10

Introduction Pesticides are widely used by farmers in Malaysia but there is limited information on exposures experienced.

Objective To determine Malaysian farmer's exposure from pesticide spray events through the collection and analysis of urine samples.

Method 25 farmers growing either rice (n=16) or vegetables/ fruits (n=7) from the east coast of Malaysia provided two urine samples, one in the morning before they started spraying and the other in the evening of the first day of spraying either with chlorpyrifos (n=16), cypermethrin (n=18) or pyrethroids (n=21). Urinary levels of 3,5,6-Trichloro-2-pyridinol (TCPy), 3-phenoxybenzoic acid (3PBA), and total 2,2,dimethylcyclopropane carboxylic acid (DCVA) were determined by liquid chromatography-mass spectrometry and corrected for urinary creatinine levels. Results Farmers who used the precursor pesticide had higher levels of urinary metabolites after spraying than those who did not. Urinary TCPy levels of chlorpyrifos applicators were significantly higher post-spraying compared to pre-spraying: median levels and interguartile range (IQR) were 94 (18.6-228.4) versus 43 (18.8-121.5) µmol/mole creatinine respectively (p urinary 3PBA levels of pyrethroid users (n=21) were also significantly higher post-spraying than pre-spraying: median levels (IQR) were 1.8 (0.6-3.7) versus 0.9 (0.5-1.7) µmol/mole creatinine (p Urinary DCVA levels of cypermethrin users (n=18) were significantly higher post-spraying than prespraying : median levels (IQR) were 5.6 (2.3-10.3) versus 1.9 (1.4-4.2) µmol/mole creatinine (p Pre-spraying urinary TCPy (but not 3PBA or DCVA) levels in farmers who had applied the precursor pesticide were higher than pre-spray levels in farmers who had not (p < 0.01).

Conclusion Current use of pesticides by Malay farmers results in increased exposure that can be detected by urinary metabolite measurement. This suggests further training is needed to reduce exposure in this population.

Breast Cancer

O-10 BREAST CANCER IN DANISH WOMEN OCCUPATIONALLY EXPOSED TO DIESEL EXHAUST AND POLYCYCLIC AROMATIC HYDROCARBONS

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Introduction Both diesel exhaust and specific polycyclic aromatic hydrocarbons (PAHs) have been classified as carcinogenic to humans. However, there is overall limited evidence for an association between these exposures and breast cancer.

Objectives To explore the association between occupational exposure to diesel exhaust and PAHs, respectively, and breast cancer, including subtypes.

Methods The study included 38,375 women with incident breast cancer identified in the Danish Cancer Registry, and five breast cancer-free controls per case matched on year of birth who were randomly selected from the Danish Civil Registration System. Full employment history was obtained for all women from a nationwide pension fund, and exposure to diesel exhaust and PAHs was assessed using a job exposure matrix. Conditional logistic regression was used to estimate of odds ratios (ORs) with adjustment for reproductive factors and socioeconomic status.

Results No noteworthy associations were observed for overall breast cancer in women exposed to diesel exhaust. However, diesel exhaust modestly elevated the risk of estrogen receptor negative breast tumours before age 50 years (OR=1.26, 95% CI: 1.09–1.46). Duration- and dose-response relationships were also observed for this subtype in this age group. No notable risk patterns were generally observed for PAH exposure.

Conclusion Occupational exposure to diesel exhaust may elevate the risk of early-onset estrogen receptor negative breast tumours in women. Future studies exploring this association are warranted.

0-67 DOES UNDERSTANDING OCCUPATIONAL MALE BREAST CANCER HELP US UNDERSTAND FEMALE BREAST CANCER?

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10.1136/OEM-2021-EPI.12

Objectives Identifying work-related risks for female breast cancer is often challenged by confounding hormonal and reproductive factors. Examining risk in men may help us understand occupational breast cancer risk factors, but few studies have been able to do this due to the rarity of male breast cancer. We used a large cohort of 2+ million Ontario workers to determine if evidence of male breast cancer by occupation can inform our understanding of female breast cancer.

Methods Our study uses data from the Occupational Disease Surveillance System (ODSS), established through administrative data linkage, to follow 2,190,246 Ontario workers derived from WSIB lost time claims data (1983–2014). Breast cancer cases were identified in the Ontario Cancer Registry (OCR, 1964–2016). Cox-proportional hazard models were used to estimate age-adjusted hazard ratios (HR) and 95% confidence intervals (CI) with an internal reference group of all other workers in the cohort.

Results A total of 17, 865 and 492 breast cancer cases were identified in working women and men, respectively. By occupation, elevated rates were observed for management/administration, social sciences, teaching and related, and medicine and health. Specifically, elevated rates were observed for elementary and secondary school teachers (HRw=1.27, 95% CI 1.19–1.35; HRm=2.16, 95% CI=1.02–4.55), nurses (HRw=1.08, 95% CI=1.04–1.13; HRm=4.73, 95% CI=3.02–7.41) and other medicine/health workers (HRw=1.18, 95% CI=1.03–1.34; HRm=6.50, 95% CI=2.69–15.7).

Conclusion The ODSS enabled the analysis of a large cohort of working men and women with breast cancer. Findings show that at-risk groups were similar among both sexes, demonstrating the importance of occupation for breast cancer risk, although the HRs were much higher for men. Further research is needed in potential job-related factors such as sedentary behaviour, stress, shift work, and for some occupations, radiation exposure.

0-233 OCCUPATIONAL SOLAR EXPOSURE AND RISK OF SUB-TYPES OF BREAST CANCER IN DANISH WOMEN

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10.1136/OEM-2021-EPI.13

Introduction It has been suggested that exposure to UV radiation from the sun (UVR) may increase the blood level of vitamin D and, in turn, decrease the risk of breast cancer.

Objectives We explored the associations between outdoor occupational solar radiation and subtypes of female breast cancer.

Methods Totally 38,375 female employees under the age 70 years were identified with first primary breast cancer from the Danish Cancer Registry. Five age matched employed controls, were, based on the incidence density principle, randomly

chosen. The Danish Supplementary Pension Fund Register was used to retrieve full employment history. A job exposure matrix was used to assess individual occupational UVR exposure. Conditional logistic regression with adjustment for reproductive factors and SES was used to estimate odds ratios (ORs).

Results Longer duration of UVR exposure (≥ 20 years: OR=0.8, 95% CI: 0.75–0.92) and highest cumulative exposure (OR=0.9, 95% CI: 0.83–0.95) were inversely associated with the risk of breast cancer after age 50 years. Further, the reduced risk pattern for duration of exposure was most pronounced for estrogen receptor negative tumors (≥ 20 years: OR=0.8, 95% CI: 0.57–0.98).

Conclusion Our study of outdoor workers shows a modest decreased breast cancer risk.

0-288 OCCUPATIONAL EXPOSURES AND BREAST CANCER RISK IN THE CECILE STUDY

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10.1136/OEM-2021-EPI.14

Introduction The etiology of breast cancer is only partially understood. An increasing body of epidemiological evidence indicates that environmental and occupational factors may affect breast cancer risk, yet no established risk factors have been identified. Although recent studies have shown increased risks associated with specific workplace exposures, the evidence remains largely inconclusive for most occupational agents.

Objectives To examine associations between selected occupational exposures and breast cancer risk.

Methods In a population-based case-control study conducted in France between 2005 and 2008, detailed information on lifetime occupational history was collected for 1,206 cases and 1,294 population controls. An industrial hygienist coded occupations and industries for each job held by a participant. To identify occupational exposures, job codes were linked to the Canadian job-exposure matrix. Twenty-seven agents with relatively high prevalence were selected. Three exposure metrics of ever exposure, duration of exposure, and cumulative exposure to selected agents were analyzed. The reference group were participants having never been exposed to the specific agent. Odds ratios (OR) and 95% confidence intervals for associations with breast cancer were estimated using logistic regression models, adjusting for well-established breast cancer risk factors.

Results Increased risks were suggested for high cumulative exposure to calcium carbonate, polyester fibres, fabric dust, cotton dust, aliphatic aldehydes, mononuclear aromatic hydro-carbons, and synthetic adhesives, with ORs ranging from 1.45 to 1.66. Inverse associations were observed for all exposure metrics for ultraviolet radiation and grain dust, with ORs ranging from 0.41 to 0.68.

Conclusion These findings suggest that some occupational exposures may increase breast cancer risk. The decreased ORs associated with ultraviolet radiation and grain dust suggest that certain exposures that are typical of agricultural workers might be protective but should be interpreted with care. More research contributing to the knowledge base on occupational factors in relation to breast cancer is required.

0-461 OCCUPATIONAL SOLAR ULTRAVIOLET RADIATION AND BREAST CANCER RISK IN CANADA

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10.1136/OEM-2021-EPI.15

Introduction Solar ultraviolet radiation (UVR) has potential protective, and confirmed detrimental effects on cancer risk. Several studies have examined recreational sun exposure in relation to breast cancer risk, and a recent meta-analysis found that moderate sun exposure (1–2 hrs/day) was associated with a decreased risk of breast cancer. Only one previous study in Canada has investigated UVR and breast cancer risk in an occupational setting.

Objectives The primary objective is to investigate the relationship between occupational solar UVR and breast cancer risk in Canada to inform on the dose-response relationship at the high end of the solar UVR spectrum.

Methods Questionnaire data from the Canadian Partnership for Tomorrow's Health (CanPath) will be utilized for participants in Ontario, Quebec, and Alberta. Information on sun exposure, longest job held, and breast cancer risk factors were obtained at baseline. Cancer outcomes have been ascertained via linkage with provincial cancer registries. A case-cohort approach was employed to facilitate job coding. Jobs codes were linked to a job exposure matrix (SUNJEM) to assign exposure. Breast cancer risk estimates (hazard ratios [HR]) and 95% confidence intervals (CI) will be estimated using a weighted Cox proportional hazard's regression with Prentice weights, controlling for potential confounders.

Results Preliminary results are available from the Ontario cohort, the analyses of additional cohorts are currently underway. From the underlying Ontario cohort 1,213 breast cancer cases met eligibility criteria. In the random sample of 2,500 women selected for the sub-cohort, the prevalence of occupational exposure (>2 hrs/day) to solar UVR was less than 2%. Preliminary HRs [0.995 (95%CI 0.684, 1.448)] suggest that occupational UVR does not have a protective or detrimental effect on the risk of breast cancer for Canadian women.

Conclusion This will be the second study to examine the relationship between occupational sun exposure and breast cancer risk in Canada, and the first to examine the dose-response relationship.

Cancer

0-19 COLORECTAL CANCER AMONG FARMERS IN THE AGRICAN COHORT STUDY

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Objective Specific farming types and tasks have never been studied in relation to colorectal cancer (CRC). We evaluated associations between 5 types of livestock and 13 types of crops in relation to CRC and its subsites within the Agriculture and Cancer (AGRICAN) study.

Methods AGRICAN cohort includes 181 842 agricultural workers living in 11 French geographical areas. Data on farming types and tasks was collected by self-administered questionnaires. We identified 2 609 CRC, 972 right colon, 689 left colon and 898 rectal incident cancer cases during follow-up from 2005 to 2015. Cox proportional hazards models were used to estimate hazard ratios (HR) and 95% confidence intervals (95% CI).

Results Significantly increased CRC risk was observed for farmers producing horses (HR=1.18, 95% CI 1.06–1.31), sunflower (HR=1.23, 95% CI 1.03–1.45) and field vegetables (HR=1.18, 95% CI 1.02–1.36). Positive associations were also observed for pig, poultry and wheat/barley. Some associations were observed only for specific subsites: left colon cancer was associated with fruit growing (HR=1.36, 95% CI 1.09–1.70) and potato (HR=1.28, 95% CI 1.05–1.57). Tasks related to livestock (animal care, insecticide treatment, disinfection of milking equipment and building) or to crop (haymaking, sowing, pesticide treatment, seed treatment, harvesting) were also associated with CRC. Duration and size of farming types/tasks increased the risk for some of the associations. Analysis stratified by gender suggested an interaction with several farming types/tasks.

Conclusion The current study showed original and positive findings for several farming types and tasks and CRC risk, overall and by subsites.

O-22 CANCER SURVEILLANCE AMONG PLASTICS AND RUBBER MANUFACTURING WORKERS IN ONTARIO, CANADA

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Objective Occupational exposure to agents used in plastics and rubber manufacturing have been associated with elevated risk of certain cancers. We sought to estimate cancer risk among workers with a history of employment in plastics and rubber manufacturing as part of an ongoing surveillance program in Ontario, Canada.

Methods The Occupational Disease Surveillance System (ODSS) cohort was established using workers' compensation claims data and includes 2.18 million workers employed between 1983–2014. Workers were followed for site-specific cancer diagnoses in the Ontario Cancer Registry through 2016. Cox-proportional hazard models were used to estimate adjusted hazard ratios (HR) and 95% confidence intervals (CI).

Results We identified 81,127 workers (69% male) everemployed in plastics and rubber manufacturing industries or materials processing and product fabricating occupations. Compared to all other workers in the ODSS, workers in materials processing occupations had an elevated rate of lung cancer (HR 1.11, 95% CI: 1.02–1.20), which occurred almost exclusively among females (HR 1.38, 95% CI 1.20– 1.58) in sex-stratified analyses. An elevated rate of breast cancer was observed among female labourers (HR 1.36, 95% CI: 1.01–1.82) and moulders (HR 1.47, 95% CI: 0.91–2.37) in plastics and rubber product fabricating occupations. Rates were elevated for esophageal, liver, stomach, prostate, and kidney cancer in job-specific subgroups including mixing and blending, bonding and cementing, and labouring. Workers in the plastics product fabricating industry had modestly elevated rates of pancreatic and brain and nervous system cancer.

Conclusions Elevated rates of lung and breast cancer among females are consistent with other studies of women in plastics and rubber manufacturing and warrant further attention in Ontario. Results for digestive and other cancers are broadly consistent with exposure to known or suspected carcinogens in these industries and suggest new sites of potential concern.

0-272 EXPOSURE TO CARBAMATE INSECTICIDES AND RISKS OF NON-HODGKIN LYMPHOMAS IN THE FRENCH AGRICULTURE AND CANCER COHORT (AGRICAN)

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Introduction Existing epidemiological studies have suggested a positive association between agricultural exposure to carbamates and risks of non-Hodgkin's lymphomas (NHL); however, the association remains inconclusive with most studies lacking statistical power to examine specific carbamates and subtypes of NHL.

Objectives We estimated the associations between carbamate insecticides and the risks of NHL overall and three major histological subtypes, multiple myeloma (MM), chronic lymphocytic leukaemia/small lymphocytic lymphoma (CLL-SLL), and diffuse large B-cell lymphoma (DLBCL) in the French prospective Agriculture and Cancer cohort (AGRICAN).

Methods At enrolment (2005–2007), participants completed a questionnaire on lifetime occupational history of agricultural practices, lifestyle habits, and medical history and were followed up until 2015 through linkage to the cancer registries. Information on pesticide use for different agricultural activities (crops, animals, barns, seeds) was crossed with the French crop-exposure matrix, PESTIMAT, enabling us to assess exposure to 19 specific carbamates (e.g., carbaryl, carbofuran) by type of activity. We estimated hazard ratios (HRs) with 95% confidence intervals (CIs) for NHL overall and its subtypes in relation to activity-specific exposure to carbamates (ever/never, duration) by fitting multivariate Cox proportional hazards models with age as the time scale. Non-users of pesticides were chosen as the reference group.

Results During the follow-up (median=8.9 years), 533 incident cases of NHL (MM=125, CLL-SLL=134, DLBCL=72) were diagnosed. Ever use of carbaryl on animals (HR=1.84, 95% CI=1.05–3.24) or barns (HR=1.86, 95% CI=1.06–3.27) were significantly associated with an increased risk of MM, but not for crops (HR=1.24, 95% CI=0.70–2.19). No significant trend by exposure duration were observed. None of the other carbamate insecticides were significantly associated with the risk of MM, CLL, DLBCL or NHL overall.

Conclusion Use of carbaryl on livestock production may lead to an increased risk of MM. Studies on activity-specific exposure pathways and levels are warranted to better understand the observed association.

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10.1136/OEM-2021-EPI.19

Introduction Occupational diesel exhaust exposure has been linked to increased bladder cancer risk in epidemiologic studies, but few explore mechanistic links.

Objectives We examined the relationship between diesel exhaust exposure and somatic mutations and mutational signatures in bladder tumors.

Methods Targeted sequencing was conducted in bladder tumors from the New England Bladder Cancer Study (NEBCS), a population-based case-control study. Using data on 797 cases and 1,418 controls, two-stage polytomous logistic regression was used to calculate odds ratios (ORs) and 95% confidence intervals (CIs) to evaluate etiologic heterogeneity between bladder cancer subtypes and quantitative estimates of respirable elemental carbon. Poisson regression was used to evaluate associations between REC and mutational signatures including those from nitro-polycyclic aromatic hydrocarbons (nitro-PAHs) in the NEBCS and in publicly available wholegenome sequencing bladder cancer dataset from The Cancer Genome Atlas Project (TCGA) (N=412).

Results We observed significant heterogeneity in the dieselbladder cancer risk relationship, with a strong positive association predominantly among cases with high-grade, non-muscle invasive TP53-mutated tumors compared to controls (ORTertile3vsUnexposed = 4.8, 95% CI=2.2,10.5; p-trend T mutations at CpG dinucleotides (Relative Risk (RR)=1.47, 95% CI=1.38,1.57). In muscle-invasive tumors, we also observed a positive association between diesel exposure and the dieselassociated nitro-PAH signatures of 1,6-dintropyrene (RR=1.93, 95% CI=1.28,2.92) and 3-nitrobenzoic acid (RR=1.97, 95% CI=1.33,2.92) in pooled analyses of NEBCS and TCGA.

Conclusion The relationship between diesel exhaust and bladder cancer was heterogeneous based on the presence of TP53 mutations in tumors. Assessing the impact of diesel exhaust exposure at CpG dinucleotides and any resultant transcriptional changes in bladder tumors may be valuable considering the wealth of data linking particulate exposures to altered DNA methylation. Future studies that can identify nitro-PAH signatures in tumors are of interest to support the findings generated here.

O-324 INCIDENCE OF POTENTIALLY EXPOSURE-RELATED CANCER SITES AMONG NORWEGIAN FIREFIGHTERS: 58 YEARS OF FOLLOW-UP

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Introduction Firefighters are exposed to a variety of known and suspected carcinogens through their work, and previous studies have found elevated risk for a number of cancer sites among firefighters.

Objectives The aim was to examine cancer incidence among Norwegian firefighters in sites with established associations to known carcinogenic occupational exposures. This included sites within the respiratory, urinary, and lympho-haematopoietic systems, as well as the skin and all sites combined.

Methods A newly established historical cohort of 3881 Norwegian firefighters who worked within the period 1950–2018 was linked to the Cancer Registry of Norway for incident cancers occurring in the period 1960–2018. We calculated standardized incidence ratios (SIR) with rates for the national male population as reference, and stratified SIR analyses by period of first employment, duration of employment, and time since first employment.

Results Elevated risk was seen for all sites combined (SIR 1.15, 95% confidence interval 1.07–1.23). Elevated risk of urinary tract cancer was observed among firefighters who began working before 1950, and with observation \geq 40 years since first employment. With \geq 40 years since first employment, risks of mesothelioma and laryngeal cancer were also elevated.

Conclusions Our patterns of increased incidence in cancer sites somewhat differs from observations in other studies, which may reflect that firefighting is a complex exposure that differs between countries, and that exposures have likely changed alongside changing fire contents, firefighting techniques, and equipment. However, our observed associations between firefighting and urinary tract cancer, laryngeal cancer, and mesothelioma have been observed in some studies previously, and may be related to carcinogenic occupational exposures. Differences in risk by period of employment potentially reflect improved quality and use of personal protective equipment, while stratification by time since first employment suggests that some cancers may have yet to develop among more recently employed firefighters.

0-392 EARLY DETECTION OF PROSTATE CANCER IN FIREFIGHTERS – A REGISTER-BASED STUDY OF PROGNOSTIC FACTORS AND SURVIVAL

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Introduction Meta-analyses have shown firefighters to have increased prostate cancer (PCa) incidence compared to the general population. Firefighters are exposed to many occupational carcinogens, but no chemical agent is considered an established risk factor for PCa. Increased diagnostic intensity through regular health check-ups has been suggested as an explanation for increased PCa risk among firefighters.

Objectives To examine age at diagnosis, prognostic factors and survival of PCa in Norwegian firefighters and three other occupations undergoing occupational health check-ups, and comparing with PCa cases in the general population.

Methods All PCa cases diagnosed 1960–2017 were extracted from the Cancer Registry of Norway. Firefighters, military employees, pilots and police officers were identified through occupational data from Statistics Norway. Age at diagnosis, clinical stage, prostate-specific antigen (PSA), Gleason score, performance status and overall and PCa-specific survival in cases in these occupations were compared with cases in the general population.

Results Firefighters were significantly younger at PCa diagnosis than cases in the general population in the periods 1960–1993 (mean difference 2.1 years) and 2007–2017 (mean difference 4.3 years). At diagnosis, firefighters had significantly lower PSA values, Gleason scores and performance status scores than the general population. Firefighters diagnosed 2007–2017 had lower risk of all-cause death compared to the general population (crude hazard ratio (HR) 0.71 (0.53–0.95)). No difference was found after adjusting for age at diagnosis (HR 1.03 (0.77–1.37)). Cases in the other three occupations generally also had lower age at diagnosis, better prognostic factors and better crude overall survival than cases in the general population.

Conclusion Younger age and better prognostic factors at PCa diagnosis among firefighters and other occupations with requirements for health check-ups compared with cases in the general population may indicate an increased diagnostic intensity, likely contributing to elevated PCa incidence in such occupations.

Cardiovascular

O-110 OCCUPATION AND INCIDENT STROKE IN A U.S. GENERAL POPULATION COHORT 45 YEARS OF AGE OR OLDER (REGARDS STUDY)

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10.1136/OEM-2021-EPI.22

Objective To identify occupational groups with greater risk of stroke within a cohort of older adults in the United States.

Methods Participants with occupational history data were selected from the REasons for Geographic and Racial Differences in Stroke (REGARDS) study (n=17,333) - a populationbased prospective cohort of black and white men and women aged \geq 45 years enrolled between 2003 and 2007. Selfreported occupational data were collected between 2011 and 2013. Participants were contacted every 6 months by telephone for self- or proxy-reported strokes later adjudicated by medical records through October 2018. Analyses focused on participants with a coded occupation who were employed in their longest held job prior to enrollment (n=15,016). Modified Poisson regression analyses were performed to estimate the relative risk (RR) for each two-digit Standard Occupational Classification (SOC) (2010 version) compared to all other occupation groups combined to highlight occupation groups at greatest risk of stroke.

Results We observed 735 strokes (5%) during 15 years of follow-up. Results showed that participants employed in 'food preparation and serving' (22 cases; 8%;), 'sales' (69 cases; 7%), and 'production' occupations (80 cases; 6%;) experienced a greater occurrence of stroke, compared with all other occupational groups combined. These associations were robust to adjustment for Framingham stroke risk score (that includes age, sex, smoking status), race, region, and BMI with adjusted RRs 1.5 (95% CI, 1.0, 2.3), 1.4 (95% CI, 1.1, 1.7) and 1.2 (95% CI, 1.0, 1.5), respectively. Findings may be biased by incomplete job histories, crudeness of exposure assessment, latent confounding, and survivor effect.

Conclusions We found evidence of an association between three two-digit occupation groups and incident stroke. We will better contextualize these results by refining the exposure assessment by examining associations with more detailed three-digit occupation groups, include all jobs held prior to enrollment, and incorporate employment duration.

0-140 OCCUPATIONAL NOISE EXPOSURE AND METABOLIC SYNDROME

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10.1136/OEM-2021-EPI.23

Objective Metabolic syndrome, a major risk factor for cardiovascular disease and diabetes, is recognized as an important health problem. Both environmental and occupational noise exposure has been related to increased risk of cardiovascular disease. We examined if metabolic syndrome was associated to occupational noise exposure.

Methods Associations between quantitative measures of occupational noise exposure and metabolic syndrome were analysed with logistic regression in 411 industrial- and 154 finance and service workers selected as a random sample from 12 industries between 2009 and 2010. We used anthropometric measures and biomarkers to define metabolic syndrome as abdominal obesity and the presence of ≥ 2 of the following conditions: high blood pressure, high triglycerides, low HDL cholesterol and high HbA1c.

Results A total of 167 workers were classified with metabolic syndrome. After adjustment for potential confounders, prevalence ratios for metabolic syndrome comparing the highest to the lowest noise exposure quartiles were 2.04 (95% CI: 1.03–4.03) for cumulative occupational noise exposure. In stratified analyses, the association diminished for industrial workers and increased for finance and service workers.

Conclusion These cross-sectional findings suggest cumulative occupational noise exposure may contribute to cardiometabolic health, but results need to be confirmed with prospective data.

0-144 RISK OF MYOCARDIAL INFARCTION AMONG PIGEON BREEDERS EXPOSED TO ORGANIC DUST

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10.1136/OEM-2021-EPI.24

Introduction Anthropogenic airborne particulate matter is associated with ischemic heart disease, while little is known about particles from organic dust.

Objective Pigeon breeders are exposed to high levels of organic dust in the pigeon lofts, and the objective of this study is to investigate the association with myocardial infarction.

Methods We followed 6,256 male pigeon breeders and their 1:30 individually matched referents from 1980 or first year of

membership in the Danish Racing Pigeon Association if later, until end of study in 2013. Referents were matched on sex and year of birth and randomly drawn from the general Danish population. Information on hospital-based diagnoses, emigration, death and confounders were obtained by record linkage with Danish national registers. Subjects with a diagnosis of myocardial infarction, or chronic ischemic heart disease prior to start of follow-up were excluded. Stratified Cox regression analyses estimated the hazard ratios (HR) of myocardial infarction, adjusted for occupation and place of residence (urban/rural) at start of follow-up.

Results The incidence rate of myocardial infarction was 507 (per 100,000 person-years) among pigeon breeders and 445 among the referents. The crude hazard ratio was 1.16 (95% CI,1.06–1.26), similar after adjusting for possible confounding variables; 1.12 (95% CI,1.03–1.23).

Conclusion In this study we found an increased risk of myocardial infarction among male pigeon breeders. The excess risk is suggested to be explained by exposure to organic dust, pointing to organic dust being a part of ischemic heart disease aetiology. We partly adjusted for lifestyle factors, but the lack of individual information on ex. smoking and dietary factors is a clear limitation. Thus, findings must be interpreted with caution even if adjustment by occupation and place of residence may have reduced such potential confounding. Future research with more detailed information on organic dust exposure and lifestyle factors is warranted.

O-190 THE OCCUPATIONAL DISTRIBUTION OF METS PREVALENCE AND INCIDENCE DIFFERS BY SEX AND IS NOT EXPLAINED BY AGE AND HEALTH BEHAVIOR: RESULTS FROM 75,000 DUTCH WORKERS FROM 40 OCCUPATIONAL GROUPS

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10.1136/OEM-2021-EPI.25

Objective This study examines the association between 40 occupational groups and baseline prevalence and incidence of metabolic syndrome (MetS), separately for male and female workers, and whether age and health behaviors can explain the association.

Methods Data from 74,857 Lifelines Cohort and Biobank Study participants were used to regress occupational group membership, coded by Statistics Netherlands, on the prevalence and incidence of MetS using Logistic and Cox-regression analyses. MetS diagnosis was based on physical examinations, blood analysis, and recorded medication use. Information on age, smoking status, physical activity, diet and alcohol consumption was acquired using questionnaires.

Results MetS prevalence was 17.5% for males and 10.6% for females. In the fully adjusted models, three occupational groups were associated with increased MetS prevalence in both sexes. Three additional occupational groups were associated with MetS among men, nine among women. Strongest associations were found for male 'hospitality, retail and other service managers' (odds ratio (OR): 1.65; 95% confidence interval (CI): 1.03–2.65) and female 'stationary plant and machine operators' (OR: 3.44; 95% CI: 1.57–4.54). During a median 3.8-year follow-up, MetS incidence was 7.8% for

males and 13.2% for females. One occupational group was associated with an increased MetS risk in both sexes. Six additional occupational groups had an increased risk for MetS among men, four among women. Highest risks were found for male 'stationary plant and machine operators' (hazard ratio (HR): 1.94; 95% CI: 1.26–3.00) and female 'food preparation assistants' (HR: 1.80; 95% CI: 1.01–3.22).

Conclusion Findings indicate that occupational group matters for men and women in MetS development, and that differences in MetS prevalence across occupations are not merely a reflection of selection of metabolically unhealthy workers into specific occupations. The striking sex differences in the occupational distribution of MetS indicates that preventive measures should, with some exceptions, target men and women separately.

O-345 ASSOCIATIONS AMONG WORKING HOURS, ROTATING SHIFT WORKS, AND RISK OF CARDIOVASCULAR DISEASES IN TAIWAN: ANALYSES FROM THE NATIONAL LEVEL TO THE COMPANY LEVEL

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10.1136/OEM-2021-EPI.26

Introduction Long working hours and rotating shifts are risk factors for cardiovascular disease. National policies and corporate actions play an important role in sound working hours and shifts. Imbalanced rotation speed and working hours may double the burden of cardiovascular disease. We investigated the incidence of work-related cardiovascular disease before and after government relaxed disease recognition criteria in Taiwan. We further used a traditional manufacturing factory as an example to analyze the association between corporate health promotion activities and workers' cardiovascular disease risks.

Methods At the national level, we collected data on the number of work-related cardiovascular disease and average working hours per month before and after policy changes. At the corporate level, we collected data on shift types, working hours, health promotion activities, and 10-year risk of manifesting clinical cardiovascular disease. Our statistical analyses included applying mixed-effect models, a mediation analysis, and a generalized estimating equation.

Results The relaxation of national criteria for recognizing work-related cardiovascular disease has resulted in a 2.5-fold increase in the incidence rate. This effect was mediated by working hours. Our case study showed workers who worked 12 hours per shift had a higher risk of cardiovascular disease than those who worked 8 hours per shift. Workers who needed to rotate shifts and spent more time on each shift had a higher risk of cardiovascular disease than those who solution activities had a lower risk of cardiovascular disease.

Conclusion National policies relaxing disease recognition criteria have helped more workers received compensation. Criteria that quantitatively point out the hazard of prolonged working hours to cardiovascular disease prompt reductions in working hours at the corporate level. Our case study highlights potentially additional benefits of health promotion activities on the prevention of work-related cardiovascular disease.

COVID19-1

O-125 OCCUPATIONAL CHARACTERISTICS ASSOCIATED WITH SARS-COV-2 INFECTION IN THE UK BIOBANK DURING AUGUST-NOVEMBER 2020

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Objective Occupational exposures may play a key role in SARS-CoV-2 infection risk. We used a job-exposure matrix (JEM) linked to the UK Biobank to measure occupational characteristics and estimate associations with a positive SARS-CoV-2 test.

Methods People reporting job titles at their baseline interview at assessment centers in England were included. We excluded healthcare workers and people >65 years old by March 2020. Jobs were linked to a IEM based on the US O*NET database. For each job, O^*NET -based scores (range=1-5) were assigned for characteristics relevant for SARS-CoV-2 infection: physical proximity, exposure to diseases/infection, outdoors-exposed to weather, and outdoors-under cover. O*NET variables were used to determine whether jobs could be done remotely based on two algorithms. We evaluated SARS-CoV-2 tests occurring between August 5th and November 10th, 2020 (time when UK was not shutdown with a 5day lag added). Cox regression was used to calculate adjusted hazard ratios (aHRs) as estimates of associations with a positive SARS-CoV-2 test accounting for age, sex, race, education, deprivation, assessment center, household size, and income.

Results Our inclusion/exclusion criteria identified 115,581 people, including 1746 with a positive SARS-CoV-2 test. A onepoint increase in physical proximity score was associated with 1.12 times higher risk of a positive SARS-CoV-2 test (95% CI=1.03–1.22). A one-point increase in exposure to disease/ infections score was associated with 1.08 times higher risk of a positive SARS-CoV-2 test (95%CI=1.01–1.15). There were borderline associations between outdoors work and a positive SARS-CoV-2 test (outdoors-exposed to weather aHR=1.05, 95%CI=1.00–1.10; outdoors-under cover aHR=1.08, 95% CI=1.00–1.17). People reporting jobs that could not be done remotely had higher risk of a positive SARS-CoV-2 test regardless of the algorithm used to classify jobs (aHRs=1.16 and 1.18).

Conclusion Numerous occupational characteristics were associated with increased risk of a positive SARS-CoV-2 test even after accounting for demographic and socioeconomic differences between workers.

O-162 IMPACT OF THE COVID-19 PANDEMIC ON KEY WORKERS IN ENGLAND: FINDINGS FROM THE HEALTH AND EMPLOYMENT AFTER FIFTY (HEAF) STUDY

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Introduction In the UK, workers who were essential to maintain communications, travel, food and healthcare were deemed 'key workers'. There is scarce evidence about the effect that the pandemic had on this group of workers as compared with people who were home working, furloughed or retired.

Objectives To compare measures of health and lifestyle amongst older key workers as opposed to other older adults working or not working during the pandemic.

Methods In February 2021 participants in the Health and Employment After Fifty (HEAF) study (aged 55–73) were sent an online survey, enquiring about changes to their mental/ physical health and lifestyle during the first UK lockdown (starting late March 2020). Logistic regression was used to explore the association between being a keyworker (healthcare/not healthcare) and adverse outcomes, with adjustment for age and sex. Participants in work but not identifying themselves as key workers were used as the reference category.

Results A total of 2,040 (46%) returned a usable questionnaire and completed the question about key worker status. 281 were in work but not as key workers; 50 were key workers in healthcare; 298 were key workers not in healthcare; 1,411 were retired. Key workers were predominantly women. Key workers not in healthcare were more likely to see a worsening of mental health (OR=1.6; 95%CI 1.0 to 2.4) physical health (OR=1.5; 95%CI 1.0 to 2.3), to report that their diet was less healthy (OR=1.8; 95% CI 1.2 to 2.8) and to report eating more than pre-lockdown (OR=1.6; 95%CI 1.1 to 2.4) compared with participants in work but not as key workers. Associations were similar among key workers in healthcare, however they did not reach statistical significance.

Conclusion Being a key worker during the pandemic (especially not in healthcare) was associated with a deterioration of health and lifestyle choices.

0-222 RISK OF INPATIENT CARE WITH COVID-19 IN DIFFERENT OCCUPATIONAL GROUPS: THE ROLE OF CLOSE HUMAN CONTACTS IN THE WORK ENVIRONMENT

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10.1136/OEM-2021-EPI.29

Introduction Several cross-sectional studies indicate that occupations such as physicians, nurses, dentists, physiotherapists, bus- and taxi drivers, bartenders, waiters, chefs and shop assistants either have higher risks of dying or be tested positive due to COVID-19.

Objectives The aim of this study was to analyse if employees in occupations characterized by working close to other people and/or being more exposed to diseases or infections are treated for inpatient care due to COVID-19 more often than other employees.

Methods Survey data regarding proximity to other people and to what extent individuals are exposed to diseases and infections were retreived from https://onet.rti.org/about.cfm. Analyses werebased on a prospective cohort comprising 1 037 811 residentsin Region Stockholm March 1, 2020, 18–64 years old and having a valid occupational code. The follow-up period was nine months. Quartiles were created, based on averages for each occupation regarding these questions. Adjusting factors were age, country of birth, daily smoking, overcrowding, household size and percentages in demographic areas being test positive to COVID-19. We calculated both IRR's and SMR's.

Results During the period, 2984 individuals received inpatient care for COVID-19. Higher risks were observed in the highest exposed quartiles after adjusting for confounders. These associations were found among both sexes, in all age groups and in each 3-month calender period with IRR's ranging from 1.68 to 2.58 compared to the least exposed quartile. SMR's calculated for each occupation revealed higher risks among e.g. physicians, nurses, assistant nurses, care assistants and traffic instructors with SMR's ranging from 138 to 272.

Conclusions A strength of this study is the use of inpatient care as an outcome, and adjustment for individual confounders. The observation that the risk from close occupational contacts was not reduced over the observation period highlights the importance of further improvement of risk assessment and protective measures.

0-332 AN UMBRELLA REVIEW OF THE WORK AND HEALTH IMPACTS OF WORKING IN A PANDEMIC ENVIRONMENT

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10.1136/OEM-2021-EPI.30

Introduction The effects of the coronavirus disease 2019 (COVID-19) pandemic on work, employment and health are considerable. There is a need for actionable and targeted evidence that policy-makers, employers, workers and other stakeholders can use to ensure that work is safe and healthy not only during the COVID-19 pandemic, but also in its aftermath.

Objectives The purpose of this umbrella review is to inform evidence-based decision making and best practices for the work and health of workers during an epidemic/pandemic; and to identify research gaps to inform evidence needs for future studies and research funding priorities. We examined the evidence on the work and health impacts of working in an epidemic/pandemic environment; factors associated with these impacts; and possible risk mitigation or intervention strategies that address these factors or outcomes.

Methods We examined review articles published in MEDLINE, PsycINFO and Embase between 2000 and 2020. Data were extracted and analyzed using a narrative synthesis.

Results The search yielded 1,524 unique citations, of which 31 were included. The search yielded a large volume of reviews on mental health and infection risk to health care workers. Reviews identified a variety of individual, social, organizational and risk mitigation factors that influenced study outcomes. Equity considerations were only tangentially referenced in the included studies. Only a few reviews examined intervention strategies in the workplace, and none included long-term outcomes of exposure or work during an epidemic/ pandemic.

Conclusion Findings suggest a number of critical research and evidence gaps, including the need for reviews on occupational groups potentially exposed to or impacted by the negative work and health effects of COVID-19 in addition to health care workers, the long-term consequences of transitioning to the post-COVID-19 economy on work and health, and research with an equity or social determinants of health lens.

0-347 LOW BACK PAIN OCCURRENCE AND EVOLUTION IN DIFFERENT WORK SITUATIONS DURING COVID-19 EPIDEMIC LOCKDOWN FROM 17 MARCH TO 10 MAY 2020, IN METROPOLITAN FRANCE

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10.1136/OEM-2021-EPI.31

Introduction The work organization of most French workers was significantly modified (extended implementation of teleworking, work interruptions...) during the first mandatory lockdown set up to fight the spread of the COVID-19 pandemic, from 17 March to 10 May 2020.

Objectives The aim of the study was to estimate the effects of the changes in the work organization due to lockdown on low back pain onset and its evolution.

Methods Workers were retrospectively interviewed online during three waves of the Coviprev study (access panel in the general population) between 8 June and 8 July 2020 about their work situation during lockdown and their low back symptoms before and at the end of the lockdown.

Results The rate of low back pain onset in workers who did not have any low back symptoms prior to the lockdown (n=2,113) was 10.4% [9.1-10.7]. The work situation during the lockdown was associated with significantly increased risks of low back pain in people who began teleworking due to lockdown, and in those who continued to work outside home at a higher pace than usual (compared to working outside home as usual; odds ratio of 2.81 [1.77-4.46] and 2.76 [1.50-5.09], respectively). The work situation during lockdown was also significantly associated with the evolution of low back pain in workers who already suffered from it before the lockdown (n=1,111, 34.3% [32.7-36.0]) with an increased risk of worsening for those who worked outside the home at a higher pace than usual (odds ratio 3.39 [1.38-8.31]) and a higher probability of improvement for those who usually worked from home before the lockdown (odds ratio 1.86 [1.00-3.43]).

Conclusion While the Covid-19 epidemic and teleworking take hold, measures should be implemented in order to prevent an increase in the burden of low back pain in workers.

O-446 OCCUPATIONAL RISK FACTORS FOR SARS-COV-2 INFECTION AND COVID-19: RESULTS FROM THE COVICAT COHORT STUDY IN CATALONIA, SPAIN.

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10.1136/OEM-2021-EPI.32

Introduction During the first lockdown in Spain (March-June, 2020) essential workers may have been at increased risk of coronavirus disease 2019 (COVID-19) via occupational exposure. Results from published studies are heterogeneous.

Methods Ongoing population-based cohort studies from Catalonia were pooled to form the COVICAT study. A random sub-population donated a blood sample (May-July, 2020) for validated multiplex serology testing. Occupational analyses were restricted to working age (18–65 years). Participants responded to a web-based or telephone survey including questions on socio-demographics, pre-pandemic health, behavioural and environmental risk factors. Occupational questions covered mode of work (e.g. telework), job title, availability of personal protective equipment (PPE), and mode of commuting. Job titles were coded by an occupational hygienist to the Spanish CNO-11 and cross-walked to ISCO-08. COVID-19 cases were defined by symptoms or hospitalisation and SARS CoV-2 seropositivity based on immune responses to 15 isotype-antigen combinations (serology sub-cohort). Logistic regression models were built for type of work, job titles and job-exposure matrix (JEM), covering several dimensions and levels of SARS-CoV-2 transmission probabilities , and adjusted for age, sex, education, deprivation index, population density and survey type.

Results This analysis included 8,582 participants, of which 3,599 were tested for SARS-CoV-2 antibodies, median (SD) age 53.7 (6.3) years, 59.9% were women. The relative risk for COVID-19 for work in the usual workplace compared to telework was 1.87 (95% CI: 1.44, 2.42), and 1.44 (95% CI: 1.09, 1.90) among the serology study. The relative risk for nurses who worked in their usual workplace was 4.57 (95% CI: 3.12, 6.7). Detailed results by job title, JEM, availability of PPE and commuting mode will be presented.

Conclusions This study has several strengths, including random serology testing and individual-level exposure data. Detailed results may support extended legal definitions of COVID-19 as a recognized occupational disease.

COVID19-2

O-151 ARE HEALTHCARE WORKERS USING PERSONAL PROTECTIVE EQUIPMENT DURING THE COVID-19 PANDEMIC?

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10.1136/OEM-2021-EPI.33

Introduction Personal protective equipment (PPE) can prevent transmission of COVID-19; however, proper use requires time, experience, training and sufficient supplies of PPE.

Objective The aim of the overall study is to investigate the risk of COVID-19 among Danish healthcare workers. Here, the availability and use of PPE among the Danish healthcare workers during the pandemic is investigated.

Methods Healthcare workers employed at the Central Denmark Region (32,413) and the Capital Region of Denmark (38,807) on April 1, 2020 were invited to respond to daily questionnaires from April 24, 2020, until June 30, 2020 that addressed work tasks, contact with COVID-19 patients, use of PPE and breach of PPE. On November 17, 2020, 26,092 healthcare workers from the Central Denmark Region and on December 15, 2020, 9,664 from the Capitol Region of Denmark were invited to a second round of daily questionnaires, and were followed until April and March 30, 2021, respectively.

Results In total, 12,328 (38.0%) and 9,664 (24.4%) healthcare workers participated in the first round of the study, respectively in the Central Denmark Region and the Capital Region of Denmark. One fifth (20.3% and 20.6%) respectively), reported that they did not use the recommended PPE at least once during the study. Forgetfulness (26.1% and 27.3%, respectively) and time constrains (23.1% and 21.1%, respectively) were the primary causes for not using the recommended PPE. At the time of the conference, data from the second round of questionnaires (response rates of 26.1% and 41.6%, respectively, corresponding to 6,816 and 3,959 participants respectively) will also be available for presentation.

Conclusion One fifth of Danish healthcare workers have been in a situation where PPE was recommended but not used. Time constrains and forgetfulness are important reasons for this. Healthcare workers not wearing the recommended PPE increases the risk of the healthcare workers becoming infected with COVID-19, and is harmful to the performance of the healthcare system.

0-168 COVID-19 INFECTION AND MENTAL WELLNESS IN A CANADIAN COHORT STUDY OF HEALTHCARE WORKERS

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10.1136/OEM-2021-EPI.34

Introduction Healthcare workers (HCW) working through the pandemic are in the front line for infection, psychological pressure and overwork.

Objectives To identify modifiable work factors associated with COVID-19 infection and mental distress, and to assess the effectiveness of provisions to mitigate their impact.

Methods A cohort study of HCWs was set up in the first weeks of the pandemic in Canada. HCWs from British Columbia, Alberta, Ontario, and Quebec completed an online questionnaire in the spring/summer of 2020, and a Phase 2 questionnaire from October 2020. They also provided a blood sample to assess SARS-CoV-2 antibodies. HCWs reporting a COVID-19 infection after the Phase 2 questionnaire were matched on job-type and province to 4 referents for a nested case-referent (C-R) study concentrating on exposures immediately prior to infection. Phase 3 is underway, with a final contact planned for March 2022.

Results 5135 HCWs completed the Phase 1 questionnaire with 93% (4539/4857) of those eligible completing Phase 2. By March 1st 2021, 157 cases had been confirmed by PCR and a further 10 found positive only on antibody testing (an overall rate of 3.3%). The odds of infection doubled for working one-on-one with known COVID-19 patients. Rates were lower in physicians and nurses, compared to personal support workers, health care aides, and licensed practical nurses. HCWs in a hospital setting had lower rates than those working in the community, where shortages of personal protective equipment were more widespread. High rates of anxiety (on the Hospital Anxiety and Depression Scale) were recorded in both Phase 1 and 2. Only 1 in 4 HCW had used available mental health supports. By May 2021, 100 cases with 389 referents had been recruited to the on-going C-R study.

Conclusion Information collected prospectively has the potential to improve HCWs protection during this and future epidemics. ¹Priscilla Ming Yi Lee, Shelly Lap-ah TSE, Dongming Wang, Yan Li, Wang Shoulin, Lau Janice Ying Chui, Shuyuan Yang, Tangchun Wu, Hongbing Shen, Xiaoming Ji, Weihong Chen. ¹The Chinese University of Hong Kong, Hong Kong

10.1136/OEM-2021-EPI.35

Introduction Workers who frequently contact to public or provide close-contact service may have higher anxiety and depression levels, as they may be worried about getting infected with the coronavirus at work.

Objectives To examine the association of perceived risk of COVID-19 at work (including contact with people and close contact to public) with anxiety and depression levels among non-healthcare worker, taking perceived effectiveness of company's preventive measures into account.

Methods This is a multi-city cross-sectional study in Hong Kong, Nanjing and Wuhan. We recruited 7391 non-healthcare workers who were aged>18 during 07/2020-04/2021. We used standardized questionnaire to collect sociodemographic, job-related information and their satisfaction of effectiveness of company's preventive measures. Participants' frequency of contact and close contact to public were collected and classified into occasionally, sometimes and often, and their anxiety and depression levels were measured using DASS-21. We performed multinomial logistic regression models to examine the association of frequency of contact and close contact to public with anxiety and depression levels. Path models were developed to analyze the potential modification of perceived effectiveness of company's preventive measures on these associations.

Results Compared with workers with occasional contact to population, workers with sometimes contact were associated with severe anxiety (AOR=1.59, 95%CI=1.27–1.99). The AOR for workers with often close contact to public compared with no contact were 1.53 (95%CI= 1.25–1.87) for severe anxiety, and 1.43 (95%CI=1.14–1.79) for severe depression. Additionally, according to path analysis, the indirect path between contact or close contact to public and anxiety/depression were modified by perceived effectiveness of company's preventive measures.

Conclusion Workers with frequent contact with people or close contact to public was associated with worse anxiety and depressive symptoms. Companies should consider effective and sustainable measures in mitigating the risk and thereby reducing employees' anxiety and depression levels during the COVID-19 pandemic.

0-369 SARS-COV-2 ANTIBODY SEROPREVALENCE AMONG FIREFIGHTERS IN ORANGE COUNTY, CALIFORNIA

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Introduction Firefighters play a vital role in Orange County (OC) California (CA) communities by assisting in emergencies, providing emergency medical treatment, and transporting ill or injured individuals, in addition to performing traditional firefighting duties. Antibody testing can be a useful tool in understanding seroprevalence within an occupational cohort by detecting past immune response.

Objectives We conducted serological SARS-CoV-2 antibody testing from October-November 2020 to estimate the SARS-CoV-2 seroprevalence among firefighters/paramedics in Orange County.

Methods OC firefighters employed at the time of the surveillance activity were invited to participate in a voluntary survey that collected demographic, occupational, and previous COVID-19 testing data, and a SARS-CoV-2 immunoglobulin (Ig)G antibody blood test. We collected venous blood samples using mobile phlebotomy teams that traveled to individual fire stations, in coordination with an annual tuberculosis testing campaign for firefighters employed by OC Fire Authority (OCFA), and independently for firefighters employed by cities. We estimated seroprevalence and assessed several potential predictors of seropositivity.

Results The seroprevalence was 5.3% among 923 OCFA personnel tested, with 92.2% participating. Among firefighters self-reporting a previous positive COVID-19 test result, twenty-one (37%) were no longer positive. There were no statistically significant differences in demographic characteristics between cases and non-cases. Work city was a significant predictor of case status (p=0.015). Seroprevalence (4.8%) was similar when aggregated across seven city fire departments (42–65% participation). In total, 1,486 OC fire personnel were tested.

Conclusion Using a strong serosurvey design and large firefighter cohort, we observed a SARS-CoV-2 IgG seroprevalence of 5.3%. The seroprevalence among OC firefighters in October 2020 was lower than the general county population estimated seroprevalence (11.5%) in August. The difference may be due in part to safety measures taken by OC fire departments at the start of the pandemic, as well as differences in antibody test methods and/or duration of antibody response.

0-481 COVID-19 INFECTION AMONG HEALTHCARE WORKERS AT MALAYSIA HOSPITALS

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10.1136/OEM-2021-EPI.37

Introduction Healthcare workers are at a substantially increased risk of being infected by COVID-19 patients. However, risk of being infected is depending on the critical phase of the pandemic, patients with COVID-19 might not be the absolute source of infection. Health workers could also be exposed to infected colleagues, infected family members, lives in communities of active transmission, or infected contacts during crowded events such as wedding reception and religious gathering.

Objectives To explore the epidemiology data of COVID-19 infection among health care workers at Malaysia Hospitals especially on patterns of transmission and characteristics.

Methods A cross-sectional surveillance study among infected COVID-19 healthcare workers working at Malaysia government hospitals.

Results 1608 healthcare staffs at hospitals have been notified with COVID-19 infection in year 2020. By proportion,

nursing occupation contribute up to 40.5%, followed by medical doctor (20.8%), healthcare assistant (9.7%), medical doctor assistant (9.1%), medical specialist (3.2%) and hospital administrative assistant (2.8%). Most of cases were reported from Sabah (39.8%), Selangor (27.5%), Wilayah Persekutuan Kuala Lumpur & Putrajaya (6.7%), Sarawak (6.0%), Perak (5.6%) and Johor (4.7%). By gender, seven out of ten infected healthcare staffs were female and majority of them have no comorbidity (87%). In addition, rate of COVID-19 infection among healthcare workers was proportionately increased with rate of COVID-19 infection among community. Investigation by health authorities found 43.2% of COVID-19 infection cause by community, 36.3% occurred between staff to staff and 17% occurred between patients to staff.

Conclusion Preponderance of infection has occurred within hospital environment. Occupational Safety and Health Unit should set up a good engagement with healthcare staff and effective strategies to protect and support the health, safety and wellbeing of staff through deep-rooted assessment of standard practice procedure especially in nursing and care activities. Digital contact tracing could improve contact tracing within hospital setting.

Disease Surveillance

0-24 LUNG AND BLADDER CANCER SURVEILLANCE AMONG CONSTRUCTION WORKERS IN DIESEL ENGINE EXHAUST EXPOSED OCCUPATIONS IN ONTARIO, CANADA

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10.1136/OEM-2021-EPI.38

Introduction Diesel engine exhaust (DEE) is a lung and bladder carcinogen and one of the most common carcinogenic exposures in Canada with over 900,000 Canadians exposed at work, according to CAREX Canada. Construction workers are an understudied group despite suspected high DEE exposure; most research on DEE has been conducted in transportation and mining industries.

Objectives This study estimates incidence rates for lung and bladder cancer in construction occupations with probable DEE exposure using the Occupational Disease Surveillance System (ODSS).

Methods The ODSS includes ~2.2 million Ontario workers identified through workers' compensation claims (1983–2014). Workers were followed for cancer diagnoses through linkage with the Ontario Cancer Registry (1964–2016). DEE-exposed construction occupations were identified using Canadian Classification Dictionary of Occupation code descriptions. Coxproportional hazards models were used to estimate hazard ratios (HR) and 95% confidence intervals (CI), adjusted for age, birth year, and sex.

Results We identified 3980 lung and 1566 bladder cases among construction trades occupations. Compared to all other ODSS workers, construction trades occupations had small elevations in lung (HR=1.08, 95% CI 1.05–1.12) and bladder cancer rates (HR=1.08, 1.03–1.14). For workers in excavating, grading, paving, and related occupations, a group expected to have high DEE exposure, positive lung cancer rates were observed overall (HR=1.37, 1.25–1.49), among foremen/forewomen (HR=1.35, 1.04–1.77), excavating and grading occupations (HR=1.37, 1.18–1.58), labourers (HR=1.55, 1.29–1.86), and non-specified excavating/grading/ paving occupations (HR=1.35, 1.15–1.59). Non-significant positive rates of bladder cancer were also observed overall (HR=1.08, 0.93–1.26), among excavating and grading workers (HR=1.13, 0.88–1.45), and non-specified excavating/graving/ paving occupations (HR=1.29, 1.00–1.68).

Conclusion These results identify construction groups with high cancer risk, including excavating and grading occupations, potentially due to DEE exposure, though co-exposure to other carcinogens (e.g. silica) is possible. Targeted prevention resources could reduce exposure and subsequently occupational cancer risk, but would benefit from more detailed DEE exposure information.

0-32 THE VALUE OF PLAIN CHEST RADIOGRAPH AS A DIAGNOSTIC TOOL FOR TB RELATIVE TO GENEXPERT AMONG EX-GOLD MINERS IN LESOTHO

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Background The World Health Organisation and many national guidelines for TB management recommend treatment initiation in the presence of symptoms such as cough, weight loss, night sweats and or fever, and radiological changes suggestive of TB with or without bacteriological confirmation. However, none of the studies that investigated the value of plain chest radiograph (CXR) has been done in the Southern African ex-gold miner population. Given the characteristics of this population - a high prevalence of silicosis, past TB and recurrent TB and post-TB lung destruction -application of the above recommendation may lead to unnecessary TB treatment. **Objectives** To assess the performance of the screening CXR in the diagnosis of active TB disease among former gold miners from the South African mines using GeneXpert as the reference standard.

Methods We analysed the medical history information, CXR, and GeneXpert test results in a group of ex-miners examined between 2017 and 2018 at Mafeteng Occupational Health Service Centre (OHSC), Lesotho. We excluded those on TB treatment and those within twelve months of TB-treatment completion at the time of the visit. CXRs were read by a medical doctor with training and experience in the reading of pneumoconiosis and TB. A set of 300 of the CXRs were cross-read by two occupational medicine specialists with mining medicine experience, with 80–90% agreement with clinic readings.

Results We analysed information on 2572 subjects. The prevalence of active TB on GeneXpert was 3%, with CXR sensitivity 0.97, specificity 0.41, positive predictive value 0.05, and negative predictive value 0.99.

Conclusion A CXR negative for TB is a valuable tool in ruling out active TB disease among ex-gold miners. However, its poor predictive value, given the high background prevalence of silicosis and previous TB in this population, makes bacteriological confirmation necessary before initiating TB treatment in ex-gold miners.

0-72 HOW TO PREDICT OBSTRUCTIVE SLEEP APNOEA IN PROFESSIONAL DRIVERS?

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10.1136/OEM-2021-EPI.40

Objective Developing better tools to screen obstructive sleep apnea (OSA) in professional drivers is fundamental in occupational health services, given the serious consequences this condition can have on their safety.

Methods 1928 professional drivers were screened for OSA for three years using Berlin and Epworth questionnaires. 10.3% were suspected to be positive for OSA and send for polysomnography tests. We had a return of 39 data. We analysed the results with the MAP index because it has shown a high sensitivity and specificity in studies on professional drivers. The MAP index is easy to use and combines selfreported apnea symptoms (snoring and cessation of breathing) as well as objective data like age, sex, and body mass index (BMI). As the apnoea symptoms regarding snoring and observed apnoea are often not properly reported, we included the questions of the Berlin questionnaire about tiredness in order to improve the predictability and calculated a MAP2. To determine diagnostic test accuracy, we calculated both MAP indexes with apnea-hypopnea index (AHI) criteria already published in articles. Sensitivity, specificity, negative and positive predictive values (NPV, PPV) and area under curve (AUC) for receiver operating characteristic (ROC) were analysed. Predictive utility of both indexes was examined by characteristic variables, age (< 50 or > 50years) and BMI ($< 30 \text{ or} > 30 \text{ kg/m}^2$).

Results Employing the MAP_index1 for OSA, the sensitivity obtained was 63.3% and specificity was 41.2%. The PPV was 58.3% and NPV was 46.7%. The AUC was 0.524 (95% CI 0.339–0.709). The accuracy was higher in younger versus older drivers (AUC 0.701 versus 0.620). Sensitivity for Map index2 was 59.1% and specificity was 52.9%. The PPV was 61.9% and the NPV was 50.0%. The AUC was 0.560 (95% CI 0.376–0.744).

Conclusions The MAP 2 was had lower sensitivity but higher specificity. It cannot be considered as a better tool to predict obstructive sleep apnoea.

O-254 TEMPORAL TREND AND SPATIAL PATTERN OF MORTALITY FOR MALIGNANT PLEURAL MESOTHELIOMA IN TAIWAN DURING 1975–2019

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10.1136/OEM-2021-EPI.41

Introduction Malignant pleural mesothelioma (MPM) is a rare but aggressive malignancy associated with asbestos exposure for more than 80% of cases. The average latency of MPM is twenty to forty years. The history of asbestos use in Taiwan showed the massive importation during 1960–1980, but was under control by legislation since 1989, and was totally banned by legislation since 2018. **Objective** The aim of study is to investigate the temporal trend and spatial pattern of mortality for malignant pleural mesothelioma in Taiwan during recent decades.

Method The standardized rates of mortality for MPM (ICD-9: 163, ICD-10: C45.0 & C45.9) in Taiwan were computed at national and regional levels during 1975–2019; the sex ratios of male to female deaths for MPM were also computed at regional level.

Result The trend of national mortality for MPM in Taiwan is still increasing in twenty to thirty years after the asbestos control, especially among male population; the pattern of regional mortality for MPM reflects the distribution of the asbestos-related industrial settlements in the country.

Conclusion In adequate response to the epidemic of asbestosrelated diseases, it is necessary to implement a national comprehensive program for the surveillance, diagnosis, and treatment healthcare to protect workers and community people.

0-284 ENHANCING OCCUPATIONAL DISEASE SURVEILLANCE USING A JOB EXPOSURE MATRIX

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10.1136/OEM-2021-EPI.42

Introduction Surveillance is useful for identifying occupations and industries at high risk of disease. However, less is known about workers' risks from exposure to specific occupational hazards.

Objectives Apply a job-exposure matrix to occupational disease risk estimates to enhance surveillance efforts.

Methods The Occupational Disease Surveillance System (ODSS) uses Cox proportional hazards models to derive health risks for 30+ health outcomes. The Canadian job-exposure matrix (CANJEM) is a general population JEM that provides exposure data on over 250 hazards by occupation and industry. Exposure data for prevalence, intensity (non-exposed, low, medium, high), and duration of exposure (proportion of workweek exposed) were extracted. Hazard ratios (HRs) for silicosis and lung cancer from the ODSS were linked to silica exposure metrics from CANJEM by occupation (4-digit Canadian Classification and Dictionary of Occupations) and industry (3-digit 1970 Standard Industrial Classification).

Results There were 163 occupations and 141 industries exposed to silica according to CANJEM. Among occupations with >5 cases and \geq 50% prevalence, the mean HRs were 18.33 (range: 16.5–19.7) and 1.25 (0.77–1.87) for silicosis and lung cancer respectively. Similar results were seen with occupations with \geq medium intensity, and \geq 25% duration of exposure. Occupations with both \geq 50% prevalence and \geq medium intensity had mean HRs 18.33 (16.5–19.7) and 1.44 (1.16–1.87) for silicosis and lung cancer respectively. Industry results had similar distributions for lung cancer HRs, and lower mean HRs for silicosis (at \geq 50% prevalence HR: 8.57, range: 1.48–19.3).

Conclusion Using silica, we demonstrated that incorporating exposure information can help to identify and quantify workers' exposure risk. Incorporating multiple exposure metrics improved detection of high-risk groups although is less sensitive. Understanding the role of exposure on health risk may allow prevention strategies to be implemented more pragmatically.

Exposure Assessment

0-94 DEVELOPMENT OF TASK-SPECIFIC ENDOTOXIN CONCENTRATIONS FOR AGRICULTURAL ACTIVITIES USING META-REGRESSION OF PUBLISHED DATA

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10.1136/OEM-2021-EPI.43

Introduction Endotoxin has been hypothesized to partly account for the observed deficit of lung cancer in farmers; however, most epidemiologic studies have relied on surrogate metrics, such as number of animals.

Objective To obtain task-specific estimates of endotoxin exposure for agricultural tasks using meta-regression models of published data.

Methods We extracted the geometric means (GM, in EU/m3) and geometric standard deviations (GSD) of endotoxin measures for various farming activities from 43 published studies (1989-2018). We linked each measure to an activity within the questionnaire used in the Biomarkers of Exposure and Effect in Agriculture Study. When necessary, we calculated the GM and GSD from other available measures. We used mixed-effects meta-regression models with the weighted log-transformed GM as the dependent measure, task as the independent measure, and summary statistic identifier as a random effect to account for between-study heterogeneity. We grouped the tasks into three categories (crop, animal, stored seed/grain), and analyzed each category separately. We conducted sensitivity analyses by restricting data to only North America, only task-based, and only inhalable fraction.

Results We extracted 30 crop, 90 livestock, and 10 seed/grainrelated summary statistics. Among animal tasks, most had predicted GMs above 1000 EU/m3, including work in poultry confinement (GM=1470 EU/m3), cleaning poultry confinements (1470), grinding feed (1410), work in swine confinement (1310), cleaning swine confinement (1270), feeding swine (1070), and veterinarian services (1030). Among crop tasks, predicted GMs were below 100 EU/m3, including harvesting corn/grains (30), hauling grain (60), and mowing (80). For stored seed/grain tasks, the predicted GM of cleaning grain bins was 1130 EU/m3 and other work with stored grains/seeds was 230 EU/m3.

Conclusion Our characterization of task-specific endotoxin concentrations can be used in conjunction with questionnaire responses on agricultural activities, including task duration, to improve future endotoxin assessments in epidemiologic studies.

0-122 DETERMINANTS OF TASK-BASED EXPOSURES TO ALPHA-DIKETONES IN COFFEE ROASTING AND PACKAGING FACILITIES

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10.1136/OEM-2021-EPI.44

Introduction Coffee production is a global industry and is estimated to increase by 15.4 million lbs in 2021. Coffee

production workers can be exposed to inhalational hazards such as diacetyl and 2,3-pentanedione, which are associated with the development of occupational respiratory disease, including obliterative bronchiolitis, a rare and irreversible lung disease.

Objective Identify determinants contributing to task-based exposures to alpha-diketones, specifically diacetyl and 2,3-pentanedione, at 17 U.S. coffee roasting and packaging facilities.

Methods We collected 606 personal task samples including roasting (n=189), grinding (n=74), packaging (n=203), quality control (n=44), flavoring (n=15), and miscellaneous production/café (n=81). Samples were collected and analyzed according to the modified OSHA Method 1013/1016. Information on sample-level and process-level factors relating to production scale, sources of alpha-diketones, and engineering controls was collected during surveys. Bayesian mixed-effect regression models accounting for censored data were fit for overall data and specific tasks including roasting, grinding, packaging, quality control, and flavoring. Significant determinants were used in multiple regression models using variable selection or model averaging Bayesian methods.

Results Task-based sample durations ranged from 2–86 minutes. Total number of alpha-diketone sources, sum of all open storage sources, average roasted coffee production per day, average percent of production as ground coffee, flavoring during survey, and number of grinders all resulted in increased exposures for at least one task category. General exhaust ventilation (GEV) with natural ventilation, supply air turned on, and GEV turned on resulted in lowered exposures for at least one task category.

Conclusions GEV and supply air turned on and natural ventilation were identified in most models as determinants which reduced exposures. Open storage of roasted coffee and flavoring during survey were significant in most models contributing to higher task exposures and can be targeted for exposure mitigation to reduce short-term and full-shift exposures and minimize risks for respiratory disease.

O-137 ASSESSMENT OF MULTIPLE EXPOSURES TO CHEMICAL AGENTS IN FRENCH WORKPLACES: FINDINGS FROM TWO EXPOSURE DATABASES

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10.1136/OEM-2021-EPI.45

Background National surveys of the French working population estimate that approximately 15% of all workers are exposed to at least three different chemical agents at work. However, the most prevalent coexposure situations and their associated health risks remain relatively understudied.

Objective To characterize occupational coexposure situations in France using available data from two occupational exposure databases.

Methods We extracted personal measurement data from the Colchic and Scola databases for the period 2010–2019. We selected 118 chemical agents that had \geq 100 measurements with detected concentrations, including 31 carcinogens (IARC groups 1, 2A, and 2B). We grouped measurements by work situation (WS, combination of sector, occupation, task, and

year). We characterized the mixtures across WS using frequent itemset mining methods.

Results We retained 275,213 samples from 32,670 WS, encompassing 4,692 unique mixtures. Workers in thirty-two percent of all WS were exposed to >2 agents (median 3 agents/WS, interquartile interval 2-5) and 13% of all WS contained ≥ 2 carcinogens (median 2 carcinogens/WS, maximum 14). The most frequent coexposures across all agents were ethylbenzene-xylene (1,550 WS), quartz-cristobalite (1,417 WS), and toluene-xylene (1,305 WS). Prevalent combinations of carcinogens also included hexavalent chromiumlead (368 WS) and benzene-ethylbenzene (314 WS). Agents with the lowest proportions of coexposure were wood dust (6% of WS exposed to at least one other agent) and asbestos (8%). Tasks with the highest proportions of coexposure to carcinogens include electric arc welding (37% of WS with coexposure), polymerization and distillation (34%), construction drilling and excavating (34%), and water collection and treatment (32%).

Conclusion Coexposure to multiple chemical agents, including carcinogens, was highly prevalent in the databases, and should be taken into account when assessing exposure risks in the workplace. However, these databases do not necessarily represent a random sample of the working population, thereby limiting the generalizability of our findings.

O-156 PESTICIDE EXPOSURE IN FRUIT GROWERS: COMPARISON OF LEVELS AND DETERMINANTS FROM THE CANEPA FIELD STUDY AND FROM THE 'AGRICULTURAL OPERATOR EXPOSURE MODEL' (AOEM) PREDICTIONS

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10.1136/OEM-2021-EPI.46

Introduction Pesticide exposures increase the risk of chronic diseases in farmers. Knowledge of exposure levels are needed for epidemiological studies and for regulation. In pesticide registration process, operator's exposure is predicted by the AOEM, set up in 2014 by the European Food Safety Authority, based on thirty studies conducted by the pesticide industry. To date, we are not aware of any field study comparing predicted data with those measured under real working conditions.

Objective We aimed to compare operators' exposures during treatment days in apple-growing under non-controlled conditions of work and values predicted by AOEM.

Methods Thirty apple growers from the French CANEPA study, were observed applying two fungicides (captan/dithianon) in 2016–2017. Dermal exposure was measured by body patches and cotton gloves. Detailed parameters about the farm, operator, application day, spraying equipment and personal protective equipment (PPE) used were recorded. For each observation, the corresponding exposure was calculated by the AOEM, using these parameters. The relationship between measured and calculated exposures was studied by linear regression.

Results Significant linear correlation was observed between calculated and measured daily exposures. Overall, the model overestimated daily exposure and exposure during application. However exposure was underestimated at mixing/loading in many observations, especially when the operator wore long working clothes or gloves.

Conclusion The AOEM model did not appear conservative in the sense that it did not overestimate exposures in all circumstances. More specifically: 1) the overestimation at spraying appeared a consequence of the overestimation of daily treated area, 2) the protection provided by PPE appeared overestimated, 3) mixing/loading exposure, a phase in which operators are exposed to concentrated products, appeared underestimated. These discrepancies could be due to optimal working conditions (larger farms, newer equipment) under which industries' studies are conducted that are not representative of operators' actual working conditions in fruit growing.

0-185 ASSESSING OCCUPATIONAL AND ENVIRONMENTAL DEPLOYMENT-RELATED MILITARY EXPOSURE AMONG U.S. VETERANS

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10.1136/OEM-2021-EPI.47

Introduction Twenty-first century occupational and environmental (OE) exposures arising from military service encompass combustion byproducts, particulate matter, and traditional job exposures.

Rationale Multiple potentially collinear exposures can require data reduction to facilitate epidemiological analyses. Our data provided an opportunity to characterize relationships among a range of interrelated exposures.

Methods We analyzed interim data from the Veterans Affairs 'CSP #595: Service and Health Among Deployed Veterans' study. As of May 2020, survey responses were available from 1962 randomly selected Veterans with one or more deployments to Afghanistan, Iraq, or elsewhere in southwest Asia between 2001 and 2017. The interviewer-administered questionnaire yielded 3-level responses to 32 OE deployment-associated exposures included in this analysis. We identified a priori six anticipated exposure factors: burn pit (4 items); other open combustion sources (5 items); combustion engine byproducts (5 items); mechanically generated dust/dust storms (4 items); occupational vapors, gas, dust, and fumes (VGDF; 11 items); and other toxicants (3 items). We used confirmatory factor analysis (CFA) to assess construct validity of these groupings.

Results In preliminary CFA, two of six groupings that were highly collinear (combustion engine byproducts/mechanically generated dust) required combination for model viability. The resulting 5 factor model performed adequately (incremental or Comparative Fit Index [CFI]= 0.945). After excluding 4 of 32 items with lower factor loadings (0.50 for 28 3-level items on five factors.

Conclusion These findings provide a basis for item reduction in an expansive survey battery of exposure items addressing occupational and environmental military exposures. We identified 28 items (three response levels) comprising five distinct factors. These results suggest that among previously deployed Veterans, multiple OE exposures can be simplified to exposure-related factors as part of assessing health effects.

0-262 IMPACT OF OCCUPATIONAL PESTICIDE EXPOSURE ASSESSMENT METHODS ON RISK ESTIMATES FOR PROSTATE CANCER, NON-HODGKIN'S LYMPHOMA AND PARKINSON'S DISEASE – RESULTS OF THREE META-ANALYSES

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Introduction Assessment of occupational pesticide exposure in epidemiological studies of chronic diseases is particularly challenging. Biomonitoring of current pesticide levels might not correlate with past exposure relevant to disease etiology, and indirect methods often rely on workers' imperfect recall of exposures, or workers' job titles.

Objectives

Within the IMPRESS project (www impress-project.org) we investigated how exposure assessment method (EAM) type for assessing occupational pesticide exposure influenced risk estimates for some chronic diseases.

Methods In three meta-analyses the influence of type of EAM on the pooled risk of prostate cancer (25 articles), Non-Hodgkin's lymphoma (NHL) (29 articles), and Parkinson's disease (PD) (34 articles) was investigated using subgroup analyses by type of EAM. Data were mainly obtained from a previous systematic review conducted by the authors. Categories of EAM types used were: group-level assessments (e.g. job titles), self-reported exposures, expert-level assessments (e.g. job-exposure matrices), and biomonitoring. Further sub-group analyses were made by study design and publication year.

Results EAM types were not associated with statistically significantly different pooled risk estimates regarding any health outcome. However, for all health outcomes, case-control studies showed consistently higher risk estimates when expert-level assessments were used compared with self-reports. Overall, case-control designs showed higher risk estimates than cohort designs. Cancer studies showed higher risk estimates in later publications, whereas PD studies showed higher risk estimates in earlier publications.

Conclusion Overall, EAM type in studies of occupational pesticide exposure appears not to affect risk estimates of prostate cancer, NHL, and PD. Nevertheless, in case-control settings self-reported exposures might yield lower risk estimates than expert-based methods, possibly resulting from a higher degree of exposure misclassification due to workers imperfect recall of exposures. In systematic reviews of health effects of occupational exposure to pesticides, study design, year of publication, and exposure assessment method(s) should be taken into account.

Exposure Assessment: Dusts, fibers and metals

0-23 ASBESTOS EXPOSURE IN WASTEWATER COLLECTION AND TREATMENT WORKERS: A LITERATURE REVIEW AND ANALYSIS OF FRENCH EXPOSURE DATABASES

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Introduction Releases from asbestos abatement activities, asbestos-cement pipes and natural sources may contaminate wastewater with asbestos fibres. However, asbestos exposures in wastewater collection and treatment (WCT) workers are insufficiently characterized.

Objective To identify workers at risk of asbestos exposure in the WCT sector in France.

Methods We conducted a search of the international literature to identify sources of asbestos exposure and risks of asbestos-related diseases in WCT workers. We also extracted measurements from occupations related to WCT activities contained in two large French administrative databases of workplace measurements (Colchic and Scola) collected since 1987.

Results Studies conducted in the United States in the 1990s showed detectable concentrations of asbestos fibres in sewage sludge from several cities, with residual concentrations varying between disposal methods (e.g., incineration, composting). We identified six cohort studies of sewer workers and/or treatment plant operators. Five studies reported non-significant increases of respiratory cancer incidence or mortality, and one study of French sewer workers showed increased mortality from mesothelioma. Analyses of the two databases provided 2886 measurements from 13 occupations and collected from 2003 to 2020, with 58% below the limit of detection. Ninety-fifth percentiles of asbestos concentrations by occupation were 22 f/L for sewer workers (n=135), 148 f/L for sanitary systems control technicians (n=36), and ranged between 185 to 520 f/L for pipe laying, installing, or removal occupations. Sewer cleaners (n=12) and sewer workers supervisors (n=24) had no detectable concentrations of asbestos fibres.

Conclusion The available literature and the reported presence of fibres in sewage sludge suggest that WCT workers are potentially exposed to asbestos at various endpoints of the wastewater collection and treatment process. While asbestos exposure levels for most workers are likely to be low, a detailed risk assessment was not possible because of a lack of quantitative measurement data.

0-27 SILICA EXPOSURE ESTIMATES IN ARTIFICIAL STONE BENCHTOP FABRICATION AND ADVERSE RESPIRATORY OUTCOMES

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Introduction Silicosis is being increasingly reported among young stonemasons in the artificial stone (AS) benchtop fabrication and installation industry.

Objectives To identify metrics of exposure that predict risk of work-related respiratory ill-health among these stonemasons.

Methods Respiratory health screening which included a job and exposure history, a chest x-ray (CXR), a respiratory health questionnaire and gas transfer testing, were offered to stonemasons in Victoria Australia.

Results Workers typically reported a variety of tasks, including cleaning and labouring, which made exposure assessment complex. We estimated the relative respirable crystalline silica exposure intensity of each job from the proportion of time using AS and doing dry work (work without water suppression). The average intensity of exposure for up to five jobs was calculated. Cumulative exposure was calculated as the sum of the work duration multiplied by intensity for each job. Stone bench installers and factory machinists (other than CNC operators) were the most likely to report dry work with AS, and so had a greater average intensity of exposure. Exposure intensity and cumulative exposure were associated with increased odds of an ILO CXR category of >1 and with dyspnoea. Exposure duration was also associated with increasing ILO CXR profusion category. In multivariate analyses of health outcomes, only job type was associated with the ILO category. For both most recent and longest duration job type, factory machinists were more likely to have a CXR ILO category ≥ 1 than the lowest-exposed job group.

Conclusions This suggests that intensity of exposure estimated from the proportion of time dry cutting and proportion of time working on AS can predict risk of adverse respiratory outcomes for workers in this industry.

O-64 ASSOCIATIONS OF CUMULATIVE, ALVEOLAR AND PLASMA INDIUM WITH RESPIRATORY HEALTH OUTCOMES AT AN INDIUM-TIN OXIDE MANUFACTURING FACILITY

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Introduction Previous epidemiologic studies have reported associations between respiratory symptoms, lung function, and biomarkers of lung disease and indices of cumulative exposure and plasma indium in indium-exposed workers. Indices of exposure at a location more proximal to the dose at target tissue might provide more precise and accurate estimates of dose-response relationships. The objective of this study was to compare exposure-response relationships for respiratory health outcomes with indices of cumulative exposure, alveolar indium, and plasma indium.

Methods In a study of 110 indium-tin oxide manufacturing workers, indium exposures, plasma indium, respiratory symptoms, lung function, and serum biomarkers of lung disease were measured during two surveys. Cumulative exposure was calculated by multiplying current exposures with time spent in jobs and summed across all jobs. The International Commission on Radiological Protection's Human Respiratory Tract Model was used to calculate the mass of indium remaining in the alveolar compartment after accounting for initial deposition, particle characteristics, and mechanical and dissolution clearances. Relationships between exposure indices and health outcomes were evaluated using generalized linear mixed models with subject as a random factor and adjusted for smoking status and age. Models were compared using a ratio of the regression coefficient to its standard error, a measure of precision, and the Akaike Information Criterion (AIC), a relative measure of model fit.

Results The alveolar dose metric correlated well with cumulative exposure (rsp = 0.876) and plasma indium (rsp = 0.726). All three exposure indices were associated with respiratory symptoms, lung function, and serum biomarkers, but alveolar dose identified additional significant or borderline significant associations not present for cumulative or plasma indium. Alveolar dose often had the highest precision for the effect estimate and lowest AIC.

Conclusion The alveolar dose metric performed better than cumulative exposure and plasma indium despite the high correlation, demonstrating that dose-based metrics can improve exposure-response modeling.

0-317 CURRENT RESPIRABLE CONCENTRATIONS OF QUARTZ ACROSS OCCUPATIONS IN DENMARK

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Introduction High airborne concentrations of respirable quartz have been reported from workers in construction, foundries, and quarries. Current exposure levels in prevalent but presumably lower exposed jobs have been less examined.

Objectives To quantify the current exposure concentrations of respirable dust and quartz across prevalent occupations with expected moderate to high levels of exposure in Denmark. A second aim was to identify determinants of respirable quartz exposure across occupations.

Methods 189 full-shift personal samples of respirable dust within 11 occupations were sampled and analysed for quartz content with infrared spectrometry. Determinants for respirable quartz like use of tool and location of worksite were analysed in mixed linear effect models.

Results The overall geometric means (geometric standard deviation) for respirable dust and quartz were 220 μ g/m3 (4.19) and 16 μ g/m3 (4.07), respectively. The highest quartz concentrations were observed among stone cutters and carvers (93 μ g/m3 (3.47)), and metal melters and casters (61 μ g/m3 (1.71)). Use of power tools increased exposure concentrations by a factor of 3.5. Of the total variance, variability between jobs explained 27%, variability between companies within jobs explained 29%, and variability between workers within a job within a company explained 14%. 30% of the total variance was explained by day-to-day variability.

Conclusion A number of jobs in this study had average exposure levels to respirable quartz above 50 μ g/m3. Use of power tools were the main determinant. Preventive measures to lower excess risk of lung cancer among these workers are still needed.

O-462 ASSESSMENT OF OVEREXPOSURE TO MULTIPLE METALS IN ELECTRONIC RECYCLING FACILITIES: USING AIR SAMPLES AND BIOMARKERS TO HIGHLIGHT POTENTIAL TOXICITY

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Objective To estimate potential toxicity risks associated with exposure to several metals in electronic waste recycling (erecycling) facilities in Quebec.

Methods In a cross-sectional study, personal air samples were collected on cellulose ester filters from six e-recycling facilities, during an 8-hour work day for 85 workers (66 men, 19 women). Twelve metals were analyzed by inductively coupled plasma mass spectrometry (ICP-MS). End-of-shift blood and urine spot samples were taken; blood cadmium and urinary arsenic were also analyzed by ICP-MS, and blood lead and urinary mercury by atomic absorption spectrometry. Additive hazard indices (HIs) were calculated for organ-specific toxic effects, by adding the ratios of measured concentrations of metals in air or biological fluids, on the threshold limit value (TLV[®]) or on the biological exposure indices (BEI[®]).

Results All facilities provided workers with some personal protective equipment, with inconsistent wearing of respiratory equipment. They all conducted manual dismantling, and three performed shredding of electronic/plastic residues. Cadmium, copper and lead were found in the highest concentrations in the air, albeit all below the TLVs. Air concentrations of lead showed a strong association with biological levels, indicating an occupational exposure origin. HIs calculated with the biological measures revealed an exceedance of the mixture's threshold limit for lung toxicity (arsenic, cadmium, cobalt, nickel and chrome) in 95% of the workers, as well as an exceedance for skin irritation (arsenic, mercury, cobalt, nickel) in 19% of them. HIs exceeded the unity as well in some workers for gastrointestinal, peripheral nervous system, and reproductive function toxicity.

Conclusions

Multi-exposures complicate risk assessment Although individual metals all respected the TLVs, the calculation of hazard indices from both air samples and biomarkers highlighted potentially increased risks of toxicity for several organs or systems in erecycling workers.

Heat and Climate Change

0-127 HEAT-RELATED ACUTE KIDNEY INJURY IN INDOOR AND OUTDOOR WORKERS IN THE U.S.

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Introduction Heat-related acute kidney injury (HR-AKI) may increase workers' risk of chronic kidney disease. Occupational HR-AKI has been reported in agriculture and a few other sectors, but there has been no comprehensive study of HR-AKI across indoor and outdoor industries. **Objectives** To enumerate and characterize HR-AKI cases among U.S. workers in a range of industries.

Methods Two data sources were analyzed: (1) archived case files of the Occupational Safety and Health Administration's (OSHA) Directorate of Technical Support and Emergency Management's Office of Occupational Medicine and Nursing from 2010 through 2020, and (2) the Severe Injury Reports database of work-related hospitalizations that employers reported to OSHA as required by regulation from 2015 to 2020. Confirmed cases of HR-AKI were ascertained by serum creatinine measurements. When creatinine measurements were unavailable, probable and possible cases of HR-AKI were ascertained from narrative incident descriptions. Industry-specific incidence rates of HR-AKI were computed. Capturerecapture methods assessed underreporting.

Results There were 607 cases of HR-AKI, including 22 confirmed cases and 585 probable or possible cases. HR-AKI occurred in a variety of indoor and outdoor industries including manufacturing, construction, mail and package delivery, and solid waste collection. Among the confirmed cases, 95.2% were male, 50.0% had hypertension, and 40.9% were newly hired workers. Incidence rates from 1.0 to 2.5 HR-AKI hospitalizations per 100,000 workers per year were observed in high-risk industries. The capture-recapture analysis suggested that employers accurately reported only 41.2% of eligible HR-AKI hospitalizations.

Conclusions Workers experienced HR-AKI in a diverse range of industries, including indoor facilities. Because of underreporting, data on work-related hospitalizations likely underestimate the true burden of occupational HR-AKI. Clinicians should be aware of kidney risk from recurrent heat stress. Employers should provide interventions to prevent kidney injury in heat-exposed workers.

0-163 PROTECTION, RESILIENCE, EFFICIENCY AND PREVENTION (PREP), PREPARING WORKERS AND EMPLOYERS FOR A CHANGING CLIMATE

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Introduction Chronic kidney disease of nontraditional cause (CKDnt), is a risk for millions of workers in Latin America and Asia. Treatment is expensive, resulting in early death for those affected. Strenuous work in extreme heat without sufficient rest and hydration is an important driver. Without prevention, this epidemic will likely accelerate due to climate change.

Objectives We established the Adelante Initiative, a workplace intervention focusing on heat stress mitigation, together with improved ergonomics, and organizational assessment designed to prevent CKDnt among workers at a sugarcane mill in Nicaragua. We aim to adapt the program to other geographies and industries.

Methods PREP builds on Adelante, investigating the following: 1)immediate and long-term impact of the intervention has on workforce health and productivity; 2)economic and social impacts on those affected by CKDnt and whether intervention promotes resilience 3)the economic burden on health systems treating CKDnt; 4) analysis of public and private policies to understand what policy factors (present or absent), have contributed to the disease and what policies are required to address it.

Preliminary observations Despite the inconsistent implementation of intervention there is a 72% reduction of kidney injury. The economic burden in households with CKDnt is dire. CKDnt is depleting health systems. Current public and private policies are insufficient to address CKDnt though signs are encouraging within the development sector and some industries.

Conclusions Knowledge gained will create the groundwork to expand to other sugarcane mils and eventually other industries at-risk for heat stress and CKDnt. Climate change means more extreme temperatures in already impacted regions and the likelihood that regions further north and south of the equator will also be impacted by CKDnt. It is essential to develop a model to protect worker health and productivity. Occupational heat stress and resulting CKDnt require increased attention and resources.

O-370 HOT AMBIENT TEMPERATURE AND ITS IMPACTS ON ADVERSE PREGNANCY OUTCOME (APO) -A SYSTEMATIC REVIEW

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Introduction Exposures to hot ambient temperature have been associated with pregnancy complications and congenital abnormalities among working pregnant women. Workplace heat is likely to exacerbate the Adverse Pregnancy Outcomes (APO) especially with rising temperatures in tropical countries. Research evidence that associates occupational heat stress and APO are scarce and there is a need for new types of knowledge in this research area.

Objective Review the evidence from published literature on the association between exposure to hot ambient temperature and APOs.

Methods We conducted a systematic literature review of the published literature on the effects of hot ambient/occupational temperature and its impacts on pregnancy outcomes from databases such as Pub Med, Cochrane, Web of Science, and Science direct. We searched more than 500 related original & review articles, short communications, dissertations, newsletters, and book chapters. We systematically grouped the reviewed literature into the following categories: Heat stress/ strain, adverse maternal, fetal outcome, and interventions. The categorized literature was then analyzed and examined the principal findings of the studies.

Results This review found a convincing association between heat stress and APOs among the exposed pregnant women, including miscarriages, preterm birth, stillbirth, low birth weight (LBW), and congenital anomalies. Furthermore, few articles found occupational heat may intensify the complications, an anticipated risk, which may trigger APOs during all the trimesters. Our review informs the magnitude and significance of the impacts of heat stress on pregnant women's health, providing useful information for exploring the biological mechanisms of APOs and also outlines various interventions to prevent heat-related APOs.

Conclusions The limited quantity of existing review gave us key insights and reemphasized the need for more extensive

cohort studies, and strong evidence to design robust policies to protect pregnant women from heat stress risks in developing countries for improved reproductive health.

O-371 OCCUPATIONAL HEAT EXPOSURES AND RENAL HEALTH IMPLICATIONS – A CROSS-SECTIONAL STUDY AMONG COMMERCIAL KITCHEN WORKERS IN SOUTH INDIA

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Introduction Strenuous jobs in hot working environments, such as in commercial kitchens, are proven risk factors for adverse renal implications for workers working without adequate interventions. Evidence is scarce on the heat exposures and their impacts on commercial kitchen workers' renal health.

Objectives To investigate the renal health implications due to the workers' exposures to heat stress and exertion in commercial kitchens.

Methods We conducted a cross-sectional study among 266 workers in 7-commercial kitchens in the summer and winter of 2018. We monitored the Wet Bulb Globe Temperatures (WBGT), the physiological indicators of heat strain viz., rise in Core Body Temperature (CBT), Sweat Rate (SwR), and Urine specific gravity (USG) and analyzed the post-shift serum creatinine to calculate the estimated Glomerular Filtration Rate (eGFR). We administered a validated questionnaire to capture the workers' self-reported renal health symptoms of heat stress.

Results About 66% of workers were exposed to WBGTs levels higher than the safer Threshold Limit Value (TLV) with an average exposure of $30.1^{\circ}C\pm 2.7^{\circ}C$. Among the exposed workers, 82% reported experiencing heat strain symptoms such as excessive sweating, exhaustion, headache irrespective of the season. Above TLV-WBGT exposures were significantly associated with self-reported symptoms of dehydration (Adjusted Odds Ratio (AOR):2.3; 95% CI:1.2–4.3) and measured heat strain indicators (AOR: 2.9; 95% CI:1.6–5.1). Prevalence of heat strain indicators viz., rise in CBT (9.1%), SwR (17%), USG (75%), was observed among heat-exposed workers. Heat-exposed workers had a 2.8-fold higher risk of reduced kidney function (eGFR of < 9 0 mL/min/1.73 m2) even after adjusting for the potential confounders (AOR:2.8; 95% CI:1.1–6.9).

Conclusion The preliminary study results show adverse renal impacts of heat exposures among commercial kitchen workers that warrant further investigation to arrive at conclusive results. A need for adaptation and interventions is imperative to protect few million kitchen workers from hazards of occupational heat stress.

0-418 OCCUPATIONAL HEAT EXPOSURES, PHYSIOLOGICAL RESPONSES AND RENAL HEALTH OUTCOMES AMONG BRICK WORKERS IN SOUTH INDIA

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10.1136/OEM-2021-EPI.58

Introduction Rising temperature with consequent heat stress is likely to subject millions of workers exerting outdoors at risk of heat-related illnesses and adverse renal health outcomes. Need for such research evidence is urgently needed to address this issue especially in the changing climate scenario.

Objective To investigate the relationship between occupational heat stress, physiological indicators of heat strain, and associated renal health outcomes among brick workers in South India.

Methods We conducted a cross-sectional survey with 327 brick workers during the summer of 2017 & 2018. We collected Wet Bulb Globe Temperatures (WBGT°C), pre-and post-shift Core Body Temperature(CBT), Urine Specific Gravity(USG), and post-shift Sweat rate(SwR), and serum creatinine/uric acid for calculating eGFR (estimated Glomerular Filtration Rate), a kidney function indicator.

Results Workers were exposed to an average WBGT of 27.7° C ± 2.2 with more than 51% of measurements above the ACGIH-Threshold Limit Value (TLV). 69% of the workers reported heat-strain symptoms such as excessive sweating, exhaustion, and headaches. The workers exposed to above TLV-WBGT had 1.8-fold higher risk of dehydration (Adjusted Odds Ratio (AOR):1.8; 95%CI: 1.0–3.0, p=0.03), rise in CBT (AOR=2.2, CI: 1.0–4.7, p=0.02) and measured heat-related symptoms (AOR=2.5, 95%CI: 1.5–4.2, p=0.0001). Heat-exposed workers had CBT>1°C (14%), SwR>11it/hr (24%), and USG>1.020 (35%). The prevalence of low eGFR (; 95%CI: 1.6–4.2) compared to workers exposed to WBGT below TLV.

Conclusion The preliminary study results only give a clue to the impacts of occupational heat stress on renal health. To have conclusive results, further epidemiological investigations are warranted with stratification for various personal and exposure factors that determine the disease etiology. With or without evidence, the drive for precautionary protective labor policies/welfare measures does not diminish for better occupational health outcomes.

0-427 RISK FACTORS FOR ELEVATED CORE BODY TEMPERATURE IN FARMWORKERS

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10.1136/OEM-2021-EPI.59

Introduction Heat-related illness (HRI) poses a serious occupational health risk for farmworkers, particularly considering harvest season corresponds to peak summertime heat. The California Heat Illness Prevention Study (CHIPS) collected objective data on the physiological responses of farmworkers to environmental heat, covering a wide range of crops and working conditions.

Objectives The primary objective of this analysis is to identify risk factors for elevated core body temperature (CBT).

Methods A convenience sample of farmworkers was recruited through farms and farm labor contractors. Bilingual researchers administered questionnaires pre- and post-shift. CBT and work rate were measured using an ingestible wireless thermistor and an accelerometer, respectively. Ambient weather conditions, including wet bulb globe temperature (WBGT), were recorded using two weather stations at the work site. Multiple logistic modeling was used to identify risk factors for elevated CBT (\geq 38.5°C).

Results In total, 587 farmworkers on 30 farms throughout California participated over the summers of 2014 and 2015. After data cleaning, 507 participants were included in analyses using elevated CBT as the primary outcome. In multiple logistic modeling (AOR [95% CI]) male sex (3.74 [1.22 - 11.54]), WBGT (1.22 [1.08 - 1.38]), work rate (1.004 [1.002 - 1.006]), and increased BMI (1.11 [1.10 - 1.29]) were all independently associated with elevated CBT.

Conclusion Despite high summer temperatures, most farmworkers were able to keep their CBT below 38.5°C. Risk of HRI was exacerbated by work rate and environmental temperature despite farms following Cal/OSHA regulations.

Injuries

0-11 DIFFERENCE IN THE DEATHS OF DESPAIR BY OCCUPATION, MASSACHUSETTS, 2000–2015

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Objective To determine differences in mortality rates and trends according to the occupation of workers who died from the 'deaths of despair' (DoD).

Methods Death certificates for deaths due to poisonings (including opioid-related overdoses), suicides, and alcoholic liver disease occurring in Massachusetts from 2000 to 2015 were collected and coded according to the occupation of the decedent. Mortality rates and trends in mortality were calculated for each occupation. We also examined possible underlying causes of differences by occupation in rates of DoD by investigating the relationship between occupational injuries and DoD using data from the U.S. Bureau of Labor Statistics.

Results DoDs increased by more than 50% from 32.5 deaths per 100,000 workers in 2000-2004 to 49.6 in 2011-2015. Deaths increased in all three cause categories, but opioidrelated deaths increased most rapidly. There were substantial differences in mortality rates and trends according to occupation. There were particularly elevated risks for blue collar, notably: construction; farming, fishing, and forestry; installation, maintenance, and repair; transportation and material moving; building and grounds cleaning and maintenance; production; and healthcare support workers. Most of these occupations not only had higher than average rates of death, but these rates also increased more rapidly over the 16 year period. As hypothesized, occupations with high injury rates also suffered from high DoD mortality rates. Compared to occupations in the lowest quartile of injuries (< 40 per 10,000 full-time workers), those in the high quartile (> 199 per 10,000 full-time workers) had nearly 4 times higher rates of DoD.

Conclusions These findings suggest that work may be a factor contributing to DoD. Interventions should be targeted to the needs of workers with elevated mortality rates and trends for the deaths of despair. Further work is needed to identify preventable risk factors for these outcomes that may be contributing to these.

0-12

WORKPLACE WELLNESS PROGRAM INTEREST, PARTICIPATION BARRIERS, AND ASSOCIATIONS WITH SOCIODEMOGRAPHICS, HEALTH STATUS, AND WORKPLACE FACTORS: A SURVEY OF WORKERS WITH WORK-RELATED PERMANENT IMPAIRMENTS

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Introduction Injured workers with work-related permanent impairments—who account for roughly 10% of all injured workers—face elevated risks of reinjury and return-to-work (RTW) interruption related to health, disability, and workplace factors. Nearly half of United States workers have access to workplace wellness programs (WWPs), which hold potential to improve health and employment outcomes, yet only 58% of workers with access choose to participate. Equitable access for workers with permanent impairments is crucial, but interest levels and barriers are unknown.

Objectives To assess interest in WWP participation among injured workers who have RTW with a permanent impairment; to assess associations with sociodemographics, health status, and workplace factors; and to describe self-reported participation barriers and reasons for expressing lack of interest.

Methods Workers who had RTW after a work-related injury involving permanent impairment were interviewed about a year after workers' compensation claim closure. Workers were queried regarding interest in potential WWP participation; if they expressed no interest, they were asked, 'Why is that?' Qualitative content analysis methods were used to inductively code open-ended responses.

Results Of 560 respondents, 51.4% expressed interest in WWP participation, and 48.6% were not interested. Expressing interest was significantly associated with more adverse: health status, work function, pain, perceived reinjury risk, job security, missed work days, and earnings. Workers expressing interest were less likely to have health insurance, and more likely to have certain chronic health conditions. Among those not interested (N=272), reasons included: not needed (21.0%), have own fitness/wellness programs (18.38%), wouldn't be helpful (6.25%). Barriers included: too busy, commute, work schedules, age/health/injury status, privacy. Few workers (1.47%) expressed negative perceptions of WWPs.

Conclusion Most workers with permanent impairments—particularly those at higher risk of adverse health outcomes—are interested in participating in WWPs. Interest among this high-risk population might expand if participation barriers are addressed.

0-35 OCCUPATIONAL INJURIES AND HAZARD EXPOSURES AMONG SMALL-SCALE MINERS IN THE PHILIPPINES

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Objectives This study investigated the ergonomic and safety hazards of small-scale miners in one of the largest small-scale

mining area in the Philippines which is the area of Itogon, Benguet.

Methods There were 93 small-scale miners who were included in the study as they complied with the inclusion criteria. The methods consisted of survey questionnaires, health physical examination guide, individual interviews, and work process observation tool.

Results The results showed that the small-scale miners worked for an average of 10.7 years, and a maximum work year of 40. The most widely employed mining technique was the dog-hole mining consisting of several sub-processes -tunneling, ball milling and gravity concentration, cyanide leaching, and smelting. The ergonomic and safety hazards identified were noise exposure from the dynamite blast, temperature extremes, and exposure to dust from dynamite blasting. The miners experienced prolonged crouching and bending, prolonged handling of tools, and carrying heavy sacks filled with mineral ores. In the ball milling and gravity concentration process, machine-related accidents were noted such as experiencing cuts from the crusher. In the cyanide leaching which uses massive amounts of cvanide, the most prevalent hazards were heat, dust, and chemicals such as cyanide fumes. In the smelting process, smoke from burning ore and coal as well as exposure to borax and nitric acid fumes. Burn injuries were reported among miners. A third (31.2%) of miners have experienced accidents. The most common injury was laceration at 47.8%, followed by methane inhalation, fracture of hand digits, and contusion at 17.4%.

Conclusion The most prevalent health symptom reported by the miners was muscle pain which points to exposure to ergonomic hazards and risks.

O-120 UNDER-REPORTING OF NON-FATAL OCCUPATIONAL INJURIES AMONG PRECARIOUS AND NON-PRECARIOUS WORKERS IN SWEDEN

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Introduction Data are lacking on under-reporting of occupational injuries (OI) among precariously employed workers in Sweden, challenging effective surveillance of OI and targeted preventive measures.

Objective To estimate the magnitude of under-reporting of OI among precarious and non-precarious workers in Sweden in 2013.

Methods Capture–recapture methods were applied using the national OI register and records from a labour market insurance company. All employed workers 18–65 resident in Sweden in 2013 were included in the study. Injuries were linked using personal identification numbers. Employment data were obtained from the national labour market register to construct precarious employment level, while injury severity (no healthcare/only outpatient/hospitalised) was constructed with data from the National Patient Register. Under-reporting estimates were computed stratifying by OI severity and by socio-demographic factors, occupation and precarious employment level.

Results Overall, under-reporting of OI was consistently higher across all socio-demographic factors for the very precarious

group (very PER), followed by the precarious group (PER) and lastly the standard employment relationship group (SER). Under-reporting was higher among females compared to males (17.8%, 95% confidence interval (CI) 17.4–18.3), and younger compared to older workers (19.8%, 95% CI 18.6–21). Notably under-reporting increased with educational level across all employment groups (20.9%, 95% CI 20.0–21.9). Under-reporting of the OI decreased as injury severity increased and was higher with highest level of precariousness in all groups of severity.

Conclusions This is the first register-based study in Sweden to empirically demonstrate that under-reporting of OI is higher among precariously employed workers. OI under-reporting may represent unrecognized injuries that especially burden precariously employed workers' financial, health and social outcomes, shifting consequences from the employer to the employee.

0-157 EFFECT OF EXPOSURE TO PSYCHOSOCIAL WORK FACTORS ON THE OCCURRENCE OF WORKPLACE INJURIES

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Objective To determine the effect of psychosocial factors (PSF) on the incidence of workplace injuries (WI) among workers from of the French two-waves survey 'Health and Career paths'. A second objective was to explore effects of gender and age.

Methodology The outcome considered here was the occurrence of WI between 2006 and 2010, reported by participants. Nineteen self-reported PSF, evaluated in 2006, explored six domains: labour intensity and working time (9 items), emotional demand (3), autonomy (2), social relationships at work (2), conflict of values (2), and job insecurity (1). Multiple logistic models were performed for each PSF. Interactions between PSF and respectively gender and age class (\leq 30y., 30– 50y., >50y.) were tested using Wald test.

Results The study population consists in 3,277 men and 3,565 women in employment in 2006 and re-interviewed in 2010. Over the period, 255 workers reported at least one WI, corresponding to an annual average rate of 6 WI/1000 workers. PSF associated with the incidence of WI were mostly related to emotional demand, social relationship at work and labour intensity. The risk of WI was greater in women reporting difficulties reconciling work and family life, tensions with public, necessity to hide or fake emotions or lack of reward, and in men reporting more than 48 h/week, irregular working hours or fear for own safety or for safety for others during work. Participants under 30y. reporting tensions with public, necessity to hide or fake emotions, or fear for own safety or for safety for others during work than the others.

Conclusion These results provide evidence for relationships between PSF exposure and the occurrence of WI. In particular, the risk of WI was greater in participants reporting exposure to emotional demand at work and varied according to gender and age.

Interventions

0-61 BARRIERS AND FACILITATORS FOR PARTICIPATION IN WORKPLACE HEALTH PROMOTION PROGRAMS: PEER-TO-PEER INTERVIEWS AMONG EMPLOYEES

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Introduction Workplace health promotion (WHP) programs have shown to be effective in the reduction of body weight, increased psychological wellbeing and perceived health of employees. Despite the potential benefits for employees, participation rates of WHP programs are often low (10–64%).

Objectives To get more insight into reasons for (non)participation, the objective of this study was to identify the barriers and facilitators for participation in WHP programs from the employee perspective.

Methods Peer-to-peer interviewing, a method derived from citizen science, was used to actively involve the target group of employees. In total 14 employees working in the cleaning-, ICT- and facility- sector were trained to conduct interviews themselves with co-workers. All interviews were recorded and transcribed verbatim. The Consolidated Framework for Implementation Research (CFIR) was used to create an initial codebook, complemented with the constructs 'interpersonal' and 'intrapersonal factors' from the Social Ecological Model. Data were coded both deductively and inductively, and ranked by two researchers independently.

Results In total, 62 peer-to-peer interviews were conducted by the 14 peer-interviewers. Preliminary findings show that main barriers for participation in WHP interventions are a lack of knowledge about the programs and a negative attitude towards WHP (e.g. no belief that their employer can help them with improving their lifestyle). Facilitating factors identified were fit of the WHP activities to the employees' needs and available (working) time to participate.

Conclusion Our findings on the main barriers and facilitators for participation in WHP according to employees may contribute to more successful implementation and higher participation rates in future WHP programs.

O-76 COMPLEX INTERVENTION TO PREVENT AND MANAGE MUSCULOSKELETAL PAIN IN NURSING STAFF AT WORK: COST-EFFECTIVENESS OF A CLUSTERED RANDOMIZED CONTROLLED TRIAL (INTEVAL_SPAIN)

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Objective To evaluate the cost-effectiveness of a multifaceted workplace intervention to prevent musculoskeletal pain (MSP) in nursing staff.

Methods The study was a one-year cluster randomized controlled trial and encompassed participatory ergonomics, health promotion and case management. Control group received usual care. The societal and the Health System perspectives were used. Costs included direct health costs and indirect costs. The outcomes were MSP, sickness absence and Quality-Adjusted Life Years (QALYs). MSP was measured with the Standardized Nordic Questionnaire at baseline, six and 12month follow-ups. Sickness absence data were obtained from Human Resources database. QALYs were measured using the EuroQol-5D-3L at six and 12-month follow-ups. Incremental costs and effectiveness were modelled by GEE models and adjusted for sex, age, occupation and baseline values. Incremental cost-effectiveness ratios (ICERs) were calculated.

Results Total direct health costs were €102.80 and €73.57 for the intervention and control groups, respectively. The intervention costs were €27.96 per nurse and/or nursing aide. Neck, shoulders and upper back showed a statistically significative difference of 20 percentual points of MSP. From the societal perspective, the ICER in terms of MSP in the former anatomical site was €3.63 (€1.69 Health system perspective) to achieve 1-extra percentual point reduction of MSP. ICER were €60.58 and €28.21 for MSP in hands from societal and health system perspectives respectiely; €11.18 and €5.21 respectively in legs; and €12.98 and €6.04 respectively in feet. In both societal and health system perspectives, the ICER was dominated by usual care for low-back pain, elbows, knees, sickness absence and QALY.

Conclusion The intervention was cost-effective to reduce MSP in neck, shoulders and upper back at 12-month follow-up compared to the control group. Health systems and society could implement this kind of multifaceted interventions in the workplace for nursing staff since the additional cost required to improve MSP seems to be low and affordable.

0-273 PILOT TESTING TWO TAKE-HOME EXPOSURE PREVENTION EDUCATIONAL SESSIONS WITH CONSTRUCTION WORKERS AND THEIR FAMILIES

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Introduction 'Take-home exposures' occur when workers accidentally bring home contaminants from work. In construction, job responsibilities may expose workers to lead and other metals, which extend to their household members via the take-home pathway. It is crucial that construction workers are aware of the take-home pathway and learn about exposure prevention strategies.

Objectives This work is part of the RECLEAN Pilot Study, which aims to reduce lead in the homes of construction workers through educational and environmental interventions.

Methods We developed and evaluated a suite of educational materials to train construction workers and their families on strategies to prevent take-home lead exposure. Each of the two sessions targets a specific audience, with one tailored to construction workers and the other to workers' family or household members. The sessions were originally developed to take place in person but given the COVID-19 pandemic we adapted them for online delivery as well.

Results Like traditional occupational health and safety trainings, the construction worker sessions present workers with best practices to prevent take-home lead and open discussion for how such practices may fit into their own routine after work. Alternatively, the family session is designed to engage household members in discussion through a process derived from motivational interviewing. The materials for both sessions include an introduction, behavior scoring sheet, behavior wheel, and action plan. Facilitators and participants discuss strategies to prevent take-home lead, identify barriers participants (and their coworkers or families) experience when trying to change their behaviors, and ultimately prioritize a prevention goal.

Conclusion The materials for both educational sessions were developed based on current literature on take-home lead and behavioral theories and in partnership with lead and construction experts from multiple organizations. Using feedback from participants, project stakeholders, and session facilitators, we evaluate the feasibility and efficacy of these educational interventions.

0-352 EVALUATING PROGRAM EFFECTIVENESS ON RETURN-TO-WORK AFTER WORK-RELATED INJURY IN THE CONSTRUCTION SECTOR

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Introduction Return-to-work (RTW) in the construction sector is more challenging than in many other sectors. Between 2010 and 2011, the Ontario Workplace Safety Insurable Board (WSIB) introduced the Work Reintegration (WR) program in an attempt to improve RTW outcomes for injured workers.

Objective To determine whether the WR program was associated with reducing work disability duration in the Ontario construction sector.

Methods WSIB claims data were extracted for construction workers compensated for time off work following workrelated injuries betwen the years 2009 and 2015 (n=27,131). Claims receiving referrals to return-to-work (RTW) and vocational rehabilitation (VR) specialists were propensity score matched with claims receiving no referrals. Multivariable quantile regression models were used to examine differences in the cumulative disability days paid during two-years post-injury between the groups of claims before and fater the WR intervention period and the differences in these differences.

Results Prior to the WR program, cumulative disability days paid was greatest among claims referred to VR specialists, followed by claims referred to RTW specialists (390 and 109 additional days than claims with no referrals, respectively). Following the WR program intervention, cumulative disability days paid reduced for all claims but most notably among longer duration claims referred to RTW specialists (reduction of 274 days at the 90th percentile in the disability distribution) and shorter duration claims referred to VR specialists (reductions of 255 and 214 days at the 25th and 50th percentiles in the disability distribution, respectively).

Conclusion The WR program intervention was effective in reducing the cumulative disability days paid for construction worker claims targeted under the various referrals. While the effects varied at different percentiles in the disability distribution, and by specialist referral, future research should examine the type and timing of services received to more fully understand what may be driving the overall findings.

O-423 EVALUATING CHANGES TO SICKNESS ABSENCE IN PRISON STAFF FOLLOWING THE IMPLEMENTATION OF A NATIONAL PRISON SMOKEFREE POLICY

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Objective Sickness absence (SA) is a significant problem for many workplaces, due to loss of productivity, increased workload on other staff, and resources spent to cover incapacity to work and restore health. To date, research on prison staff SA is still limited. High levels of SA related to mental health problems, including job-related stress, anxiety and depression have been reported for UK prison staff. In conjunction with stressful and often challenging working conditions which prison staff experience, organisational change can also impact on SA. In 2018 the Scottish Prison Service introduced comprehensive smoking restrictions across all prisons to protect prison staff and people in custody from second-hand smoke (SHS) exposure. The multi-phase, multi-methods Tobacco in Prisons (TIPs) study has evaluated this process and the impacts of the implementation of the smokefree policy; one part of this evaluation was to assess whether the smokefree policy impacted on prison staff SA rates and duration.

Methods and Results Box-Jenkins Autoregressive Integrated Moving Average (ARIMA) time series is used to analyse potential changes to sickness absence rates before and after the introduction of the smokefree policy. Change in absence duration before and after the implementation of the smokefree free policy are analysed using Kaplan-Meier survival curves and Cox's proportional hazards models for all sickness absence events and by cause. Results from each methodology will be presented for the entire prison service, by cause of sickness absence event and by SHS exposure levels.

Conclusions The findings of this study cover a significant knowledge gap on sickness absence in an occupational cohort that often faces challenging and stressful working conditions. In the TIPs study we are able to model potential impacts on SA during organisational change. This information can help employers when developing policies and workplace interventions for employees in improving health and return-to-work times.

Job Control



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Introduction Poor psychosocial working conditions and unhealthy behaviors are known determinants of poor health. The objective of this study is to examine the mediating role of unhealthy behaviors and body mass index (BMI) in the relationship between high job strain and self-rated poor health in workers with a low educational level.

Methods A total of 8,369 low educated workers, who participated in the Lifelines cohort study during the period 2012– 2017, were included. Self-reported job strain, health behaviors (smoking, physical activity, fruit and vegetable consumption) and BMI were assessed at baseline, and self-rated health after 2 years. To assess mediation by the health behaviors and BMI, structural equation modeling with logistic and multinomial regression analyses were performed.

Results Workers with high job strain had a higher odds of poor health (OR 1.34; 95%CI 1.13–1.60) compared to those with low job strain. Workers with high job strain were more likely to have a lack of physical activity (OR 1.14; 95%CI 1.01–1.28), but were not more likely to smoke, to be overweight or obese, or to have a low fruit or vegetable consumption. Workers who smoked (OR 1.37; 95%CI 1.16–1.60), had a lack of physical activity (OR 1.25; 95%CI 1.08–1.43) or were overweight (OR 1.37; 95%CI 1.16–1.61) or obese (OR 2.25; 95%CI 1.86–2.72) were more likely to report poor health. Indirect (mediating) effects of unhealthy behaviors and BMI in the relationship between high job strain and poor health were small and not statistically significant.

Conclusion No mediating effects of unhealthy behaviors or BMI were found in the relationship between high job strain and self-rated poor health among workers with a low educational level.

0-43 CHANGES IN JOB CONTROL AND PERCEPTIONS OF GENERAL HEALTH: A LONGITUDINAL ANALYSIS OF AUSTRALIAN WORKERS, 2005–2017

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Introduction Low job control is associated with poor health outcomes. However, establishing the causal nature of this association is challenging mostly due to methodological biases across studies.

Objectives To examine whether changes in job control over time were associated with changes in perceptions of general health, using data from a nationally representative longitudinal study of Australian households.

Methods Our sample included 105,017 observations (18,574 persons) over 13 years from working age participants with information on job control, general health, and other sociode-mographic and health factors. We used dynamic fixed-effects regression models to control for time-invariant confounding and reverse causation, and ordinary least squares regression with cumulative job control exposure to analyse cumulative exposure to low job control. Perceptions of general health, scores ranging from 0–100 points (higher scores indicating better health), were modelled in relation to self-reported job control.

Results There was a strong stepwise relationship between increasing job control and general health, with a 2.4-point increase in general health (95% CI 2.0–2.8) for participants in the highest job control quintile compared to those in the lowest quintile. The inclusion of a lagged effect of job control

supported a small prospective relationship (β =0.17; 95% CI 0.07–0.27) but the contemporaneous association was essentially unchanged. Going from the lowest to highest observed value of cumulative job control predicted an 8-point higher general health score supporting a prospective association between job control and general health over a period of 4 years (β =0.47; 95% CI 0.38–0.57).

Conclusion This analysis with improved causal inference over previous research showed that increased job control is strongly associated with increasing general health. The validation of job control as a potentially modifiable causal factor of general health has considerable public health implications, and substantial economic consequences. Appropriate work stress interventions might contribute to better health and well-being.

O-265 LATENT PROFILE ANALYSIS: AN ALTERNATIVE PERSPECTIVE ON JOB SUB-TYPES OF THE JOB DEMAND-CONTROL-SUPPORT MODEL

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Introduction The Job Demand–Control–Support (JDCS) model suggests that a combination of job demands (JD), job control (JC), and job support (JS) forms eight different job types. In the last three decades, these constellations of job types have been explored by adopting the traditional variable-centered perspective. In this sense, these constellations of job types as postulated in the JDCS model have been rarely confirmed empirically and few studies were able to find all the hypothesized constellations.

Objectives The aim of this study was to expand previous research on the JDCS model by adopting a person-centered approach to identify relevant job type profiles.

Methods We applied latent profile analysis (LPA) to identify profiles in a sample of Italian workers (n=348). LPA including one to eight latent profiles were estimated by using MPlus 7 robust maximum likelihood estimator, considering the following goodness-of-fit indices: Bayesian information criterion, Akaike information criterion, Constant AIC; bootstrapped likelihood ratio p-value and the Lo-Mendell Rubin adjusted likelihood ratio.

Results LPA showed a five-latent-profiles solution: isolated high strain (high JD, low JC, low support; n=36, 10.35%), cowboy-hero (high JC, low support; n=16, 4.60%), moderate-strain (moderate JD, moderate JC, low support; n=125, 35.92%), collective-low-strain (low JD, high JC, high support; n=37, 10.63%), and supported (high support, n=134, 38.51%).

Conclusion Results from our study partially agree with JDCS theorization as it replicated three of the eight-profile solutions identified, finding two new constellations. In fact, we were not able to identify the passive jobs, active jobs, obedient comrade, and participatory leader constellations. This study extends previous research on JDCS, highlighting that future studies should consider empirically identified profiles rather than theoretically defined subgroups. Finally, one of the main theoretical contribution of the present study was the consideration of job support as an important component for job types identification, as postulated in the JDCS model.

0-269 SELF-ROSTERING AND SICKNESS ABSENCE – A DANISH COHORT STUDY ON PAYROLL DATA

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Introduction Work time control (WTC) is defined as 'employees' possibilities to control over the duration and distribution of own work time'. A recent study found shorter sickness spells on wards using participatory scheduling compared to traditional scheduling, and that a high level of control over working times provides possibilities to adjust job demands with employees' prevailing resources.

Objectives The objective of this study was to investigate the association of WTC on sickness absence among nursing personnel in the public health care sector in Denmark.

Methods The study was based on the Danish Working Hour Database (DWHD), which is a nationwide database based on payroll data primarily from all the public hospitals in Denmark during 2007–2015. For the current analyses, we included 2049 departments (31 595 nursing personnel) that introduced the self-rostering tool 'MinTid' in the period 2011 to 2016. Rosters using MinTid are based on a combination of input and wishes from the employees regarding individual working hours and staffing requirements from the organization. Information on daily working hours as well as sickness absence is objectively obtained from the DWHD. Data was summarized on a yearly basis and analyzed using Proc Mixed, including repeated measures.

Results There was a notable difference in the number of sickness spell per year before $(3.43 \ (3.41-3.52))$ and after $(3.36 \ (3.32-3.40))$ introducing 'MinTid', and also a remarkable difference in the number of short-term $(1-3 \ days)$ sickness spells per year before $(3.36 \ (2.63-2.70)$ and after $(2.57 \ (2.54-2.61))$ 'MinTid'. We observed no difference in total number of sick days per year before and after introducing 'MinTid'.

Conclusion Introduction of self-rostering tools seems to reduce the number of particularly short-term sickness spells in Danish public hospitals.

0-315 DETERMINANTS OF BURNOUT AMONG TEACHERS: A SYSTEMATIC REVIEW OF LONGITUDINAL STUDIES

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Introduction Teachers represent an occupation with high levels of burnout.

Objective To identify determinants of burnout in teachers.

Methods We conducted a systematic review according to PROSPERO protocol CRD42018105901. We performed literature search for the period 1990–2018 in three databases: MEDLINE, PsycINFO and Embase. We included longitudinal studies where burnout was dependent variable, with at least 50 participants per exposure group. We sorted and summarized studies by type of independent variables (determinants), and used MEVORECH tool for risk of bias assessment (RBA). For quantitative synthesis, we focused on the emotional exhaustion dimension of burnout (EE). We standardized the reported regression coefficients and their standard error and plotted them using R software to distinguish between detrimental and protective determinants.

Results Qualitative analysis of included studies (n=33) identified 35 determinants studied among teachers. Most studies implemented two waves (W) of data collection with 6-12 months between W1 and W2, but different outcome definitions and instruments for data collection were used in different studies. Only four types of determinants could be summarized quantitatively: support, conflict, organisational context and individual characteristics, based on six studies. After plotting the results, individual characteristics (low teacher self-efficacy, low job satisfaction, neuroticism, and emotional exhaustion at W1) and organisational factors (classroom disruption, perceived collective exhaustion, and poor work climate) had significantly detrimental effect. The RBA showed that most studies assessed the major confounding factors, but had external and internal validity issues, due to limitations in sampling, inadequate reporting of response rates and exclusion rates, or use of self-reported instruments with uncertain validity and reliability.

Conclusion This review identified several detrimental determinants of burnout in teachers. The results on protective determinants were inconsistent between studies and varying from wave to wave. Further investigations should be conducted by using the same burnout definition and validated instruments for its measurement.

Lung Cancer and Mesothelioma

0-192 OCCUPATIONAL AND NON-OCCUPATIONAL FACTORS AND LUNG CANCER MORTALITY AMONG WORKERS OF THE SWISS NATIONAL COHORT

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Introduction Lung cancer is the most frequent cancer, with smoking and radon as the two leading causes. Occupational exposures are another important risk factor, with an estimated population attributable fraction up to 15%.

Objectives This study aimed at assessing the effect of occupational exposures on lung cancer mortality in Switzerland after adjustment for non-occupational lung carcinogens.

Methods We used negative binomial regression to analyse data of 4,351,383 Swiss residents with available occupation, and assess its effect on lung cancer mortality between 1990 and 2014, accounting for socio-demographic factors, smoking probabilities (by age, geographical region, civil status, educational level, nationality, and occupation) and measured environmental exposure to radon.

Results Male machine operators and workers in mining, stone working and building materials manufacturing showed the highest risk with a relative risk (RR) of 2.42 (95%-IC: 2.05–2.87) and 2.08 (95%-IC: 1.50–2.89) compared to health occupations, respectively. In women, two of the largest risks were identified in electronics, watchmaking, vehicle construction and toolmaking (RR : 2.33 (95%-IC: 1.75–3.10)) and transport and traffic occupations (RR : 2.23 (95%-IC: 1.75–2.83)). Smoking RRs were 1.33 (95%-IC: 1.27–1.38) in

males and 1.37 (95%-IC: 1.26–1.48) in females, while radon related RRs were not statically significant. Adjusting for socio-demographic factors, the RRs by occupation decreased by 16% and 4% on average in men and women, and by 4% and 6% when adjusting for smoking, but remained statistically significant.

Conclusions The results suggest the presence of occupational exposures to lung carcinogens in addition to non-occupational factors. Longer follow-up and analysis by histological types of lung cancer are needed to improve the estimates of occupational lung cancer.

0-303 THE ROLE OF OCCUPATIONAL EXPOSURES IN LUNG CANCER RISK AMONG WOMEN: PRELIMINARY RESULTS FROM A POOLED CASE-CONTROL STUDY OF LUNG CANCER

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Introduction Lung cancer is the most common cause of cancer death among women. However, little is known regarding occupational risk factors for lung cancer in women.

Objective To investigate possible associations between selected occupational agents and lung cancer risk among women.

Methods We pooled data from ten case-control studies of lung cancer with detailed lifetime occupational and smoking history. The current analysis was restricted to working women, including 3040 cases and 4186 controls. To assess occupational exposure, we used the Canadian Job-Exposure Matrix (CAN-JEM). Linking participants' jobs to the CANJEM allows the estimation of probability, and frequency of exposure to a list of 258 agents. This analysis was restricted to 36 most prevalent occupational agents in our sample of women. The association between lung cancer risk and lifetime ever exposure, duration of exposure, and cumulative exposure for each agent was estimated in separate logistic regression models, adjusted for smoking and other selected covariates.

Results Most agents we examined were not associated with lung cancer. We observed an increased risk of lung cancer among women occupationally exposed to cooking fumes for over 10 years (OR(95%CI)=1.73(1.09-2.82)). Statistically significant decreased risks of lung cancer were observed among women exposed to various textile fibres, especially among long-duration workers. The results regarding the various textile agents have not been mutually controlled yet. When restricting to never smokers, increased risks of lung cancer were observed among women exposed to metallic dust, isopropanol, and aliphatic alcohols, with OR point estimates for ever exposure ranging from 1.5 to 1.7.

Conclusion Our preliminary results indicate that occupational exposure to cooking fumes is associated with an increased lung cancer risk in women, while exposures to various textile fibres seem to be associated with a decreased lung cancer risk.

O-321 EXPLORATION OF OCCUPATIONS AS RISK FACTORS FOR LUNG CANCER IN MULTIPLE EXPOSURE HIERARCHICAL AND PENALIZATION MODELS

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Introduction We used hierarchical and penalization models to explore occupational risks associated with lung cancer while accounting for exposures to multiple known carcinogenic exposures.

Methods We pooled lung cancer case-control study subjects from 14 European and Canadian studies. Associations between employment in 1,506 five-digit ISCO-68 occupations and lung cancer were screened using Bayesian hierarchical and lasso penalized regressions accounting for age, smoking, sex, study, and fully quantitative exposures to six known occupational lung carcinogens: asbestos, chromium, diesel engine exhaust, nickel, PAHs, and silica. False positive findings in the penalization model were controlled using stability selection with specified family-wise error rates. Lung cancer odds ratios for selected occupations were calculated using unconditional logistic regression model with identical covariates.

Results Our study included 16,901 cases and 20,965 controls. Jobs selected by the hierarchical and penalization models were similar. Occupations with positive associations with lung cancer after controlling for the known carcinogens included building painters (OR: 1.40; 95 CI: 1.17, 1.67), carpenters (OR: 1.77; 95 CI: 1.36, 2.33), and paviours (OR: 3.91; 95 CI: 1.75, 9.61).

Conclusion We demonstrated viable agnostic approaches in identifying employment risk factors for lung cancer. Future work involves investigations of factors that contribute to the observed elevated cancer risks.

O-335 OCCUPATIONAL PHYSICAL ACTIVITY AND LUNG CANCER RISK AMONG FOUR COHORTS OF THE CANADIAN PARTNERSHIP FOR TOMORROW'S HEALTH PROJECT

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Introduction Recreational physical activity (PA) has been associated with reduced lung cancer risk. Occupational-related PA may be one of the most important sources of PA, but the few studies that have examined the occupational PA-lung cancer relationship have produced inconsistent result.

Objective To investigate the association between occupational PA and lung cancer risk.

Methods A case-cohort study was nested among four cohorts of the Canadian Partnership for Tomorrow's Health Project. Through linkage of each cohort to their respective provincial cancer registry, 453 incident lung cancer cases diagnosed between 2009 and 2016 were identified; a random sub-cohort of 2,435 participants was sampled at baseline. Data on the longest-held job and risk factors were gathered via a harmonized questionnaire. Using a database generated by our team on the energy expenditures associated with almost 3,600 job titles, metabolic equivalent of tasks (METs) were assigned to the longest-held job of each participant. In total, 335 cases (139 men; 196 women) and 2,320 sub-cohort members (879 men; 1,441 women) with assignable job codes and MET values were included in this analysis. Multivariable logistic regression models, with normal or robust variance estimators, were used to estimate study-specific odds ratios (ORs) and 95% confidence intervals (CIs) for the relationship between occupational PA (categorized in tertiles) and lung cancer risk, while

adjusting for smoking and lung cancer risk factors identified using directed acyclic graphs. The ORs were then pooled using a random-effects model.

Results Compared with low occupational PA as reference, subjects with medium and high occupational PA had ORs of 0.64 (95% CI: 0.38–1.07) and 0.73 (95% CI: 0.39–1.34), respectively. The ORs were similar by sex and by smoking status (never vs. ever smokers).

Conclusion Our findings suggest that, like recreational PA, occupational PA may protect against lung cancer risk.

0-415 CHANGING TRENDS FOR MESOTHELIOMA IN CANADA AND THEIR IMPLICATIONS

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Introduction Canada was once the world's largest producer of asbestos, but exposure has been decreasing since the 1970's due to restrictions on use, lower occupational exposure limits, closing of mines, and a ban in 2018.

Objectives The objectives of this study were to evaluate how rates of mesothelioma in Ontario and British Columbia (BC), which together constitute over 50% of the Canadian population, have changed over time, by sex, age, geographical region and tumour site.

Methods The Ontario and BC Cancer Registries were used to identify 4,146 and 1,659 malignant mesothelioma cases between the years 1993–2017 and 1992–2016, respectively. Time trends were examined by sex, age, and anatomical site. Birth cohort models for Ontario were fit using US National Cancer Institute's age-period-cohort analysis web tool.

Results Ontario incidence rates for mesothelioma climbed from 1.0/100,000 in 1993 until 2012 when rates plateaued at approximately 1.6. In BC the rate climbed from 1.1 in 1993 to 1.7/100,000 in 2003, when it began to plateau. Although female rates are much lower than male, they continue to steadily rise in both provinces. Rates among people over the age of 70 rose dramatically over time, while rates were steady or dropped among people below the age of 50 in both provinces. Relative to the 1921–25 birth cohort, male incidence rate ratios increased until peaking in 1936–40. Rate ratios for subsequent male cohorts decreased. In contrast, using the same reference period, the risk in women rose slowly with successive birth cohorts, though confidence limits were wide due to the low case counts.

Conclusion These complex changes over time may be due to major reductions in exposure in the 1970's, longer latency periods associated with lower levels of exposure, and the growing importance of environmental exposures.

Methods

0-15 OCCUPATIONAL HEALTH: A MULTI-COHORT JOB TITLE CLEANING PROJECT BY ALGORITHM

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Introduction Occupational data in prospective cohort studies is often underutilized due to the human and financial resources required to code open-ended text, such as job titles. Recognizing the value of occupational data in health research, as well as potential errors associated with manual coding, an Automated Coding Algorithm (ACA)-NOC algorithm was developed utilizing a Natural Language Processing approach.

Objectives We tested the ACA-NOC algorithm on two regional cohorts of a pan-Canadian cohort study, which represents the largest dataset an algorithm of this kind has been applied to. This process will harmonize and greatly expand the utility of the occupational data, enrich the research platforms, and further refine the efficiency of the algorithm.

Methods The ACA-NOC algorithm was tested on data from the Canadian Partnership for Tomorrow's Health (CanPath), a longitudinal cohort examining the role of genetic, environmental, lifestyle, and behavioural factors in the development of cancer and chronic disease. Using an iterative and interactive approach, the algorithm was applied to job title data from 111,000 questionnaires from two regional cohorts, coding the data to the Canadian National Occupation Classification (NOC) system. The algorithm was further refined based on each round of analysis, increasing the quantity of accurately coded data.

Results Results from this research demonstrate the ability to refine the ACA-NOC algorithm with a 10% overall improvement in exact matching from the baseline algorithm. There were also instances where the algorithm performance was superior to the manual coding. The utilization of the algorithm offers significant savings in time, human resources and cost compared to a singular manual coding approach.

Conclusions The coding and harmonization of this multicohort data demonstrates the value of the ACA-NOC algorithm, while increasing the utility of the CanPath data and research related to occupational health. Future research may involve comparisons between CanPath and international cohorts.

O-299 AN APPLICATION OF A PSEUDOLIKELIHOOD APPROACH IN A COUNTER-MATCHED STUDY OF BLADDER CANCER IN A COHORT OF STEEL WORKERS EXPOSED TO METALWORKING FLUID MISTS

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10.1136/OEM-2021-EPI.81

Objectives To compare partial likelihood and pseudolikelihood approaches in a nested case-control study under countermatching design in the presence of time varying-covariates.

Methods Within a prospective cohort of 17603 French steel workers, cases were newly diagnosed with a histologically-confirmed carcinoma of the bladder in 2006–2012. Three controls per case matched on age at diagnosis were randomly selected following a countermatched sampling scheme using a four-strata surrogate time-varying exposure to metalworking fluid (MWF) mists covariate, assessed by a job-exposure matrix. Cases (n=84) and controls (n=251) provided information during questionnaire interviews concerning smoking history and occupational exposures history that were compiled by experts to assess occupational exposure to straight MWFs, soluble MWFs, synthetic MWFs and polycyclic aromatic hydrocarbons (PAHs) not included in MWFs. Three quantitative time-varying metrics were used in the models: the duration, the frequency-weighted duration and the cumulative exposure index. Cox models were fitted with the standard partial likelihood approach using only the 3 countermatched controls for each case as well as by maximizing the pseudolikelihood which uses all the controls sampled for each case with calibrated weights.

Results Compared to the standard method, in the pseudolikelihood approach there is a reduction in the variance of the estimates for straight MWFs, synthetic MWFs and smoking but an increase for soluble MWFs and PAH. The hazard ratios that were > 1 with the standard method were attenuated when considering the pseudolikelihood approach. The hazard ratios for the straight MWFs in the pseudolikelihood approach were 1.10 (95% CI: 1.01 – 1.19) per year of exposure and 1.33 (95% CI: 1.05 – 1.7) per full-time equivalent year of exposure.

Conclusion Nested case-control study under countermatching design would benefit from pseudolikelihood approach. Results from the current study suggest that occupational exposure to straight MWFs increases the risk of bladder cancer.

O-300 CORRECTING THE REFERENCE LIFE TABLE IN MORTALITY ANALYSIS: APPLICATION IN A COHORT OF SEWER WORKERS

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10.1136/OEM-2021-EPI.82

Objectives To apply correction in life tables in mortality analyses to address selection effect with respect to the reference population in a cohort of sewer workers.

Methods We used excess hazard model to assess the excess mortality from all-cause and from all-cancer in an historical cohort of 1898 sewer workers between 1960 and 2011. National and regional life tables were available to assess the all-cause and the all-cancer background mortality. The corrections of these life tables were modeled by spline functions in the logit of survival scale. The excess hazard was modeled using splines functions with the time since hiring as the time scale. The parameters of the model were estimated by maximizing the likelihood. The expected excess number of cases were estimated using both regional and national model-based corrected tables and compared to those obtained without correcting the life tables. In a simulation study estimates were obtained using the corrected life table with a known model of correction (i), using the uncorrected life table but applying the model of correction (ii), and without model of correction (iii). Results The simulation study showed that applying the model of correction reduces the estimation bias in the excess rate model. In the cohort study, for all-cause mortality, the difference between the excess numbers of cases estimated reduced from 28.0 using the original life tables to 1.5 when a model of correction was applied. For all-cancer mortality, the difference reduced from 24.3 to 11.8. However, the standard error was doubled.

Conclusions The differences between estimates obtained using two reference life tables decreased when the model of correction was applied at a cost of larger confidence intervals.

Correction in life tables can be applied in mortality analyses when the life tables available are not fully suitable to the cohort studied.

O-304 CONCORDANCE BETWEEN THE CANADIAN JOB-EXPOSURE MATRIX (CANJEM) AND EXPERT ASSESSMENT IN OCCUPATIONAL EXPOSURE ASSESSMENT AMONG JOBS HELD BY WOMEN

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Introduction The Canadian job-exposure matrix (CANJEM) is a general population JEM built from expert assessment data of 31,673 jobs held by 8,760 participants from four Montreal case-control studies.

Objective To examine the validity of CANJEM for jobs held by women, by comparing exposure assessments using CAN-JEM and our expert assessment method to a selected list of 69 agents.

Methods We compared the exposure estimates for 69 agents within a population-based case-control study of lung cancer assigned by expert assessment to those derived from CAN-JEM. We linked the job histories of 998 women (3403 jobs) to CANJEM and thereby, derived probability of exposure to each of the 69 selected agents in each job. To create binary exposure variables (exposed/unexposed), we dichotomised probability of exposure using two cutpoints: 25% and 50% (referred to as CANJEM-25% and CANJEM-50%). Using the 3403 jobs as units of observation, we estimated the prevalence of exposure to each selected agent using CANJEM-25% and CANJEM-50%, and using expert assessment. Further, using expert assessment as the gold standard, for each agent, we estimated sensitivity, specificity and Kappa.

Results CANJEM-based prevalence estimates correlated well with the prevalences assessed by the experts. Sensitivity, specificity and Kappa varied greatly among agents, and between CANJEM-25% and CANJEM-50% probability of exposure. For some agents such as fabric dust and cooking fumes, the concordance between CANJEM-based and expert-based assessments was high and inspired confidence that CANJEM-based assessments will be adequate; however for many other agents, the concordance was low. We present concordance estimates for 69 agents.

Conclusion Exposure concordance measures between CANJEM and expert assessment differed greatly by agents. The results of this study could guide users of CANJEM as to which agents are most likely to provide results that mimic those that would be obtained with expert assessment.

O-467 EVALUATING THE IMPACT OF SEX AND GENDER ON THE PERFORMANCE OF MACHINE LEARNING FOR AUTO ENCODING OF JOB TITLES

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10.1136/OEM-2021-EPI.84

Introduction Ongoing studies into the use of algorithms for the automated coding of job titles to the Canadian National Occupation Classification have performance accuracy which are at least equivalent to manual coding accuracy. Moreover automated coding provides significant time savings. These studies have identified that both natural language processing and machine learning algorithms are effective for auto coding. Whereas NLP based and machine learning approaches both rely on bespoke rules, and existing data sets, machine learning models can proliferate bias from training data if not corrected.

Objectives The goal of the study is to explore the impact of altering sex/gender ratios in training data sets on overall performance of the machine learning based prediction of NOC codes using patient provided job titles.

Methods Using data participant patient data provided by Atlantic PATH, training data sets were prepared for 100 4digit NOC categories. The data sets were prepared with sex/ gender ratios of 50/50 30/70, 70/30. The data sets were used to train ENENOC machine learning platform and tested on a set of manually coded job titles provided by Atlantic PATH CanPATH . Performance levels were contrasted for all 4-digit NOC categories used in the study.

Results Initial results in this preliminary study have identified that sex and gender are variables that can influence auto coding performance, however the extent to which overall coding accuracy is impacted is relative minor. Further studies are required with larger training sets to fully explore the extent of sex and gender as contributing variables to bias to ENENOC.

Conclusion We initiated studies to investigate the impact of sex and gender bias on performance of the ENENOC algorithm. Together, the ENENOC contributed training and test sets provide a suitable framework for ongoing work in this area.

Muskuloskeletal-1

0-21 PATTERNS OF OPIOID DISPENSING AND ASSOCIATED WAGE REPLACEMENT DURATION IN WORKERS WITH ACCEPTED CLAIMS FOR LOW BACK PAIN: A RETROSPECTIVE COHORT STUDY

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Introduction When unable to work due to low back pain a worker may seek income support and funding for healthcare from an income support system such as workers' compensation. Clinical practice guidelines recommend opioids for low back pain are only used for a short duration, at a low dose and with a plan to cease use.

Objectives This study aimed to identify patterns of opioid dispensing in Australian workers with low back pain and determine the association of dispensing patterns with wage replacement duration.

Methods Australian workers' compensation claimants with low back pain and at least one day of wage replacement were included. We used group-based trajectory modelling to identify opioid dispensing patterns over a two and half year period from reported low back pain onset. Quantile regression was then used to compare wage replacement duration between each dispensing pattern group. **Results** One third of workers with low back pain (N=3205, 33.3%) received at least one opioid dispense during their claim. Three dispensing patterns were identified. The majority had a short-term low-volume opioid dispensing pattern (N=2166, 67.6%), while 798 (24.9%) had a long-term moderate-volume pattern and 241 (7.5%) had a long-term high-volume pattern. Workers dispensed opioids had significantly longer wage replacement duration than those not dispensed opioids (median (weeks): 63.6 versus 7.1 respectively). In addition, moderate- and high-volume long-term dispensing had significantly longer wage replacement duration compared with short-term dispensing (median (weeks): 126.9, 126.0 and 30.7 respectively).

Conclusion Our study found a high use of opioids for long durations among compensated Australian workers with low back pain. Multifaceted strategies to limit long-term use of opioids are needed. These could include implementation of clinical care standards and indicators that can be used to monitor and regulate opioid use, and implementing financial mechanisms to stem long-term opioid use.

O-179 OCCUPATIONAL DEMANDS ASSOCIATED WITH ROTATOR CUFF DISEASE SURGERY: RESULTS FROM A NOVEL LINKAGE OF A JOB-EXPOSURE MATRIX TO THE UK BIOBANK

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Objective Occupations requiring high physical demands may lead to greater risk of rotator cuff disease (RCD) and corresponding surgical treatment. We linked a job-exposure matrix (JEM) to the UK Biobank to measure physical occupational exposures and estimate associations with incident RCD surgery.

Methods Job titles at baseline and UK Standard Occupational Classification (SOC) codes were recorded during a verbal interview. Lifetime job histories were captured through a webbased survey. UK SOC codes were linked to a JEM based on the US O*NET database. O*NET-based scores for physical demands were assigned to jobs including: static strength, dynamic strength, general physical activities, handling/moving objects (range=1-7), time spent using hands, whole body vibration, and cramped/awkward positions (range=1-5). RCD surgeries were identified through national hospital inpatient records. Cox regression was used to calculate hazard ratios (HRs) as estimates of associations with RCD surgery accounting for confounders. Among those with lifetime job histories, associations were estimated with duration of time with high exposure (i.e. above cut-offs identifying approximately the top quartile of exposure).

Results Job titles were available for 277,808 people, of which 1,345 (0.5%) had a subsequent inpatient RCD surgery. After adjusting for age, sex, race, education, deprivation, and body mass index, all O*NET variables considered were associated with RCD surgery (HR per point increase range=1.10-1.45, all P<0.005). More frequent occupational manual labor self-reported in the UK Biobank verbal interview was also associated with RCD surgery (HR for 'Always' vs. 'Never/rarely'=2.12; 95%CI=1.79-2.50). Lifetime job histories were available for 100,929 people, in which high exposures were

significantly associated with RCD surgery after more than 10 years of work (Ex. HR for 11–20 years vs. 0 years with static strength score \geq 4=2.06, 95%CI=1.39–3.04).

Conclusion Numerous occupational physical exposures were associated with incident RCD surgery. Associations were strongest in workers with more than a decade of high exposure.

O-240 ASSOCIATIONS BETWEEN FEELING COLD AT WORK AND WORK PERFORMANCE IN A COLD-EXPOSED WORKING POPULATION FROM THE TROMSØ 6 STUDY

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10.1136/OEM-2021-EPI.87

Objective Cold exposure is associated with an increased prevalence of musculoskeletal pain. We found earlier that employees spending $\geq 25\%$ of their working time in cold environments had higher odds of chronic musculoskeletal pain. There was a consistent tendency of higher odds for increasing frequency of feeling cold. Cold exposure can also interfere with work performance. The aim of this study was therefore to investigate if the frequency of cold experience was associated with impaired work performance.

Methods We used data from the sixth survey of the Tromsø study (2007–2008). Participants aged 30–67 years who reported to work in a cold environment $\geq 25\%$ of the time, were not retired, not receiving full-time disability benefits and without missing values were included, leading to 793 participants. Feeling cold was categorized into never, sometimes and often feeling cold. Work performance variables comprised of binary variables of impaired control of movement, heavy physical work and long-lasting physical work, finger dexterity and –sensitivity. Associations between feeling cold at work and self-reported work performance were examined with Poisson-regression, adjusted for age, sex, smoking and body mass index.

Results Both prevalence of impaired work performance and associations between frequency of feeling cold and impaired work performance were consistently lower for those never feeling cold and higher for those feeling cold often, compared to those feeling cold sometimes. In the fully adjusted model, the strongest associations were found for impaired long-lasting work performance with prevalence ratio (PR) 0,35 (95%CI 0,20–0,62) for never feeling cold and PR 1,81 (95%CI 1,35–2,42) for feeling cold often. For impaired heavy work PRs were 0,53 (95%CI 0,31–0,90) and 2,13 (95%CI 1,50–3,04), respectively.

Conclusion In this cross-sectional study on cold-exposed workers, cold experience frequency was associated with work performance with the tendency of increased work impairment with increasing frequency of feeling cold.

O-433 WHICH QUEBEC INDUSTRIES AND OCCUPATIONS ARE AT RISK OF WORK-RELATED MUSCULOSKELETAL DISORDERS? A COMPARISON OF ANALYSES OF 2010– 2012 WORKERS' COMPENSATION AND 2014–2015 HEALTH SURVEY DATA

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Introduction Non traumatic work-related musculoskeletal disorders (WMSD) represent an enormous burden of preventable illness. Two strategies and data sources to document this burden and identify workers at highest risk were compared.

Objectives To identify gender-stratified worker groups at high risk of non-traumatic WMSD by industry and type of occupation and compare WC to health survey results.

Methods Using 2014–2015 Quebec Health Survey (QPHS) data on 24,300 workers, measuring self-reported WMSD and industry groupings stratified by occupation (manual/mixed/ non-manual), WMSD risk for each industry-occupation group was estimated using gender-stratified adjusted regression analyses and estimation methods. Using Quebec 2010–2012 workers' compensation (WC) data, gender-stratified WMSD incidence rates per 1,000 full-time equivalent employees (% FTEE) were calculated for 174 industry-type-of-occupation groups. WMSD risk was ranked according to Prevention Index scores.

Results In both studies, women in manual occupations had the highest WMSD risk compared to male counterparts (WC: 39‰vs27‰ FTEE; QPHS: 36%vs25%); manual male and female workers in administrative/support/cleaning/garbage services were identified at high risk; as well as women in accommodation/restaurant and men in specialised construction trades, civil engineering, and metal manufacturing. Compensation data identified another 9 high-risk groups for men, and 11 for women including 3 health sector groups that ranked in the top 5 for women. Conversely, the QPHS identified another 13 high risk groups in men including several construction and manufacturing sectors and 5 in women.

Discussion Differences between the 2 studies' results are likely due to methodologic differences, including under-reporting in compensation data and the survey's low power to identify some industries stratified by gender and occupation. Results of the two studies are complementary and each adds to our understanding of which groups are at WMSD risk to target for prevention. Research is needed to compare different survey and compensation data analytic strategies to improve capacity to identify workers at high WMSD risk.

0-465 PAIN IN HEALTHCARE WORKERS: A PERSPECTIVE OF MULTIDISCIPLINARY APPROACH

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Introduction Health professionals deal with numerous hazards during their occupational life from a physical and mental point of view: precarious working conditions, irregular working hours, emotional pressure, physically demanding jobs, involving weight lifting and manual tasks, which may cause pain and musculoskeletal disorders. Our occupational health service assists more than 20,000 health workers in a large hospital complex in Latin America. It consists of a multidisciplinary team involving physicians, psychologists, engineers, occupational therapists, physiotherapists, as well as an emergency care service where workers may seek immediate medical attention.

Objective To describe the most frequent complaints related to musculoskeletal pain in emergency medical care at our

occupational medicine service and the multidisciplinary approach for referring and treating these workers.

Methods This descriptive and retrospective study comprised data from the occupational emergency care service from 2016 to 2020. All complaints related to International Classification of Diseases (ICD10) codes M and S were analyzed.

Results 13,312 consultations were carried out in our service from 2016 to 2020 due to ICDs M and S; 73.1% workers were female, which coincides with genre distribution in our service. The leading cause of musculoskeletal pain was low back pain (M54.5), whereas finger injuries (S61.0) and ankle sprains (S93.0) were the most important complaints related to trauma. Visits related to musculoskeletal complaints were less frequent in 2020 compared to other years due to Covid-19 pandemics, since this service was responsible for evaluating and testing workers with respiratory symptoms. Workers with musculoskeletal complaints were referred directly from emergency care or occupational physician to multidisciplinary team: orthopedic surgeon, acupuncture, physiotherapy or work adjustment with occupational team.

Conclusion Occupational emergency care data is an important indicator of injuries and pain in healthcare professionals. Its integration with a multidisciplinary team is essential to prevent further musculoskeletal illnesses in hospital workforce.

Muskuloskeletal-2

O-20 PREVALENCE, PREDICTORS AND WAGE REPLACEMENT DURATION ASSOCIATED WITH DIAGNOSTIC IMAGING IN AUSTRALIAN WORKERS WITH ACCEPTED CLAIMS FOR LOW BACK PAIN: A RETROSPECTIVE COHORT STUDY

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Introduction Diagnostic imaging is not recommended for low back pain (LBP) in the absence of clinical evidence to suggest a serious pathology is the cause of pain. Workers may access funding for wage replacement and healthcare, including diagnostic imaging, from workers' compensation if they cannot work due to LBP.

Objectives This study sought to determine in Australian workers with accepted workers' compensation claims for LBP (1) the prevalence of diagnostic imaging of the spine and factors associated with its use, and (2) the association between spinal diagnostic imaging events and wage replacement duration.

Methods Workers with accepted workers' compensation claims for LBP longer than two weeks were grouped by whether workers' compensation funded no, single, or multiple diagnostic spinal imaging in the two years since reported low back pain onset. Ordinal logistic regression was used to define the demographic, occupational and social factors associated with each group. Time-to-event analysis was used to determine the association between spinal imaging and wage replacement duration.

Results In the sample of 30,530 workers, 9,267 (30.4%) received single spinal imaging and 6,202 (20.3%) received multiple spinal imaging. Male workers and workers from the

state of Victoria had significantly higher odds of multiple imaging. Socioeconomically advantaged workers and workers from remote Australia had significantly lower odds of multiple imaging. Magnetic Resonance Imaging was the most common imaging modality. Workers with single spinal imaging (median duration 17.0 weeks; HR 2.0, 95%CI 1.9, 2.1) and multiple spinal imaging (median duration 49.0 weeks; HR 4.0, 95%CI 3.9, 4.1) had significantly longer wage replacement duration than those with no imaging (median duration 6.1 weeks).

Conclusions Over half of Australian workers with an accepted workers' compensation claim for LBP longer than two weeks received diagnostic spinal imaging. Receipt of diagnostic imaging, particularly multiple imaging, was associated with longer wage replacement duration.

0-202 WORKERS ON PROLONGED WORK DISABILITY FOR MUSCULOSKELETAL DISORDERS DO NOT WORRY FOR NOTHING

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Introduction Workers worry during prolonged work disability, but do their worries relate to their actual work disability situation?

Objective The aim of this study was to assess worries and their maintaining factors, while considering the margin of maneuver/leeway at work and their impact on return to work (RTW).

Methods We conducted a cohort study with a convenience sample of 79 (39 men and 40 women) workers having persistent (\geq 3 months) work-related musculoskeletal disorders causing absence from their regular work. Following Dugas' theory validated self-administered questionnaires (ex.: intolerance of uncertainty, utility of worrying) were completed at the beginning and the end of the work rehabilitation program. Also, the questionnaire on type of worries (QTW) assessed specific types of worries and their relationship to work. Trained occupational therapists, (n = 16) evaluated the margin of maneuver of all workers. Multivariate analyses were performed on RTW predicted by workers' indicators and occupational therapists' margin of maneuver.

Results

Twenty-one workers did not RTW The model predicted 54% of the variance in N-RTW (p .0001). Significant factors explaining N-RTW were: lack of a margin of maneuver (OR = 8.5; p = .008); high intolerance for uncertainties (OR = 1.12; p = .01), perceived utility of worrying (OR = 1.11; p .001), and for the QTW scores, a high mean intensity of worries (OR = 2; p = .004) emerging from actual situations (OR = 17.15; p = .02) occurring at work (OR = 8.5). A posthoc analysis (pseudo R2 = .33; p =) shows that a lack of a margin of maneuver is associated with QTW scores of worries emerging from uncertainties at work.

Conclusion Workers not returning to work worry about actual situations at work, but this is also associated with low margin of maneuver, assessed by occupational therapists. Thus, RTW interventions should focus on the work environment.

O-402 DOES HEAVY PHYSICAL WORKLOAD OR LOW DECISION AUTHORITY AGGRAVATE THE EFFECT OF MUSCULOSKELETAL PAIN ON THE RISK OF POOR SELF-REPORTED PHYSICAL WORKABILITY? A COHORT STUDY OF SWEDISH MEN AND WOMEN

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Introduction Musculoskeletal pain (MSP) can affect the functional capacity of workers and engender reduced work ability (WA). The effect of MSP on WA may differ between workers with and without heavy physical workload/low decision authority. Although MSP is widespread in the workforce, only a few studies have explored this hypothesis.

Objectives To investigate the separate and combined effects of MSP and heavy physical workload/low decision authority on poor self-reported physical WA.

Methods This study uses baseline data from the 2010 Stockholm Public Health Cohort (SPHC) questionnaire. The sample included 9419 workers with good baseline physical WA. Exposure to heavy physical workload and low decision authority were estimated using sex-specific job exposure matrices. The mean values for each exposure were dichotomised at the median (high/low) then combined with the presence of MSP. Follow-up data on poor self-reported physical WA were taken from the 2014 SPHC questionnaire. Logistic regression was performed adjusting for age, education, smoking, BMI, health conditions, psychological distress, and leisure-time physical activity. Additive interaction was estimated using the synergy index (SI).

Results MSP, heavy physical workload and low decision authority were separately associated with poor WA. MSP was associated with higher odds of poor WA than heavy physical workload/low decision authority for women, the opposite was observed for men. Combined exposure to MSP and heavy physical workload/low decision authority was associated with the highest odds of poor WA (e.g, MSP and heavy physical workload men: AOR: 4.04, 95%CI: 2.00–8.15; women: AOR: 3.25 95%CI: 1.81–5.83). However, the SI was non-statistically significant for both sexes.

Conclusion Combined exposure to MSP and heavy physical workload/low decision authority was associated with higher odds of poor WA than exposure to each factor separately. However, heavy physical workload/low decision authority did not statistically significantly aggravate the effect of MSP on the risk of poor WA.

0-474 PREVALENCE AND RISK FACTORS FOR WORK-RELATED NECK PAIN IN CIVIL SERVANTS: A SYSTEMATIC REVIEW

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Introduction Neck pain is a common work-related musculoskeletal outcome. To summarize its occurrence and risk factors may help to guide occupational interventions, minimizing the problem. Objective To verify the prevalence and risk factors associated with occupational neck pain in employees.

Method This is a systematic review, with a search performed in two databases (PubMed/Medline and BIREME). Publications that estimated the prevalence of occupational neck pain and associated factors among employees were included in the review. Two independent reviewers searched, selected and evaluated all articles based on the PRISMA protocol.

Results 1830 articles were identified, and 48 which met the inclusion criteria were analyzed. Number of participants ranged from 15 to 134754 individuals among the studies; 28 studies (56%) were cross-sectional, and 23 (44%) were cohort studies; 74% came from Asia, Europe and Oceania, 8% from America, and 6% from Africa. Most studies analyzed musculoskeletal disorders in general, and neck pain was the second most prevalent complaint. The highest prevalence of neck pain was 71%, and the outcome was more frequent in women. The main risk factors described were ergonomic, psychological and social aspects.

Conclusions Neck pain is the second most prevalent musculoskeletal disorder in civil servants, particularly in office workers using computers. The most common associated individual risk factors were female gender, age, body mass index, and previous history of neck pain. Ergonomic risk factors were time and frequency of use of the mouse and keyboard, the position and height of the monitor, the temperature in the work environment, the posture adopted in the chair, as well as the simultaneous use of the telephone and computer.

O-484 OCCUPATIONAL LIFTING, PUSHING AND RISK OF SUBACROMIAL IMPINGEMENT SYNDROME SURGERY: A QUANTITATIVE RISK ASSESSMENT

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10.1136/OEM-2021-EPI.94

Objective The aim was to examine exposure-response relations between intensities of pushing/pulling, lifting/carrying loads and surgery for subacromial impingement syndrome (SIS) during a 10-year period.

Methods We conducted a register-based cohort study (2003–2008), comprising all persons born in Denmark (1933–1977) with at least 5 years of work experience (N=2 374 403). Information on SIS surgery was retrieved from the Danish National Patient Register (N=14 188). Occupational mechanical exposures comprising lifting or carrying loads \geq 10 kg and pushing or pulling loads \geq 50 kg were assessed by combining individual job codes with our expert-based Shoulder job exposure matrix. We created 3 intensity-specific exposure duration variables by dividing the intensity for lifting/carrying and pushing/pulling into categories (low, medium, and high), and summed up the number of years in each exposure category for a 10-year time window. The association was analyzed using logistic regression as survival analysis.

Results The adjusted odds ratio (ORadj) increased with both exposure duration and intensity of lifting/carrying and pushing/pulling. ORadj reached a maximum of 1.78 (95% CI 1.66–1.89), 2.52 (95% CI 2.32–2.74), and 2.96 (95% CI 2.53–3.47) after 10 years of exposures for the three exposure intensities. For pushing/pulling, maximum ORadj was 1.44 (95% CI 1.31–1.58), 1.68 (95% CI 1.58–1.79), and 1.72 (95% CI 1.50–2.00), respectively.

Conclusion We found exposure-response relations for both lifting/carrying and pushing/pulling across the 10-year time window. The risk was especially pronounced for lifting/carrying compared to pushing/pulling. We did not find indications of safe exposure intensities.

Pesticides

O-111 TRANSLATING OBSERVATIONAL RESEARCH INTO REGULATORY SCIENCE: THE ROLE OF U.S. EPA'S OFFICE OF PESTICIDE PROGRAMS IN EVALUATING EPIDEMIOLOGIC EVIDENCE

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Introduction The U.S. Environmental Protection Agency's Office of Pesticide Programs (OPP) is a licensing program that regulates pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA). As part of this program, OPP has a regulatory mandate to evaluate research on the health effects of pesticides and plays a critical role in translating epidemiologic research into regulatory science and policy.

Objectives OPP has developed a framework to ensure that pesticide risk assessments include systematic evaluation of epidemiologic research on the potential adverse effects of pesticide exposure. The objective of the presentation is to raise awareness about how epidemiologic research on pesticides can inform risk assessment and occupational health policy by: (1) Providing background on OPP's risk assessment process, (2) Describing how OPP evaluates epidemiologic research using an approach that is scientifically robust and transparent; and (3) Highlighting opportunities for collaboration between researchers and risk assessment.

Methods OPP has extensive experience evaluating epidemiology studies on pesticides and is required to review all registered pesticides according to a 15-year registration review schedule. Building off of this experience, OPP will provide a survey of its evaluation approach and explore challenges that may be promising areas for future collaboration between researchers and risk assessors.

Results and Conclusions EPA/OPP routinely evaluates epidemiology research on pesticides and is guided by a systematic review framework that is scientifically robust and transparent. While epidemiologic research increasingly plays important role in the risk assessment process, there are important regulatory challenges that often limit the ability of OPP to translate research findings into policy. Therefore, there is a critical need to strengthen collaboration between researchers and risk assessors to better understand the scientific capabilities and data needs across occupational health disciplines.

O-188 PESTICIDE EXPOSURE DURING APPLICATION WITH BACKPACK SPRAYERS IN GREENSPACES: A FIELD STUDY ON GLYPHOSATE APPLICATION

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Introduction Data on pesticide exposure during occupational knapsack spraying is scarce.

Objective This field study assessed its levels and determinants. Methods Private landscapers/gardeners and municipal workers in the Normandy region, France, were enrolled between March and May 2011. They were equipped with cotton undergarments and gloves to assess actual dermal exposure to glyphosate, and with cotton coveralls separately for each phase to assess the contribution of mixing/loading and spraying and the distribution on 11 body areas. A field monitor observed the whole workshift and filled in a standardized observation grid. Respiratory samplings were also systematically performed, and additional surface wipes obtained from various equipment. Results Twenty-four workers were included, all men, with a median age of 40 years old, and a median experience in pesticide use of 14.5 years. The total work time varied between 110 and 360 min (median 210), and the number of mixing/ loading-spraying cycles ranged from 1 to 8 (median 2). Spraying was more exposing than mixing/loading for all body parts except hands. Hands contributed to nearly 90% of body exposure during mixing/loading, and 30% during spraying, followed by back for spraying (14%). The median actual body contamination was 5,256 µg, with a median of 4,620 µg for hands. Dermal PPE use was associated with a decreased actual dermal exposure (estimate -0.81, p=0.001), and the number of mixing/spraying cycles with an increased exposure (more or less than 2 cycles: estimate 0.85, p=0.0006).

Conclusion Given their large contribution to overall dermal exposure, caution should be paid to handwashing and common hygiene rules during knapsack spraying. To our knowledge, our study is the first to report a high contamination of the back during spraying.

0-283 RECALL ABILITY OF PESTICIDE USERS IN UGANDA AND THE UK: RESULTS FROM THE IMPRESS STUDY

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Introduction Epidemiological studies on occupational exposure to pesticides commonly use self-reported questionnaire or interview data, so insight into recall accuracy is crucial to understand study findings.

Objectives To evaluate farmers' and farmworkers' recall of occupational exposure to pesticides and other exposure determinants, and to estimate the size of any recall bias.

Methods We used data from the IMPRESS project (www. impress-project.org), which includes three occupational cohorts of farmers' and farmworkers' exposure to pesticides in the UK and one in Uganda. Participants were surveyed at baseline to ascertain the frequency of their pesticide use, personal protective equipment (PPE) practices, and other information that may affect their exposure to pesticides; re-assessment occurred 2–14 years later, depending on the cohort. To assess recall, we examined the percentage of overall agreement, sensitivity, specificity, and any trends by demographic characteristics using regression analysis.

Results Across the four cohorts, 899 participants provided responses at two time-points. Preliminary analysis identified
no overall trends in the recalled frequency of pesticide application in the Ugandan cohort, where reassessment occurred 2 years later. Initial results in the UK, where re-assessment took place many years later, suggested overestimation of years working with pesticides (Geometric Mean Ratio=1.25 [95% CI: 1.16 to 1.36]). The UK participants reported more frequent use of PPE items than in Uganda, which was mostly limited to long-trousers, shirt, and boots; however, recall ability was similar (mostly >70% agreement). The reporting of specific crops involving pesticide use was low among Ugandan farmers, who cultivated many crops (e.g., only 13% could recall all three major crops). Sensitivity of reported crop use in the UK appeared to be lower (<40%) with a longer recall period.

Conclusion Our results to date suggest limited evidence of recall bias, which appears to differ based on the specific exposure determinant and length of recall period.

O-307 PERMETHRIN USE AND CIRCULATING IMMUNOLOGIC MARKERS: A LONGITUDINAL INVESTIGATION IN THE BIOMARKERS OF EXPOSURE AND EFFECT IN AGRICULTURE STUDY

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Introduction Permethrin is one of the most widely used insecticides in the United States. Previous studies have reported associations of permethrin use with increased risk of multiple myeloma (MM) and its precursor, monoclonal gammopathy of undetermined significance (MGUS). Biological mechanisms underlying these associations remain unclear, with some evidence linking permethrin to altered hematological parameters, underscoring the need to further explore immunologic markers related to permethrin exposure.

Objective Evaluate associations between recent occupational permethrin use and circulating levels of immunologic markers. Methods We conducted a longitudinal investigation among 33 male permethrin applicators \geq 50 years of age in the Biomarkers of Exposure and Effect in Agriculture study who had blood samples collected in the offseason and within a day after permethrin application (recent use); 27 of these applicators also had a sample collected ~3 weeks after permethrin use. As an external comparison, we analyzed one-time blood samples from 70 age-matched non-farming controls. Serum levels of 87 immunologic markers were assessed using a multiplex immunoassay. Multivariable linear mixed models were used to estimate associations between permethrin use and immunologic markers.

Results Among pesticide applicators, recent permethrin use (vs. offseason) was associated with increased serum caspase-8 (mean relative (fold)-change in protein concentration: 1.36; 95% confidence interval: 1.04-1.78) and arginase-1 (1.24; 1.00-1.53) and reduced pleiotrophin (-1.15; -1.26, -1.05) and matrix metalloproteinase-12 (MMP-12; -1.12; -1.26, 1.00) levels. Associations with caspase-8, arginase-1, and pleiotrophin persisted at ~3 weeks after permethrin use (vs. offseason). Compared to non-farming controls, we also observed increased caspase-8 (1.44; 1.10-1.88) and reduced MMP-12 (-

1.31; -1.61, -1.06) levels among applicators after recent permethrin use, with associations persisting ~ 3 weeks after use. **Conclusion** Although exploratory, these findings suggest that permethrin use may be associated with certain immunologic markers previously implicated in MGUS/MM pathogenesis, particularly caspase-8 and MMP-12, which are involved in apoptosis and angiogenesis, respectively.

O-406 EXPOSURE TO CHLOROACETAMIDE HERBICIDES IN AGRICULTURE AND LYMPHOID MALIGNANCIES, OVERALL AND BY SUBTYPES, IN THE AGRICULTURE AND CANCER (AGRICAN) COHORT.

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Introduction Since the 80s, more and more epidemiological studies demonstrated a relationship between agricultural exposures - especially pesticide use - and Lymphoid Malignancies (LM). However, the role of specific pesticides remains little explored.

Objective We assessed the relationship between chloroacetamide herbicide exposure (as a group and for specific molecules: acetochlore, alachlor, dimethachlore, DMTA, DMTA-p, flufenacet, S-metolachlor, metolachlor metazachlor, napropamide, pethoxamid) and LM overall and by main subtypes: multiple myeloma (MM), Chronic Lymphocytic Leukemia/ Small Lymphocytic Lymphoma (CLL/SLL), Diffuse Large B-cell Lymphoma (DLBCL).

Methods Lifetime occupational pesticide use on 11 crops were collected from 181,842 people enrolled in the cohort AGRI-CAN. Incident cases were identified by cross-linkage with population-based cancer registries until 2015. Exposure to 11 chloroacetamides (ever/never) was estimated based on the crop-exposure matrix PESTIMAT.

Results Incident cases included 1,349 LM, 319 MM, 298 CLL/SLL and 221 DLBCL. Among the 51,889 pesticide users, 44% were exposed to chloroacetamides (n=22,862 including)95.4% men), ranging from 7.8% (n=4,059) for dimethachlore to 28.7% (n=14,871) for metolachlor/S-metolachlor. Positive associations were reported between chloroacetamide use on any crop and LM (HR=1.33, 95%CI=1.12-1.59), CLL/SLL (HR=1.66, 95%CI=1.15-2.39) and MM (HR=1.37, 95%) CI=0.95-1.96), especially on corn. In addition, specific associations were observed in some categories of farmers: LM overall and CLL/SLL in vinegrowers, LM in beet-growers, LM and DLBLC in rape-growers and MM in potatoes-growers. Exposure to some active ingredients were significantly associated with i) LM: acetochlor, DMTA, flufenacet, alachlor, metazachlor, metolachlor (risks from 1.32 to 1.43); (ii) CLL/SLL: alachlor, metolachlor (risks from 1.75 to 1.79). Trends to increased risks were also observed between (i) LM and DMTA-p or napropamide, (ii) CLL/SLL and napropamid, (iii) MM and alachlor or metolachlor and (iii) DLBCL and dimetachlor or metazachlor.

Conclusion We found positive associations between LM overall incidences and some subtypes, and exposure to chloroacetamide as a group or considering specific molecules.

0-456 EVALUATION OF EXPOSURE TO PESTICIDES THROUGH THE USE OF EFFECT BIOMARKERS IN RURAL WORKERS AND RURAL RESIDENTS IN RIO DE JANEIRO STATE – BRAZIL

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Introduction Brazil is one of the world's largest consumers of pesticides and this intense use impacts not only the environment but also exposes a wide range of individuals, such as rural workers who are occupationally exposed to pesticides and also the residents of the rural area environmentally exposed.

Objectives To evaluate occupational exposure to pesticides and to identify the neurotoxic and genotoxic effects in rural workers (RW) and rural residents (RR).

Methods A sectional epidemiological study was carried out with 104 RW and 23 RR of the city of Casimiro de Abreu (RJ/Brazil). A comparison group (CG) was formed with 103 residents of the urban area of the same city. Genotoxic analyses, through the comet assay and micronucleus test (MN), and the evaluation of the activity of cholinesterase enzymes (AChE and BChE), were performed.

Results A reduction in cholinesterase enzyme activity was observed, mainly for butyrylcholinesterase of RW and RR when compared to CG (RW = 3856.40; RR = 3956.04; CG = 4359.57; p = 0.002). An increase in genotoxic effects in RW when comparing CG were observed (comet assay: RW = 21; CG = 10; p < 0.001 and MN number: RW = 6.50; CG = 3.00; p < 0.001), demonstrating that individuals occupationally exposed to pesticides are more likely to have genotoxic effects when compared to non-exposed individuals.

Conclusion The findings from this research will serve to support the execution of programs to monitor populations exposed to neurotoxic and genotoxic substances and allow the development of strategies for the prevention, control and surveillance of effects generated by occupational and environmental exposures to pesticides.

Policy and Regulation

0-48 POLICY ISSUES ON WORK AND EMPLOYMENT IN SMALL SCALE MINING INDUSTRIES IN THE PHILIPPINES

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10.1136/OEM-2021-EPI.101

Objective Small scale mining (SSM) has contributed 14% of the total Gross Domestic Product (GDP) of the Philippines. The aim of the study is to look into policy issues on work and employment of small scale miners in the Philippines.

Methods The data were based on gray literature, peerreviewed journals, databases, government statistics, and secondary literature on major mining disasters in the Philippines, and the impact of regulation or lack thereof in this industry.

Results Research findings show that mining work is artisanal, with use of simple tools, and lack of sophisticated equipment and processes. There is massive use of toxic chemicals such

as cyanide and mercury that have been associated with adverse health problems. The study review showed certain health issues due to cyanide and mercury poisoning from mining such as rapid breathing, gasping, tremors, convulsions, headache, dizziness and thyroid enlargement and eventually death, and children ages 17 years old and below experienced cough, wheezing, shortness of breath. In Western Mindanao, workers were found to be exposed to high levels of mercury. Gastrointestinal complaints of the workers were significantly associated with elevated hair methylmercury levels. Despite these, the government has no existing specific regulation and monitoring system for safety and health among small scale miners in the Philippines. Other policy issues included the following-that small scale mining is unregulated and unrecognized, absence of social safety net protection for the sector.

Conclusion Based on the research and policy reviews, there is a need to integrate the small scale mining into the labour economy so as to regulate and prevent hazardous work practices.

0-70 EVOLUTION OF HEALTH INEQUALITIES IN THE CENTRAL AMERICAN WORKING POPULATION, 2011 – 2018

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10.1136/OEM-2021-EPI.102

Objective Monitoring of occupational health inequities is central to establishing effective public policies. The Central America Working Conditions Survey (ECCTS, by its Spanish acronym) was conducted in 2011 and 2018. This study analyzes changes, between these two periods, in the health inequality gap of workers in the six Spanish-speaking Central American countries, by gender, age, education level, occupation, and geographic area.

Methods The ECCTS is a cross-sectional survey of a nationally representative sample of workers (12,024 in 2011 and 9,030 in 2018), age \geq 18 years, in formal or informal employment. We calculated the prevalence of poor self-perceived health (SPH) and its 95% confidence interval by country, age, education level, occupational category, and geographic area; differences between 2011 and 2018 were measured using chi-square statistics. We also measured absolute and relative population attributable risks, the Kuznets ratio and weighted Keppel index as inequality measures. All analyses were stratified by sex.

Results Overall, the health of the population in this region improved. Poor SPH decreased from 32% to 29% in women, and from 33% to 30% in men. The health inequalities gap among occupational groups remains wide. In women, the gap increased by occupation and geographic area, and decreased by education level. Among men, we found no statistically significant changes in the gap. Inequality between countries increased, evidenced by an increase in the Keppel index from 22% to 39% in women and from 20% to 29% in men.

Conclusion A general improvement in the health status was observed, but there was no progress in closing the health gap among occupational groups, and the gap between countries grew significantly. This study is the first to benchmark surveillance information that may contribute to developing,

implementing and evaluating public policies. It could also serve as an initial stimulus to create strong national and regional occupational monitoring systems.

0-311 SETTING PRIORITIES IN OCCUPATIONAL HEALTH RESEARCH IN EUROPE

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Background Employment is an essential component of adult life, and occupation is a major determinant of health. Despite profound changes in working life, there has been little coordinated European occupational health research.

Objectives We present results from the HERA international project funded by the EU Horizon2020 program, to set priorities for an environment and health research agenda in the EU for 2020–2030.

Methods We contacted hundreds of researchers in Europe through an online survey. We also identified major policy needs in the health and environment/occupation nexus by contacting national, regional, and European stakeholders representing authorities, intergovernmental organizations, civil society, and the private sector through surveys and regional meetings. We applied a priori defined criteria to examine novelty, public health importance, importance to the environment, impact on policies, and potential for innovation within the sustainable development goals.

Results

Main research gaps identified include (i) Climate change and worker health; (ii) Ageing workers; (iii) New technologies and chemicals; (iv) Working time; (v) Changing employment patterns and precarious employment; (vi) Mixed exposures and biomonitoring; (vii) Work-life-balance; and (viii) Neglected occupational diseases. In addition, priority actions related to occupational health were identified such as commuting to work, tools, and infrastructure such as the development of big data, biobanks, occupational cohorts, and large population cohorts with occupational information, development of exposome type approaches, and approaches examining societal aspects on employment and productivity.

Conclusions We will discuss challenges in the identification of key areas in occupational health research that will benefit from new scientific evidence and challenges in strategies to ensure the engagement of stakeholders. This large initiative in Europe has systematically evaluated priorities through the engagement of a wide spectrum of stakeholders across the continent. A consultation process will continue over the next year to raise additional research gaps and calibrate recommendations.

0-329 EFFECTIVENESS EVALUATION OF A REGULATORY TRAINING STANDARD TO PREVENT FALLS FROM HEIGHTS IN CONSTRUCTION

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10.1136/OEM-2021-EPI.104

Objective The effectiveness of a regulatory training standard to prevent falls from heights in construction in the province of Ontario, Canada was evaluated. The standard specifies a full day of working-at-heights safety training, including both theoretical and practical elements, delivered by a government-approved training provider. Once the regulatory requirements were in full effect in fall 2017, over 400,000 workers were trained to the standard.

Methods A comprehensive effectiveness evaluation of the working-at-heights training standard was undertaken, including a longitudinal survey of over 600 workers who underwent the training, collection of their pre-post-training knowledge test scores, and a quasi-experimental analysis of lost-time injury claims for work disability insurance.

Results A large increase in mean knowledge test score (out of 10 points) was observed for workers on their day of training: from 6.8 to 9.5 points (p Follow-up after two years, showed a large decline in knowledge test scores (to mean score 7.5). In contrast, the work practice improvements had been sustained. The incidence rate of lost-time claim injuries due to falls targeted by the training (e.g. falls from roofs) declined by 21.0% from 2012–2014 to 2017–2018 in the Ontario construction sector. In comparison, the rate due to falls not targeted by the training (e.g. falls at the same level) increased by 2.9%; and the rate due to non-fall traumatic injuries decreased by 7.3%. These differences in incidence rate changes were statistically significant. (Analyses are currently being updated to include injuries from 2019.)

Conclusion The evaluation findings provide consistent support for a conclusion that the mandatory training standard was effective in reducing the incidence of injuries targeted by the training.

O-483 GEOGRAPHIC VARIATION IN WORK DISABILITY DURATION IN 5 CANADIAN WORKERS' COMPENSATION JURISDICTIONS

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10.1136/OEM-2021-EPI.105

Introduction Prior research has focused on individual or employer-level factors that influence work disability duration. A smaller number of studies identified differences in work disability duration by province or state and the urban-rural spectrum. Variations may also occur across smaller units of geography due to place-based factors, such as labour market characteristics and healthcare access, that play an important role in work disability duration.

Objectives The purpose of this study is to describe geographic variation in work disability duration within five work disability jurisdictions in Canada and examine if variation differs by injury type and jurisdiction.

Methods Using Canadian workers' compensation data, we examined variability in disability days by calculating the coefficient of variations (CVs) across standardized units of geography in cohorts of workers with low back, shoulder and knee injuries.

Results Preliminary results suggest shoulder injuries had the longest disability duration with a mean of 50.10 days (SD

67.94), followed by knee injuries with a mean of 44.77 days (SD 62.03). Low back injuries had the shortest duration with a mean of 27.31 days (SD 45.49). There were different patterns of regional variation within jurisdictions. In three jurisdictions, British Columbia, Manitoba and Ontario, higher CV values were observed for shoulder injuries (10.98, 12.03 and 15.65 respectively) and lower CVs observed for knee injuries (6.34, 9.77, 14.19 respectively). In contrast, in Alberta and Saskatchewan CVs were lower for shoulder injuries (4.47 and 4.92 respectively) and higher for low back injuries in Alberta (CV=8.27) and knee injuries in Saskatchewan (CV=13.49).

Conclusion Findings suggest that variation across regions differs by jurisdiction and injury cohorts. This variation may reflect differences in approaches to treatment for specific injuries across jurisdictions. Further analysis will examine the association between work disability duration and workers' compensation healthcare utilization and spending in these cohorts.

Psychosocial-1

O-38 'IT'S LIKE JUGGLING, CONSTANTLY TRYING TO KEEP ALL BALLS IN THE AIR': A QUALITATIVE STUDY OF THE SUPPORT NEEDS OF WORKING CAREGIVERS TAKING CARE OF AN OLDER ADULT

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10.1136/OEM-2021-EPI.106

Introduction Many informal caregivers of older adults combine their caregiving tasks with a paid job. Adequate support is important to enable them to combine paid work with caregiving, while maintaining their health and wellbeing. To date, however, knowledge about working caregivers' support needs is fragmented.

Objectives This study therefore aimed to obtain more insight into support needs of working caregivers of older adults.

Methods We conducted six online semi-structured focus group interviews with in total 25 working caregivers of older adults living at home. Data were complemented with information from seven working caregivers participating in the study's advisory board. Data were analyzed using inductive and deductive thematic analysis.

Results Six themes related to working caregivers' needs were identified: 1) Recognition of caregivers including the challenges they face; 2) Attention for caregivers' health, wellbeing and ability to cope; 3) Opportunities to share care responsibilities; 4) Help with finding and arranging care and support; 5) Understanding and support from the work environment; and 6) Technological support tailored to the needs and capacities of caregivers' suggested several options in multiple domains of life (i.e. work, home life, personal health and wellbeing).

Conclusion To successfully support working caregivers, a multi-faceted approach including actors from multiple settings, is needed.

0-59 RELATIONS BETWEEN WORK-RELATED FACTORS AND DEPRESSION AND INJURY AMONG JANITORS

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Introduction While there is a body of literature that identifies relations between injury occurrence and resulting depression, literature relevant to a relation between work factors and depression and injury occurrence is limited.

Objectives To identify the potential relations between: 1) work-related factors and depression diagnosis and 2) depression diagnosis and injury outcome and consequences in a high-risk, understudied population.

Methods Specially designed questionnaires were disseminated to 1,200 full-time janitors in the SEIU Local 26 union to collect information on their injury occurrences, personal characteristics, health history, and work-related exposures, for two sequential six-month periods. Risk ratios (RRs) and 95% confidence intervals (CIs) were calculated using multivariable Poisson regression with robust error variances, and included bias adjustment for non-response and adjustment for within-person correlation using general estimating equations (GEEs).

Results A total of 527 observations among 390 janitors identified associations between work environment factors (range = 1, terrible/unhappy/mostly dissatisfied; 2, mixed feelings; 3, mostly satisfied/pleased delighted) and diagnosed depression (n=48): how they felt about people they worked with (1 versus [vs] 3 - RR 3.86; CI 1.31, 11.36); how they felt about the work itself (2 vs 3 - RR 2.54; CI 1.36, 4.77); resources available for their job (1 vs 3 - RR 2.93; CI 1.27, 6.75). Associations were also identified between high (4,5 very much, often) vs low (1–3 sometimes, very little, not at all) frequency of stress and depression (RR 4.79; CI 2.22, 10.36) and between depression diagnosis and risk of injury-related persistent problems (RR 5.19; CI 1.40, 19.24).

Conclusions This analysis enabled identification of workrelated factors associated with diagnosed depression, the relation between stress and depression, and the risk of injury and consequences among those with depression. These findings serve as a basis for future research and relevant interventions to facilitate optimal working environments.

O-172 LONG-TERM EMPLOYMENT STATUS AMONG PATIENTS WITH SUSPECTED WORK-RELATED MENTAL HEALTH PROBLEMS: A 5-YEAR FOLLOW-UP STUDY

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10.1136/OEM-2021-EPI.108

Objective Little is known about the long-term prognosis for employees with suspected work-related mental health problems. Are they employed 5 years after consulting a department of occupational medicine in Denmark, or do they have no or low labor-market attachment? The aim of the study was to examine long-term employment status among patients referred to Danish departments of occupational medicine in the period 2000–2013 due to suspected work-related mental health problems. Methods The study includes data from the Danish Occupational Medicine Cohort. 17,900 patients aged 16-67 were included. All patients were referred to a department of occupational medicine in Denmark from 2000-2013 due to suspected work-related mental health problems. Register data was extracted 5 years prior to study inclusion and until 5 years after study inclusion. Information on 13 potential risk factors for negative labor market attachment was included. The primary outcome of this study was positive work status, defined as being at work or at education, maternity or parental leave. Results Preliminary results showed that approximately 85% of all patients from 2-5 years prior to study inclusion had positive work status. The proportion declined to 30% at the year of study inclusion and increased to approximately 50% of the patients 1 year after inclusion after which practically no further increase was seen. Within the subgroups of patients diagnosed with depression or PTSD only 40% and 30% had positive work status 5 years after study inclusion respectively. Besides, preliminary results indicated that diagnosis, sick leave status at inclusion time and previous work participation, were strong independent prognostic markers of work participation at 5-years of follow up.

Conclusion We found a profoundly reduced long-term employment status among patients referred to departments of occupational medicine in Denmark due to suspected work-related mental health problems, particularly among patients diagnosed with PTSD or depression.

0-271 WORK FUNCTIONING AMONG YOUNG ADULTS: THE ROLE OF MENTAL HEALTH PROBLEMS FROM CHILDHOOD TO YOUNG ADULTHOOD

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Introduction Mental health problems during childhood and adolescence are negatively associated with employment status (having a paid job or not) in young adulthood. Yet, little is known about how young adults function at work, i.e., do they experience difficulties in meeting job demands given their physical or mental health state.

Objective This longitudinal study aims to examine whether the history of mental health problems from childhood to young adulthood is associated with work functioning in young adulthood.

Methods Data were used from 1,004 young adults in the TRacking Adolescents' Individual Lives Survey (TRAILS), a Dutch prospective cohort study with 18-year follow-up and seven measurement waves. Mental health problem trajectories including 11, 13, 16, 19, 22 and 26 age points were identified using growth mixture models. Work functioning was assessed at age 29 with the Work Role Functioning Questionnaire, with scores ranging from 0 to 100. Regression analyses were conducted to examine the associations between mental health problems trajectories and work functioning.

Results Young adults with high-stable trajectories of internalising or externalising problems reported lower work functioning (respectively 74.6 and 76.2) compared to participants with low-stable trajectories (respectively 83.3 and 83.2). These scores correspond with reduced work functioning for more than one working day per week in a fulltime job. Young adults with moderate-stable trajectories of externalising problems reported lower work functioning compared to participants with low-stable trajectories.

Conclusion Persistent high-level mental health problems during childhood, adolescence and young adulthood are associated with lower work functioning in young adulthood compared to those with low-level mental health problems. As information on work functioning provides insight into the difficulties young workers experience in meeting their job demands, it can be used as a starting point for a conversation between occupational physicians and young workers to address these difficulties and to increase work functioning.

O-340 JOB STRAIN, LOW SOCIAL SUPPORT FROM SUPERVISORS AND MATERIAL HANDLING AMONG BRAZILIAN WORKERS: A STUDY ON ETHNICITY AND WORK

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Introduction The contribution of race/color to outcomes with a potential effect on worker's health needs further exploration on epidemiological occupational surveys.

Objectives The study proposed to analyze the association between job strain, social support from supervisor and material handling at work according to the self-reported race/color. **Methods** This cross-sectional study involved 1032 workers from urban cleaning service and footwear manufacturers located in the state of Bahia, Brazil. The interview included the Job Content Questionnaire to measure psychosocial exposure and questions about lifting, pushing and pulling to investigate material handling in the workday. Cox Regression provided brute and adjusted prevalence ratios (PRadj) by sex, age and education.

Results Black workers presented higher proportion of lower education and were more represented in operational positions, followed by brown, both compared with white workers. There was a greater exposure of blacks to job strain (PRadj = 1.6), a combination of high psychological demand and low job control, and low social support from supervisors (PRadi =1.3). Concomitantly, blacks were more subjected to activities with pushing, pulling and lifting materials, presenting PRadj at least 50% higher compared to white workers. Brown were slightly more exposed to job strain (PRadj = 1.1), and to the low social support from supervisors (PRadj = 1.1), and were also more subjected to lifting (PRadj = 1.2), pushing (PRadj = 1.3) and pulling (PRadj = 1.2) materials compared to whites. The complete results of this epidemiological research are available in the brazilian periodic Cience & Coletive Health (online first).

Conclusion The study evidenced an overlap of disadvantageous exposures among black and brown brazilian workers, accentuated among blacks, that can indicate the repercussions of structural racism in the world of work and should be the target of interventions focusing on improving working conditions and racial equity.

0-385 THE IMPACT OF WORKPLACE SOCIAL SUPPORT ON MENTAL HEALTH FUNCTIONING: A COHORT STUDY OF THE WORKFORCE IN STOCKHOLM COUNTY, SWEDEN

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Introduction The burden of mental illness is pervasive. Improved methods for early detection of mental ill-health and comprehensive understandings of factors associated with declining mental health are needed. Workplace social support is an important factor for addressing employee's mental health. However, only a few studies have explored how workplace social support impacts on mental health from a functional perspective.

Objectives To investigate the prevalence of limited Mental Health Functioning (MHF) among Swedish workers and the association between workplace social support and MHF.

Methods This cohort study used a sample of 4979 employees from Stockholm County who responded to population-based questionnaires in 2000 and 2002. Two subsamples were explored: workers without baseline limitations in MHF (n=2844) and workers with baseline limitations in MHF (n=2135). Exposure to workplace social support was estimated using the Swedish Demand-Control-Support Questionnaire. Follow-up data on MHF were taken from the World Health Organisation's Brief Disability Questionnaire. Multinomial regression analysis generated odds ratios (OR) with 95% confidence intervals (CI95%) adjusting for age, sex, education, socio-economic classification, cohabitation and social support outside the workplace.

Results In total, 43% (37% moderate and 6% severe) of workers had limited MHF at baseline. A higher level of workplace social support was associated with a reduced likelihood of moderate functional limitations (AOR 0.92 95%CI, 0.89–0.95) or severe functional limitations (AOR 0.87 95%CI, 0.80,0.94) two years later. Among workers with pre-existing functional limitations, increased workplace social support was associated with improved MHF at follow-up (AOR 1.08 95% CI, 1.05, 1.12).

Conclusions Limited MHF was prevalent among workers. We observed a protective relationship between increased workplace social support and limited MHF. Increased social support was also associated with improved MHF among workers with limited MHF. Interventions that increase workplace social support might protect against a deterioration in MHF and improve MHF among workers with preexisting limitations.

Psychosocial-2

0-26 WORK-LIFE INTERFERENCE AND SUBSEQUENT LONG-TERM SICKNESS ABSENCE. A LONGITUDINAL STUDY OF THE SWEDISH WORKING POPULATION.

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Introduction The literature consistently shows that work-life interference, i.e. the multiple burden of having different social roles, e.g. being a worker, parent, partner and friend is associated with poor health. However, few studies have studied the relationship between measures of work-life interference and objective measures of sickness absence.

Objectives The aim of this study is to investigate work-life interference as a risk factor for subsequent long-term sickness absence.

Methods Data were derived from four (2010–2016) waves of the Swedish Longitudinal Occupational Survey of Health. Data were linked to register data on long-term sickness absence (having at least one continuous period of medically certified sick leave exceeding 14 days) from the Swedish social insurance agency. Generalized estimating equations (GEE) with odds ratios (OR) and confidence interval of 95% was used. The sample included 15 244 individuals (43.1% men and 56.9% women).

Results Almost one fifth of the sample, 18.7% (1110) started at least one period of long-term sickness absence at any point between first wave 2010 and two years after the last wave up to year 2018. Of those 1100, 43.9% were men and 56.1%were women. Results show that work-life interference is associated with an increased risk for subsequent long-term sickness absence (OR: 1.55; 95% CI=1.44-1.67) even when adjusting for general health (OR=1.39; 95% CI=1.29-1.51) and other relevant factors (gender, having children living at home, having a partner, socioeconomic position, management position and age). We found no significant moderating effect of gender nor of time.

Conclusion We conclude that work-life interference is a risk factor for subsequent long-term sickness absence for working men and women in Sweden. From a public health perspective, improving possibilities to balance demands between work and private life can reduce risks of long-term sickness absence.

0-56 WORKPLACE VIOLENCE AMONG WOMEN IN INDUSTRIAL FACTORIES

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Introduction Workplace violence concerns a form of aggression encompassing behaviors that are intended to cause physical and mental harm. While studies reported violence is a major and increasing concern for the work environment in all countries, violence against female workers in the industrial sector has received less attention.

Objectives This study investigated the prevalence of various types of violence and associated factors among female workers in the industrial sector.

Methods This descriptive survey was conducted in eleven industrial sites in Iran. Cross-sectional data were collected by a 78-item questionnaire from 817 female workers recruited through workplace safety and wellbeing units inside the factories. The study measured three types of violence involving physical attacks, verbal threats, and sexual aggressions. Multiple logistic regression analyses were used to analyze how demographic characteristics and occupational factors were associated with women's perceived violence in work life.

Results About half of the participants reported having experienced at least one type of violence. The prevalence rates of verbal aggression, sexual harassment, and physical violence were 52.5%, 12% and 11.5%, respectively. Single female workers (adjusted odds ratio [AOR] =2.06, 95% CI= 1.09-4.27), and age older than 35 years were

(AOR=2.37, 95% CI= 1.26–2.93) each significantly related to increased odds of verbal violence. Short duration of employment (<five years) was the most strongly associated factor for sexual harassment (AOR= 2.82, 95% CI=1.7–2.94). Working the night shift was significantly associated with encountering verbal violence (AOR= 2.79, 95% CI= 1.69-3.06).

Conclusion The findings of this study highlighted occupational violence and the need for an awareness of violence against female workers in industrial plants. The high prevalence of violence suggests that management in industrial workplaces should invest time and resources in addressing violence. Providing reporting procedure and training programs are recommended in dealing with workplace violence risk.

0-158 LONG-TERM PROGNOSIS FOR HEALTH CARE UTILIZATION AMONG PATIENTS WITH WORK-RELATED MENTAL DISORDERS

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Objective The long-term prognosis for employees with workrelated stress, depression or PTSD is unclear. We aim to investigate if these conditions represent a temporary setback or a decline towards long-term poor health.

Methods From the Danish Occupational Medicine Cohort we included patients referred 2000–2012 with mental disorders (N=17.900) to Departments of Occupational Medicine across Denmark. From nation-wide registries we obtained data on general health care service utilization (GP contacts) and specialized mental health care (incident private practice psychiatrist/ psychologist care and psychiatric hospital care) for five years after/before the index-date of referral. Results are presented as utilization 5 years before referral (index-year -5), the year on either side of referral (index-year -1 and +1) and five years after referral (index-year +5).

Results General health care utilization increased from 7 median GP contacts in index-year -5 rising sharply to 12 in index-year -1 and 10 in index-year +1, then declining gradually to 8 in index-year +5. Incident private practice psychiatrist/psychologist care was 4.5% among patients in index-year -5 rising to 13.6% in index-year -1, 19.8% in index-year +1, declining to 7.4% in index-year +5. Incident psychiatric hospital care was 1.4% in index-year -5 rising to 5.6% in index-year -1, 8.6% in index-year +1, then declining to 4.7% in index-year +5.

Conclusions General health care utilization was elevated in the years surrounding referral, then declined to levels comparable to five years prior to referral. From a relatively low incidence, mental health care utilization increased 4–6 fold in the years around referral, then declined to levels 2–3 fold higher than five years before referral. This could indicate that work-related mental disorders represent a temporary setback for most patients, but for some becomes a decline towards long-term poor mental health. Further analyses will seek to identify atrisk groups from demographic, occupational and health-related prognostic factors.

O-189 MENTAL HEALTH IN CHILDHOOD AND ADOLESCENCE MATTERS: LINKING MENTAL HEALTH TRAJECTORIES WITH EMPLOYMENT OUTCOMES IN YOUNG ADULTHOOD

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Introduction Mental health problems cause a considerable burden of disease in adolescents, with potential negative consequences on employment later in life. Earlier, five trajectories of internalising and externalising problems (high-stable, moderate-high, decreasing, moderate-low, low-stable) among adolescents from 11 to 19 years were identified and a relationship with employment status at age 19 was found. However, at age 19, many participants were still in education.

Objectives This study aims to examine associations of trajectory membership with having paid work and type of employment contract in young adults at age 26.

Methods Fifteen-year follow-up data of the longitudinal TRacking Adolescents' Individual Lives Survey (TRAILS) cohort study (N=1711) were used. Logistic regression analyses were applied to examine associations of trajectory membership of internalising and externalising problems with having paid work and type of employment contract at age 26. The analyses were stepwise adjusted for sex, intelligence, parental education, family composition, physical health, negative life events and mental health comorbidity, all measured at age 11.

Results For internalising problems, the high-stable (adjusted OR: 2.19; 95% CI: 1.17–4.11) and moderate-high (adjusted OR: 1.75; 95% CI: 1.14–2.69) trajectories were strongly associated with not having paid work, compared to the low-stable trajectory. No associations were found between the trajectories of externalising problems and having paid work. For both internalising and externalising trajectories, no associations were found between trajectory were found between trajectory membership and having a permanent or temporary employment contract.

Conclusion This study expands current knowledge about the impact of internalising problems on employment of young adults. To prevent the effects of mental health problems on work, a life course perspective is needed taking into account the development of mental health problems in childhood and adolescence. In the transition from school to work, integrating youth- and occupational healthcare may be key to prevent negative employment outcomes due to internalising problems.

O-211 OCCUPATIONAL DAYTIME LIGHT EXPOSURE AND RISK OF INITIATING ANTIDEPRESSANT TREATMENT AMONG MEN AND WOMEN: A NATIONAL FOLLOW-UP STUDY

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Introduction Higher winter depression prevalence at temperate latitudes has been attributed to low daylight levels. Daytime light exposure varies across jobs.

Objectives In a nationwide study, we examined occupational daytime light exposure levels and risk of initiating antidepressant treatment among men and women.

Methods We conducted a register-based follow-up study of all gainfully employed 526 839 men and 506 092 women in Denmark (56° N) born 1980 or later. We estimated annual mean occupational daytime (6:00–17:59 h) white light exposure levels (lux) for each year of employment 2000–2015 with a quantitative job exposure matrix (JEM). We followed participants from 2001 or first year of employment (if later) until first antidepressant treatment \leq 2016 as recorded in a national prescription database. We calculated incidence rate ratios adjusted for register information on age, calendar year, family history of antidepressant treatment, and educational level. Smoking was assessed with a lifestyle JEM.

Results During follow up, the population accumulated 6 804 361 person-years and 30 816 men (5.8%) and 52 817 women (10.4%) initiated antidepressant treatment corresponding to 8 and 16 cases per 1000 person-years, respectively. Two percent of women and eight percent of men were exposed to an annual average above 500 lux. Among women, we observed reduced risk of initiating antidepressant treatment for those exposed the previous year to 500–999 lux (incidence rate ratio [IRR] = 0.92, 585 cases, 95% CI 0.85–1.00) and \geq 1000 lux (IRR = 0.90, 294 cases, 95% CI 0.80–1.01) when compared with <250 lux. No association was apparent for men.

Conclusion Our results indicate a preventive effect of daytime light exposure on depression and other mental disorders treated with antidepressants for the small fraction of workers exposed to an annual mean above 500 lux at work, but only among women. Findings need replication in other countries.

O-359 MENTAL HEALTH IN A SAMPLE OF 72,452 WORKERS FROM 8 COUNTRIES OF LATIN AMERICA: RESULTS OF HEALTH AND WORKING CONDITIONS SURVEYS

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Introduction Work is considered a key determinant of mental health. However, evidence on the impact of work in mental health in Latin America is scarce.

Objectives To analyse the relationship between mental health status and work in Latin America through three indicators: labour relationship (employed/self-employed or employer), employment condition (formal/informal), and occupational category (non manual skilled/non manual non-skilled/manual skilled/manual non-skilled).

Methods Cross sectional study based on health and working condition surveys from 8 countries of Latin America. Poor mental health was defined as a score of > = 3 on the GHQ12; >= 10 on the PHQ9; or <= 13 on the WHO5 scales. Informal workers were defined as those unregistered or lacking a contract. Occupational categories were created following the international standard classification of occupation. Prevalence ratios and their IC95% were calculated stratified by sex and adjusted by age, educational level and marital status.

Results Final sample consisted of 72,452 workers, from Argentina (n=8966), Brazil (n=52832), Costa Rica (n=1503), El Salvador (n=1507), Guatemala (n=1510), Honduras (n=1507), Nicaragua (n=1500) and Panamá (n=1505). Poor

mental health ranged from 4.5% in Brazilian men to 25.9% in Panamanian women. Manual non-skilled men showed higher prevalence of poor mental health than non-manual skilled men in Argentina (RPa 1.43 IC95% 1.04 - 1.95) and Central America (RPa 1.94 IC95% 1.12 - 3.34). In Brazil, men employers showed higher prevalence of poor mental health (RPa 1.25 IC95% 1.02 - 1.53) and informal workers showed higher prevalence of poor mental health irrespective of sex (Men RPa 1.16 IC95% 1.02 - 1.33; Women RPa 1.30 IC95% 1.05 - 1.60).

Conclusion Prevalence of poor mental health varies significantly between occupational groups and countries. Special attention should be pay to informal workers, workers in elementary occupations and employers.

Radiation

O-138 CANCER MORTALITY THROUGH 2016 AMONG URANIUM MINERS ON THE COLORADO PLATEAU: INTERACTIONS OF RADON WITH SMOKING AND TIME SINCE EXPOSURE

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Objective The long-term risks of lung cancer from radon progeny exposure are known largely from studies of uranium miners, including a cohort of 4137 male miners from the Colorado Plateau (CP) in the southwestern US. Our objective was to estimate the excess absolute risk (EAR) and excess relative risk (ERR) of lung and other cancer from radon exposure among CP uranium miners, evaluating the persistence of risk with 26 years of extended follow-up, and the form of interaction between radon and cigarette pack-years (PY).

Methods We followed the CP cohort for mortality through 2016, re-evaluated its radon exposure against original records, and imputed a smoking end date for cohort members. We evaluated EAR based on standardized rate ratios of lung cancer, adjusted for age, calendar year, and race. We modeled ERR using Cox proportional hazards regression of full risk sets (adjusted for age, race, birth year, exposure rate and time since last exposure). We also modeled variation in risk per unit exposure by attained age (AA) and time-since-exposure (TSE) and evaluated joint effects of radon and PY.

Results We identified 695 cases of lung cancer, including 146 among never- and light smokers. Lung cancer EAR per unit radon exposure increased substantially with smoking PY and throughout decades of follow-up. Lung cancer ERR decreased with AA and TSE, although to a lesser extent than observed elsewhere. The form of interaction between radon and PY was sub-multiplicative but greater-than-additive, appearing closer to multiplicative at lower radon exposures. Pancreas was the only other site showing a significantly positive ERR per unit exposure, although much lower than for lung cancer. **Conclusion** Excess risk of lung cancer persists throughout the lifespan among this cohort of uranium miners. Information about radon-smoking interactions, particularly at low exposure levels, is of interest for extrapolations to the general population.

0-159 DOES RADON CAUSE DISEASES OTHER THAN LUNG CANCER? RESULTS FROM THE GERMAN URANIUM MINER COHORT STUDY

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Introduction and Objectives Radon is an established risk factor for lung cancer. Less clear is whether radon causes other diseases than lung cancer. To further investigate such risks, updated mortality data from the German uranium miner cohort study (1946–2013) were analyzed.

Methods The cohort includes 58,974 men who were employed for at least 6 months between 1946 and 1989 at the former Wismut uranium mining company in Eastern Germany. Considered endpoints were mainly cancers other than lung cancer, circulatory diseases and non-malignant respiratory diseases. Exposure to radon and its progeny and external gamma radiation was retrospectively estimated through a comprehensive job-exposure matrix. Statistical modelling was performed by internal Poisson regression for grouped data with baseline stratification by age and calendar year. Excess relative risks (ERR) per 100 WLM (Working Level Month) and 95% confidence intervals (CI) were estimated for cumulative 5-year radon (mean=280, lagged exposure to median=33. max=3,224 WLM).

Results Within the follow-up period 1946–2013, a total of 5,122 cancer deaths other than lung cancer occurred. In this group, a statistically significant association was found (ERR/ 100 WLM=0.014; 95% CI: 0.006, 0.021). Regarding individual cancer sites, the majority of risk estimates were positive (14 out of 18), and two of them reached borderline significance (colon and liver cancer). This holds true even after adjustment for external gamma radiation. No increased ERR/ 100 WLM was found for the groups of deaths from circulatory diseases (n=10,665) and from non-malignant respiratory diseases excluding silicosis/other pneumoconiosis (n=1,674). **Conclusion** Our findings provide some evidence of an increased mortality risk for cancers other than lung cancer associated with radon. Chance, confounding by unconsidered risk factors and uncertainty in exposure assessment cannot be

completely ruled out. If present at all, the radon-related risk for diseases and cancers other than lung cancer is substantially lower than that for lung cancer.

0-174 MORTALITY IN A COHORT OF GERMAN UNDERGROUND URANIUM MINERS, 1960–2013

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Introduction and Objective Former German uranium miners had been exposed underground in the early years to high levels of radon and silica dust. The objective of these analyses is to compare mortality in the Wismut cohort with that of the male general population.

Methods A sub-cohort of 35,204 miners who worked at least 180 days between 1946 and 1989 underground, but never in processing or open pit mining was defined with observation period from 1960 to 2013. The underlying cause of death was available for 96.1% of the 18,510 deceased. For

numerous causes of death, observed deaths (O) were compared with expected deaths (E) based on external mortality rates for the general male population by standardized mortality ratios (SMR=O/E). Exposure to radon progeny and silica was retrospectively estimated by job-exposure matrices. SMR trends for different exposure levels were examined by the Poisson trend statistic.

Results A significant excess of lung cancer deaths was found (O=2,960; SMR=2.36; 95% CI: 2.28-2.45). Of the 27 considered cancer sites other than lung, SMR was statistically significantly increased for liver (O=175; SMR=1.34; 95% CI: 1.15-1.55) and stomach (O=504; SMR=1.28; 95% CI: 1.17-1.40) cancers. A significant excess mortality from non-malignant respiratory diseases was found (O=1,928; SMR=1.86; 95% CI: 1.78-1.94), mainly related to mortality from silicosis/ other pneumoconiosis (O=941; SMR=22.62; 95% CI: 21.20-24.11) and influenza/pneumonia (O=294; SMR=1.13; 95% CI: 1.01-1.27). Additionally, significant mortality excesses occurred for infectious diseases (O=157; SMR=1.18; 95% CI: 1.01-1.38) and cerebrovascular diseases (O=1,335; SMR=1.33; 95% CI: 1.26-1.41). SMRs for lung and liver cancer significantly increased with cumulative radon exposure; SMRs for silicosis/other pneumoconiosis significantly increased with silica exposure.

Conclusion Underground miners of this cohort showed a clear excess mortality for lung cancer and silicosis/other pneumoconiosis even for those later hired with lower exposures. Further research is ongoing to investigate exposure-response-relationships via internal analyses in more detail.

0-277 SOLAR UVR EXPOSURE AMONG OUTDOOR WORKERS IN ALBERTA: MEASUREMENTS AND PROTECTIVE BEHAVIOURS

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Introduction Workplace solar UVR exposure has significant health and economic impacts. However, occupational exposure and sun protection behaviour data are scarcely available.

Objectives This study aimed to characterize outdoor workers' full-day solar UVR exposures and their determinants, as well as the prevalence and determinants of sun protection behaviours used at work and leisure.

Methods We collected personal dosimetry measurements over one week using calibrated, electronic UVR dosimeters, and outdoor workers' demographics, skin cancer risk factors, job information, and sun habits at work and leisure using selfcompleted questionnaires. Workers' mean daily solar UVR exposure (standard erythemal dose, SED), corrected for repeated measurements, was summarized, and determinants of exposure were assessed using marginal models. The frequency of specific protective behaviours at leisure and work was compared. Sun protection scores were calculated, and the determinants of these scores for both settings were modelled using multiple linear regression.

Results We recruited 179 workers and collected 883 full-day measurements. The mean dose among all workers was 1.9 SED (range: 0.03–16.6). Nearly half of all measurements exceeded the recommended international limit (1.3 SED). Landscape and maintenance workers (2.6 SED), and trade and

recreation workers (1.8 SED) had the highest mean exposures. Job title, dosimeter placement, forecast, and hours spent outside were predictors of daily SED. At work, wearing a sleeved shirt (81% often/always) and hat (73%) were most prevalent, while seeking shade (12%) and applying sunscreen (36%) were least prevalent. Sun protection scores were higher at work than leisure. Hours spent outdoors was a strong determinant for the work and leisure models. Additional leisure model predictors were eye colour, sex, skin type, and job group.

Conclusion Outdoor workers are exposed to high solar UVR levels and use different sun protective behaviours at work and leisure. These findings can inform future monitoring studies and exposure reduction initiatives.

O-296 RADON EXPOSURE AND RISK OF DEATH FROM CIRCULATORY SYSTEM DISEASES AMONG A LARGE COHORT OF URANIUM MINERS – THE PUMA STUDY

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Introduction Numerous studies highlighted the association between radon exposure and lung cancer risk. Nevertheless the question of radon-related risks for non-cancer diseases, and more specifically circulatory system diseases (CSD) have received limited investigation. Among uranium miners, only one cohort observed an association between radon exposure and CSD.

Objectives To investigate the relationship between cumulative radon exposure and CSD mortality in the PUMA study (Pooled Uranium Miners Analysis), a large international pooled set of cohorts of uranium miners.

Methods The PUMA study includes seven cohorts of uranium miners from Czechia, France, Germany, Canada and USA. Annual radon exposure has been estimated individually and expressed in Working Level Months (WLM). The relationship between cumulative radon exposure, applying a 5-years lag, and CSD death, and more specifically ischemic heart disease and cerebrovascular disease, was assessed with an internal Poisson regression model integrating a linear excess relative risk (ERR) structure, expressed per 100 WLM.

Results The PUMA study includes 119,709 male uranium miners hired between 1942 and 1996. The follow-up duration was between 30-39 years in each of the cohorts, contributing to 4.3 million person-years. The mean value of cumulative radon exposure in individual cohorts ranged between 31 and 580 WLM. At the end of follow-up, 52,450 miners were dead (44% of the cohort), and among them 17,494 deaths from CSD were recorded. The exposure-risk relationship did not show any increase in CSD risk associated with cumulative radon exposure (ERR/100 WLM=2.3.10-4; 95% confidence interval [-0.0033;0.0042]). No increase in risk was observed for ischemic heart disease or cerebrovascular disease death.

Conclusion The PUMA study has a large study population and a high level of statistical power. These preliminary results did not show any increased risk for CSD mortality among uranium miners.

0-312 OCCUPATIONAL EXPOSURE LEVELS OF SOLAR ULTRAVIOLET RADIATION: AN EPHOR REVIEW

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Introduction Exposure to solar ultraviolet radiation (UVR) is the main cause of malignant melanoma, squamous cell carcinoma, and basal cell carcinoma of the skin, a risk factor of cataract, and the primary predictor of Vitamin-D levels. The UVR exposure level depends on several factors such as time of day, season, latitude and altitude, activity, and vary across occupations, with high levels reported in various outdoor jobs. Personal measurements are typically reported as full shift cumulative Standard Erythema Dose (SED).

Objective To conduct a systematic review of occupational solar UVR exposure levels.

Methods We performed a PubMed search for literature presenting personal solar UVR exposure levels measured by wearable UVR sensors during work and added papers identified from reference lists. We screened title and abstract of 1,005 papers, full text reviewed 113 papers, and extracted data from 42 included studies. Job descriptions were coded according to the International Standard Classification of Occupations (ISCO-88) on the 4-digit level.

Results In total, UVR exposure levels of 35,345 personal workday measurements of mainly construction workers, farmers, seamen, teachers, expeditioners, and athletes were included. They covered all year, 6am - 6pm working hours, latitudes from 20–75° north and 10–68° south, and altitudes in the 0–8000 m range. Repeated measurements were included in 76% of the studies. Eleven different polysulphone film, UV-sensitive spore, or electronic irradiance sensors placed on head, neck, shoulder, chest, back, arm, or wrist were used. Exposure levels varied between 0.4 SED for laboratory workers and 28.6 SED for construction workers.

Conclusion The established measurement database will be used in the development of a general population quantitative job exposure matrix (JEM) as part of the European Exposome Project for Health and Occupational Research (EPHOR). The UV-JEM will be applied in multi-centre European occupational cohort studies of adverse and beneficial effects of exposure to UVR.

Respiratory Effects

0-39 LIFETIME OCCUPATIONAL EXPOSURES AND CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) RISK IN THE UK BIOBANK COHORT

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Introduction Occupational exposures are important, preventable causes of chronic obstructive pulmonary disease (COPD). We previously found an increased COPD risk among six occupations by analysing lifetime job-histories and lung function data in the population-based UK Biobank cohort. Objectives We aimed to build upon these findings and elucidate the underlying potential causal agents.

Methods We applied the ALOHA+ job-exposure matrix (JEM) based on ISCO-88 codes in which exposure to 12 selected agents was rated as 0 (no exposure), 1 (low), and 2 (high). Agents highly correlated (>85%) were combined. COPD was spirometrically-defined as forced expiratory volume in 1 s (FEV1)/forced vital capacity (FVC) < lower limit of normal (LLN). We calculated semi-quantitative cumulative exposure (CE) estimates for each agent by multiplying duration of exposure and squared intensity. Prevalence ratios (PR) and 95% confidence intervals (CI) for COPD were estimated using robust Poisson regression adjusted for centre, sex, age, smoking, and co-exposure to the other JEM agents. Only associations confirmed among never-smokers and never-asthmatics were considered reliable.

Results Out of 116,375 participants with complete job-histories, 94,514 had acceptable/repeatable spirometry data and smoking information and were included in the analysis. Pesticides exposure showed increased COPD risks (PR=1.00, 95% CI 0.85–1.17 for low CE, PR=1.32, 95% CI 1.12–1.56 for high CE; P-trend=0.004), that were confirmed among neversmokers (P-trend=0.005) and never-asthmatics (Ptrend=0.001). Results remained unchanged when neverexposed to any of the JEM agents were used as reference category.

Conclusion Focussed preventive strategies in workers exposed to pesticides are warranted to prevent the associated occupational COPD burden.

0-71 OCCUPATIONAL INHALANT EXPOSURES AND LONGITUDINAL LUNG FUNCTION DECLINE

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Background Airborne exposures at the workplace are believed to be associated with lung function decline. However, results from longitudinal studies are conflicting.

Methods Participants from two general population-based cohorts, the Copenhagen City Heart Study and the Copenhagen General Population Study, with at least two lung function measurements were followed for an average of 9 years, range 3–27 years. Occupational exposure was assigned to each year of follow-up between two lung function measurements by a job exposure matrix. Associations between mean occupational exposure per year and mean annual decline in forced expiratory volume in 1 second (FEV1) were investigated using linear mixed effects models according to cohort and time period (1976–1990 and 2003–2015). We adjusted for sex, height, weight, education, baseline FEV1, and pack-years of smoking per year during follow-up.

Results A total of 16,144 individuals were included (mean age 48 years and 43% male). Occupational exposure to mineral dusts, biological dusts, gases & fumes, and a composite category were not associated with FEV1 decline in analyses with dichotomized exposure. In analyses with an indexed measure of exposure, gases & fumes were associated with a FEV1 change of -5.8 mL/unit/year (95% confidence interval:-10.8; -2.3) during 1976–1990, but not during 2001–2015.

Conclusion In two cohorts from the Danish general population, occupational exposure to dusts, gases, and fumes was not associated with excess lung function decline in recent years but might have been of importance decades ago.

0-133 STYRENE ASSOCIATED RESPIRATORY OUTCOMES AMONG REINFORCED PLASTIC INDUSTRY WORKERS.

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Introduction Fibreglass reinforcement industry employees are exposed to both fibreglass and the agents used in the reinforcing process. Adverse respiratory outcomes have been associated with fibreglass resins and agents in the reinforced plastic workplace.

Objectives The aim of this study was to determine the exposure-related adverse respiratory outcomes among employees in the reinforced plastic workplace.

Methods A cross-sectional study was conducted in the fibreglass reinforcement industry based in KwaZulu-Natal, South Africa. Personal monitoring of styrene and spirometry were conducted. Total cumulative exposure was calculated for each participant's lifetime of employment in the company. The 254 employees were interviewed by completing a detailed questionnaire based on respiratory health and occupational exposures. Lung function tests were conducted for all employees according to South African Thoracic Society (SATS) standards.

Results The geometric mean of styrene exposure level for the General Laminating Department was 48.2 mg/m3 (95% CI 36.3–64.1 mg/m3) and the Fitting Department was 20.7 mg/m3 (95% CI: 15.6–27.5 mg/m3. The total styrene cumulative exposure odds ratios for chronic cough, phlegm, wheezing and breathlessness in the high exposure category was 3.1 (95% CI 1.1- 8.6), 5.3 (95% CI 1.7- 16.6), 3.3 (95% CI 1.2- 9.1) and 5.5 (95% CI 1.15–26.4), respectively. The cumulative exposure associated reduction, adjusted for smoking and doctor-diagnosed TB, in FEV1/FVC ratio, percent predicted FEV1 and FVC was 0.01, 0.04% and 0.05%, respectively.

Conclusion Styrene exposure increases the risk of respiratory symptoms and is associated with reduced lung function.

0-266 CHRONIC RESPIRATORY DISEASE IN THE ONTARIO MINING INDUSTRY

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Introduction Mining involves many exposures associated with increased respiratory disease risk, including crystalline silica, diesel engine exhaust, arsenic, nickel, and other metal compounds.

Objectives To investigate the risk of non-malignant respiratory disease (NMRD) in a cohort of Ontario mixed-ore miners.

Methods The Ontario Mining Master File (MMF) contains 90,000 work histories collected during mandatory annual medical exams from 1928 to 1988. Record linkages with provincial hospital and outpatient databases (1999–2017) were performed to ascertain respiratory disease incidence. Incidence rates were compared to provincial rates using standardized incidence ratios (SIR). Internal comparisons were made using Poisson regression to estimate age and birth year-adjusted incidence rate ratios (RRs) and 95% confidence intervals (CIs) for NMRDs. Stratified analyses were conducted for types of mining and ore mined.

Results The linked cohort of 30,413 males displayed significantly increased risks for COPD (SIR=2.65, CI=2.58–2.71), pulmonary fibrosis (SIR=2.02, CI=1.85–2.20), and silicosis (SIR=15.72, CI=14.55–20.65). Excesses of silicosis were observed for underground miners (SIR=17.41, CI=14.55–20.65), surface miners (SIR=19.58, CI=15.20–24.82) and mixed-ore miners (SIR=25.52, CI=20.98–30.76). Surface miners had an increased risk of silicosis compared to never surface miners. This risk increased with increasing duration of employment with the highest employment duration (\geq 10 years) yielding an RR of 3.49 (CI 1.69–7.21).

Conclusion Results are consistent with previous findings of an excess risk of respiratory disease (NMRD) among Ontario mine workers. This study provides increased understanding of these risks in relation to occupational factors and highlights a potentially overlooked increased risk of silicosis among surface mine workers in Ontario that bears further scrutiny. These results are supported by the unexpectedly high respirable crystalline silica exposures measured in Ontario mines surface operations as part of the related Ontario Mines Exposure Database (OMED). Together with the MMF the OMED exposure data provides future opportunities to test new hypotheses, including the impact of combined exposures among miners.

O-302 A POPULATION PERSPECTIVE FOR THE PREVENTION OF OCCUPATIONAL ASTHMA (EUROPEAN COMMUNITY RESPIRATORY HEALTH SURVEY-ECRHS)

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Introduction About 15% of adult-onset asthma is attributed to occupational exposures.

Objectives We examined whether prevention policies focusing on high-risk occupations adequately identify occupational asthma risks at a population level. We estimated, in a prospective population-based study, the distribution of asthma risk by occupation, and examined whether asthma risk in prior defined high-risk occupations were distinguished from those of prior defined non-high-risk occupations.

Methods ECRHS is a multicentre cohort study; 9409 participants (52% female) from 13 countries were followed for 10 to 20 years. Incident asthma was assessed by repeated questionnaires on asthma symptoms and medication. We examined the incidence of asthma for each occupation relative to all other occupations during follow-up using Generalized Estimating Equation Poisson regression. On the basis of prior evidence, we classified occupations during follow-up into two asthma risk groups (high and non-high risk). All high-risk occupations had documented exposure to at least one highrisk asthmagen (Occupational Asthma-specific Job Exposure Matrix [JEM]). We compared the distributions of the estimated log Relative Risks (logRR) for each group limiting the main analysis to 90 occupations with more than five incident cases.

Results The median logRR for the 14 prior defined high-risk occupations such as bakers, cleaners, and welders was higher (logRR=0.37) than the non-high risk occupations (logRR=0.06) (Mann-Whitney p-value=0.02). There was considerable overlap in the distributions of the logRRs by risk group (high risk, InteQuartileRange logRR 0.14–0.49; non-high risk IQR -0.21 to 0.36). Several non-high risk group occupations had significantly increased logRRs, including architects and receptionists.

Conclusion The significant overlap in risk curves by prior risk indicates that asthma-related exposures are prevalent and occur in multiple occupations. Current programs for occupational asthma prevention focus correctly on occupations at higher risk, but should also consider exposures in occupations not identified, a priori, as high risk.

Return to Work

O-146 ASSOCIATIONS OF EMPLOYMENT SECTOR AND OCCUPATIONAL EXPOSURES WITH FULL AND PART-TIME SICKNESS ABSENCE: RANDOM AND FIXED EFFECTS ANALYSES ON PANEL DATA

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Introduction The contribution of work-related factors – such as employment sector and occupational exposures – to sickness absence is known to be strong. In addition to the potential causal mechanisms, the associations may also be affected by selection, i.e. individuals with characteristics associated with a high likelihood of sickness absences ending up in particular types of jobs.

Objectives We aimed to investigate the influence of unobserved individual characteristics in explaining the effect of work-related factors on full (fSA) and part-time sickness absence (pSA).

Methods We used register-based panel data for the period 2005–2016 on a 70% random sample of the Finnish workingage population. The relationships between employment sector and occupational exposures (% exposed to physically heavy work and job control score based on job exposure matrices) and the annual onset of fSA and pSA were investigated among men and women. First random effects (RE) models were applied controlling for observed sociodemographic factors and then fixed effects (FE) models, that examine within-individual changes over time and thereby further account for unobserved time-invariant individual characteristics.

Results In the RE analyses, public employment sector, physically heavy work and lower job control each increased the use of fSA and pSA among both genders. When unobserved individual characteristics were controlled for with the FE models, the effects on fSA attenuated. With pSA the effects of employment sector and physical heaviness of work among women even became reverse. The effect of lower job control on pSA remained specially among women.

Conclusions The role of individuals' unobserved characteristics in explaining the effect of work-related factors on sickness absence should not be neglected. The effects of work-related factors are likely to be overestimated when using traditional approaches that do not account for unobserved confounding, i.e. selection of individuals with a high likelihood of sickness absence into particular work environments.

0-208 IMMIGRANT WORKERS AND WORK DISABILITY DURATION IN BRITISH COLUMBIA, CANADA

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Introduction Immigrants are overrepresented in low prestige and precarious employment positions that may expose them disproportionally to work-related injury and illness but also longer work disability durations.

Objective To investigate differences in disability duration among immigrants (categorized as economic, family or refugees/other classification upon arrival to Canada) compared to Canadian-born workers with a work-related injury in British Columbia.

Methods Immigrants and Canadian-born workers were identified from linked workers' compensation claims and immigration records with back strain, connective tissue, concussion and fracture injuries requiring at least one day of work disability between 2009 to 2015. Quantile regression investigated the relationship between immigration classification and predicted disability days (defined as time on claim within one year of injury) at the 25th, 50th and 75th percentile of the distribution.

Results With a few exceptions, immigrants experienced greater predicted disability days compared to Canadian-born workers within the same injury cohort. The largest differences were observed for family and refugee/other immigrant classification workers, and in particular for women within these classifications compared to Canadian-born workers. For example, at the 75th percentile of the distribution of disability days, we observed a difference of 47.9 days longer for refugee/other women in the concussion cohort and a difference of 41.6 days longer for family classification women in the fracture cohort. Economic immigrants had comparable disability days with Canadian-born workers, especially in the connective tissue and back strain injury cohorts at the 25th and 50th percentiles of the distribution.

Conclusion Immigrant workers' longer disability durations may be a result of more severe injuries, or challenges navigating the workers' compensation system with delays in seeking disability benefits and rehabilitation services. Differences by immigrant classification speaks to vulnerabilities or inequities upon arrival in Canada that persist upon entry to the workforce and warrant further investigation for early mitigation strategies.

0-219 EMPLOYEES RECEIVING INPATIENT TREATMENT FOR COMMON MENTAL DISORDERS IN GERMANY: FACTORS ASSOCIATED WITH TIME TO FIRST AND FULL RETURN TO WORK

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Introduction In Germany, return to work (RTW) after inpatient treatment for common mental disorders (CMDs) is a complex process at the intersection of the mental healthcare system and the workplace.

Objectives This study examined 1) the time to first and full RTW and 2) associated factors among employees receiving inpatient treatment for CMDs.

Methods In this prospective cohort study, employees receiving inpatient psychiatric or medical rehabilitation treatment for CMDs were interviewed by phone during their last week before discharge. Follow-up interviews were conducted after 6, 12, and 18 months. Health-, personal-, and work-related factors were used from baseline measurement. Parametric survival analysis was conducted to identify factors associated with time to first and full RTW.

Results A total of N = 269 participants who stayed at a psychiatric clinic or a medical rehabilitation facility were included. Almost all participants (n = 252, 94%) from both treatment settings reported a first RTW and a full RTW. The time to first and full RTW was shortest among participants from medical rehabilitation (both median 6 days) and longer among participants from psychiatric treatment (median 17 days to first RTW and 73 days to full RTW). While only health-related and personal factors were associated with time to first RTW, leadership quality and needed individual RTW support were associated with time to full RTW.

Conclusion More attention to work accommodation needs for RTW in clinical practice and coordinated actions towards RTW in collaboration with key RTW stakeholders in the workplace may support a timely RTW.

O-282 ASSOCIATION BETWEEN PATTERNS OF RETURN-TO-WORK TRAJECTORIES AND LONG-TERM DEPRESSIVE SYMPTOMS AMONG BREAST CANCER SURVIVORS

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Introduction Depressive symptoms and fatigue are well known factors affecting return-to-work (RTW) after breast cancer (BC). However, the RTW process may in turn have a positive impact on long-term health and psychological well-being among breast cancer survivors (BCS).

Objective Our aim was to identify RTW trajectories within the 5-years following BC using a multi-phase and diachronic process and to assess their associations with depressive symptoms measured at least five year after their BC diagnostic.

Methods We used data from the French Constances cohort that included more than 200,000 participants from 2012 to 2020. Our study relied on a sub-sample of women aged up to 55 years at the time of their diagnostic, who were working at the time of their diagnostic and who fully completed their occupational calendar up to five years after their diagnostic (n=939). Sequence analysis was used to identify RTW trajectories among BCS from their diagnosis up to 5 years later. Depressive symptoms were assessed using the 20-items CES-D scale. Adjusted logistic regression analyses were performed to assess the association between RTW trajectories and depressive symptoms.

Results In our sample, 12.8% of BCS suffered from depressive symptoms at their inclusion in the cohort. Four types of

RTW trajectories were identified: full-time RTW (n=645), late or no RTW (n=114), early and progressive RTW (n=134), full time RTW before early retirement (n=46). BCS that had a late or did not RTW within the five years following their diagnostic were associated with an increased risk of long-term depressive symptoms (OR : 2.73, 95% CI [1.47–5.04]).

Conclusion This study highlighted that a late or absence of RTW within the 5 years after BC was associated with poorer long-term psychosocial factors and confirmed the potential of using sequence analysis to capture the multi-state aspect of RTW trajectories.

O-320 RETURN TO WORK AND JOB LOSS FOLLOWING HIP REPLACEMENT: FINDINGS FROM TWO LONGITUDINAL COHORTS

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Introduction People are increasingly encouraged to work to older ages, thus returning to and staying in work is an important outcome for younger arthroplasty recipients.

Objectives We examined the impact of physically-demanding occupational activities on the risk of leaving a job because of difficulties with the replaced hip.

Methods A survey was mailed to 1,457 unilateral THA recipients of working age (18–64 years) from the Geneva Hip Arthroplasty Registry and the Clinical Outcomes in Arthroplasty study. People were eligible if they had received their arthroplasty 5 years before. We collected demographic data, time to reach best function and post-operative recreational activities. For each job held post-operatively, participants self-reported exposure to activities that loaded the joint (standing, walking, kneeling/squatting, climbing ladders, lifting, digging). The risk of job loss in relation to occupational activities was calculated using Cox regression models adjusting for age at operative function, cohort and follow-up.

Results In total 514 of 817 respondents (57% response rate) resumed work post-arthroplasty. Amongst these (206 men and 205 women), 411 self-reported usable occupational information. The median follow-up post-THA was 7.5 years (IQR 6.2 -12.1). Adjusted models showed that there was an increased risk of exiting work post-arthroplasty because of problems with the replaced hip were increased if workers were exposed to: standing>4 hours/day (HR:3.81, 95%CI 1.62–8.96); kneeling/squatting (HR:95%CI 3.32, 1.46–7.55) and carrying/lifting>10 kg (HR:5.43, 95%CI 2.29–12.88) compared with those who did not.

Conclusion Certain types of occupational activities may hamper job retention following THA. Our results, although subject to replication, suggest that some types of more physicallydemanding work may be more challenging to continue posthip arthroplasty. There may be a role for focussed rehabilitation or career advice or re-deployment of people in some types of jobs.

Sex and Gender

O-91 WORKPLACE INJURIES AND ILLNESS: WHAT DIFFERENCE DO SEX AND GENDER MAKE? A SYSTEMATIC REVIEW

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Introduction As policymakers become increasingly interested in taking gender/sex differences into account in their primary prevention approaches to occupational health and safety, there is a need to summarize the existing research evidence to find where health outcome differences associated with occupational hazard exposures exist between men and women.

Objective To understand similarities and differences between men and women in health outcomes related to occupational hazard exposures, across different occupations and in the same occupations.

Methods A systematic literature review was conducted on peer-reviewed prospective epidemiological studies published from 2009 to 2019, with no language restrictions. The methodological quality of studies was assessed, with medium to high scoring studies included in the evidence synthesis. Selected studies were qualitatively analysed and compared according to the magnitude of health risks for men and women for each occupational exposure category across occupations and in the same occupations.

Results 105 studies were reviewed. Across occupations, men were at higher risk of kidney disease from occupational heat stress, and injury/disability from physical and biological/chemical hazards. Women were at higher risk of injury/disability, musculoskeletal disorders from biomechanical strain, and poor mental health from workplace stress. In the same occupations, women in the healthcare industry were at greater risk of cancers and injury compared to men in the same jobs. Both men and women exposed to work stress in the same white collar and blue jobs were at risk of injury and heart disease. Men and women working in chemical manufacturing were at risk for different cancers.

Conclusion Men and women have different health risks from exposures to occupational hazards, with differences not solely due to the gendered distribution of occupations. These results may be useful to policy makers seeking to reduce gender inequalities in occupational health, and to researchers wishing to analyse these determinants in greater depth.

0-124 MEN AND WOMEN AT WORK IN CANADA, 1991–2016

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Introduction Women's increased labour force participation in Canada is a well-known trend over the past 40 years, and there is a perception that the gendered division of the labour force has decreased over time.

Objectives The study objective was to document the division of occupations by sex/gender in Canada and to examine the trends since 1991. The evidence is intended to inform occupational health and safety policies and procedures by including issues of sex/gender as part of the discourse on risk prevention, where warranted.

Methods Data obtained from the last six Canadian Censuses of Population (1991–2016) were analyzed and descriptive statistics were used to examine the labour force composition within various resolutions of the National Occupational Classification (NOC) codes by sex/gender. GEE Poisson regression models were used to generate time- and occupation-adjusted estimates for incidence rate ratios with 95% confidence intervals for sex/gender differences in the labour force. Highly divided occupations were defined as those with 75% or more men or women.

Results Of the 500 4-digit occupational categories representing 2,892 data points over the 25-year period, 58% were highly divided, with more than three-quarters of these incidences being for male-dominated occupations, with less than one-quarter being for female-dominated occupations. GEE analyses of these occupation groups within broad occupational groups suggested relative stability in the gendered nature of occupations over time, with a statistically significant reduction in the proportion of highly divided occupations only observed among occupations broadly grouped within natural and applied sciences.

Conclusion The Canadian workforce remains highly sexed/gendered. While the distribution of men and women within occupations is driven by complex factors, our inquiry into these found that systems of gender essentialism, organizational hierarchies that favour men, and labour markets that are changeresistant remain challenges.

O-250 ASSOCIATION OF CHILD NEURODEVELOPMENTAL AND BEHAVIOURAL PROBLEMS WITH MATERNAL UNEMPLOYMENT IN A POPULATION-BASED BIRTH COHORT

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Introduction Mothers typically adjust their work participation in order to meet family needs, including their children's wellbeing. However, there is scarce evidence on the impact of children's poor mental health on maternal employment in less affluent European economies, where the dual-earner family structure is often necessary to make ends meet.

Objectives To estimate associations between suspected and diagnosed neurodevelopmental and behavioural problems in 7-year-old children and maternal unemployment at child ages 7 and 10, in a Portuguese birth cohort.

Methods We evaluated 5754 mother-child pairs of the population-based birth cohort Generation XXI. Data on child suspected and diagnosed neurodevelopmental and behavioural problems, namely learning, attention and language problems, externalizing behaviours, developmental delay, autism spectrum disorders, and other neurodevelopmental problems, were retrieved at 7 years of age using caregivers' reports. Maternal employment status was collected at child age 7 and 10. Robust Poisson regression models were used to calculate prevalence ratios (PRs) and 95% confidence intervals (CIs).

Results After adjustment for maternal age, education, being a single mother, singleton/multiple pregnancy, having children under the age of 6 years, household monthly income and maternal mental disorder diagnosis, women were more likely to be unemployed at child age 10 if the child had, up to age 7, any of the following suspected problems: externalizing behaviours (PR=1.20, 95%CI [1.03–1.40]), developmental delay (PR=1.46, 95%CI [1.12–1.91]), or an autism spectrum disorder (PR=1.62, 95%CI [0.99–2.65]). When the exposure was restricted to clinically diagnosed disorders, the magnitude of associations remained similar, although estimates were less precise. Associations with unemployment were stronger when the child was 10 compared to when the child was 7.

Conclusion Having a child with a developmental or behavioural problem or an autism spectrum disorder at age 7 was associated with maternal unemployment three years later, placing families at a higher risk of financial vulnerability.

O-378 THE ROLE OF GENDER IN THE ASSOCIATION BETWEEN SEXUAL HARASSMENT AT WORK AND SUICIDAL IDEATION: A STUDY WITH CIVIL SERVANTS FROM A MIDDLE-INCOME COUNTRY

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Introduction Sexual harassment is associated with several mental health problems, including suicidality. Despite its terrible consequences for individuals, it is frequently an invisible occupational risk. Women are more likely to be harassed than men. However, little is known about gender differences and effect modification on this association.

Objectives To analyse the association between sexual harassment at work and suicidal ideation(SI) in civil servants from a state in Southern Brazil, investigating gender differences and interaction.

Methods This is a cross-sectional study with data from a web survey with employees from the Federal Judicial Court in Southern Brazil. Sexual harassment was evaluated using a structured questionnaire with specific questions about harassment and violence. SI was assessed using the Self-Reporting Questionnaire (SRQ-20). Poisson regression was used to test associations of interest and estimate prevalence ratios (PR). Stratified analyses by sex were performed.

Results 1,636 workers provided complete information. The prevalence of self-reported sexual harassment was 5.6%, 2.7% among males and 8.2% among females. The prevalence of SI was 4.2%, 5.0% in males and 3.5% in females. Among harassed men, the prevalence of SI was 27.3%. Sexual harassment was positively associated with SI after adjustment for age and educational level(PR 2.31; 95%CI 1.13–4.72). In the analysis stratified by sex, the association remained positive only in males (PR=4.70; 95%CI 1.90–11.66), after adjustment for age, educational level and personality traits.

Conclusions Gender play an important role in the association between sexual harassment and suicide. Approaching the understanding of gender to the measured variable of sex, the social role of masculinity may explain the high effect magnitude in men. Given that women are more frequent targets of sexual harassment, a sexist social and organisational context may mask the effect of this unacceptable violence in women. Also, there might be a possible normalization of the practice with necessary adaptation of women.

O-486 GENDER-BASED VIOLENCE AND HARASSMENT AND THE INCIDENT PURCHASE OF PSYCHOTROPIC MEDICATION. A PROSPECTIVE COHORT STUDY ON THE SWEDISH WORKING POPULATION

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Introduction Gender-based violence and harassment (GBVH) in the workplace has been found to be associated with selfreported mental ill-health. The prospective risk of using psychotropic medication for the treatment of common mental disorders (CMD) is unclear, though.

Objectives To estimate the prospective association between the exposure to three types of GBVH and the purchase of psychotropic medication in a large population-based Swedish study.

Methods Survey data from the biannual Swedish Work Environment Survey (SWES) from 2007 to 2013 (N=23 452) were merged with data on antidepressants, sedatives/hypnotics and anxiolytics from the Swedish Prescribed Drug Register. Exposure to GBVH was measured as sexual harassment 1) from workplace personnel, 2) from non-workplace personnel (e.g., customers or clients), and 3) gender harassment from workplace personnel. Gender-stratified cox proportional hazards analyses with days to outtake as the time-scale and first instance of medicine outtake as the failure event were fitted for each exposure. Analyses were adjusted for age, parental migration background, education, income, family situation, and labor market industry.

Results In men, weekly to daily exposure to gender harassment (HR 2.39, 95% CI 1.35 - 4.23) and in women, gender harassment once in 12 months (HR 1.18, 95% CI 1.02 - 1.36) and weekly to daily (HR 1.62, 95% CI 1.13 - 2.31) were associated with prospective medication outtake. In women, exposure to sexual harassment monthly from workplace personnel (HR 1.60, 95% CI 1.03 - 2.49) and from non-workplace personnel (HR 1.34, 95% CI 1.00 - 1.79) were also associated with medication purchase.

Conclusion Exposure to gender harassment at the workplace may contribute to the development of CMD, particularly when it occurs more frequently. Sexual harassment seems to impact the mental health of women, regardless if it stems from individuals inside or outside the organization.

Shiftwork

0-47 BEYOND NIGHT WORK: WHY SHIFT WORK WITHOUT NIGHT WORK MAY STILL BE HARMFUL

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Objective Most literature examining the health effects of shift work prioritize night work as the exposure of interest. However, little attention has been paid to the co-occurrence of working time characteristics beyond shift type (e.g. night vs day) that may lead to circadian rhythm disruption; characteristics such as shift intensity, shift duration, rotation pattern, and weekend work. We hypothesize that the co-occurrence of these characteristics with and without night work could explain why shift work without night work is sometimes associated with adverse health effects.

Methods Time-registry data on 14,430 full-time (>150 shifts/ year) healthcare workers from 2012–2016 were sourced from the Working Hours in the Finnish Public Sector (WHFPS) study to describe the prevalence and co-occurrence of working time characteristics that may lead to circadian rhythm disruption. First, each characteristic (type, intensity, duration, rotational pattern, and weekend work) was cross-classified in a matrix to examine its co-occurrence with all other characteristics (e.g. how many night shifts were also long shifts). Second, the prevalence of each working hour characteristic by annual shift schedules (permanent or rotating day/evening/night) were examined.

Results Our results provide evidence that working hour characteristics hypothesized to cause circadian rhythm disruption have a varying distribution with each other and across shift schedules- even schedules that don't include nights. While day shifts are thought to not cause circadian rhythm disruption, 32% of day shifts versus 34% of night shifts cooccurred with long work hours, quick returns, and rotations. Furthermore, despite not including nights, the Day/Evening schedule had more quick returns than the Day/Evening/Night schedule and still contained rotations, long hours, and weekend work.

Conclusion Thus, a cautious interpretation of the association between night work and human health may be warranted, as circadian rhythm disruption may be caused by long hours, rotations, or quick returns which may or may not accompany night work.

O-148 SHIFT WORK AND BREAST CANCER. A COHORT STUDY FROM FINLAND BASED ON SURVEY AND PAYROLL DATA

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Introduction International Agency for Research on Cancer (IARC) has concluded that night shift work is probably carcinogenic to humans.

Objectives To examine the association of shift work with breast cancer among women in the Finnish public sector.

Methods We investigated the associations of night and shift work, and potential confounders, with incident breast cancer using a survey (N=64 082, mean age 42,3 years) and payroll cohort (N=17 286, 2008-) of the Finnish Public Sector study (FPS). Survey and payroll employees (baseline 2000–2012) were linked to National Cancer Register and followed-up for breast cancer to the end of 2016. Hazard ratios (HR) and confidence intervals (95% CI) from Cox proportional hazard regression models were calculated, including adjustment for age, SES, number of children, smoking, alcohol and body mass index.

Results 2057 incident cases of breast cancer were identified. Compared to day work, self-reported shift work without nights at baseline was associated with an increased risk of breast cancer during a follow-up period of less than 10 year, after adjustment (HR 1.33, 95% CI 1.15–1.55). In contrast, follow-up for > = 10 years showed no increased HR. Night shift work was most notably (HR 2.05, 95% 1.04–4.01) associated with breast cancer among employees 50 years or older after 10 years of follow-up. The risk of breast cancer tended to depend on earlier exposure time. The results of the more recent payroll sub-cohort showed no association of shift work and breast cancer, including intensity and duration of night shift work.

Conclusion This study gives some indications of an increased risk of breast cancer among subgroups of shift-working Finnish public sector employees. However, insufficient information on past exposure to, and intensity of night work, limits the ability to draw firm conclusions.

0-225 EXPLORING THE IMPACT OF NIGHT SHIFT WORK AND MELATONIN ON METHYLATION IN CIRCADIAN GENES

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Introduction Night shift work is associated with increased cancer risk, but the molecular mechanisms are not well-understood. It is hypothesized that melatonin suppression due to night shift work could impact DNA methylation in circadian genes, although this has been evaluated by few studies.

Objectives This study explored the relationship between night shift work parameters and patterns of melatonin secretion on methylation in circadian genes among women.

Methods A cross-sectional study was conducted in 2019–2020 among 74 female healthcare employees who participated in a previous study in which urinary melatonin levels were evaluated over a 48-hour period. Participants provided information on demographics, lifestyle behaviors, and night shift work such as current night shift work pattern, duration in years, and intensity (consecutive nights). The Illumina Infinium MethylationEPIC beadchip was applied to DNA extracted from new blood samples to measure methylation at 1150 CpG loci across 22 circadian genes. Multiple linear regression was used to examine the association between night shift work, melatonin parameters and methylation levels at each CpG site, while accounting for the false-discovery rate (q=0.2).

Results Compared to day workers, night shift workers had hypermethylation in the promoter region of CSNK1E (q=0.15). Women who worked night shifts for \geq 10 years exhibited hypomethylation in the body of NR1D1 (q=0.08) compared to those with < 1 0 years of history. Hypermethylation in the body of ARNTL was also apparent for those who worked \geq 3 consecutive night shifts a week compared to < 3 nights (q=0.18). Among night shift workers, melatonin patterns (24-hr concentrations, peak timing) were associated with methylation at three loci (RORA, MTNR1A, PER3) (q \leq 0.20). No association between melatonin and methylation was identified among day workers. **Conclusion** These findings suggest that circadian misalignment among night shift workers is associated with differential methylation in several circadian genes, but larger studies are needed to confirm.

O-313 NIGHT SHIFT WORK, SLEEP DISORDERS AND LUNG CANCER RISK AMONG WOMEN: RESULTS FROM A POPULATION-BASED CASE-CONTROL STUDY IN FRANCE (THE WELCA STUDY)

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10.1136/OEM-2021-EPI.142

Introduction Night shift work may lead to sleep disorders and circadian rhythm disruption. It was classified as probably carcinogenic by IARC but, unlike breast or prostate cancer, there is only scant evidence of an association with lung cancer.

Objective To explore the role of night shift work and sleep disorders in lung cancer risk among women.

Methods Information on night work and sleep disorders over lifetime was obtained in a case-control study on female lung cancer in 716 cases and 758 population controls in the Paris area (WELCA). Logistic regression models adjusting for tobacco smoking and other relevant confounders were used to estimate odds ratios (OR) and 95% confidence intervals (CI) associated with night work exposure metrics (years of night work, frequency of night shifts), sleep duration per day (< 7 h, 7 h, \geq 8 h) and sleep disorders (difficulty in falling asleep; waking up at night, too early or too tired; intake of sleep medicine). A sleep disruption index (SDI) was used to classify women by number of sleep disturbances in categories of low (0 or 1), medium (2 or 3) or high SDI (4 or 5).

Results The OR was 1.08 (95% CI 0.75–1.56) in women who ever worked at night. This OR did not increase with duration or frequency of night shifts. Women who slept 8 or more hours per day had an OR of 1.40 (95% CI 1.04–1.87) as compared to those who slept 7 hours. Women who had both high SDI and who worked at night for 6 or more years had an OR of 3.61 (95% CI: 1.27–10.23).

Conclusion Lung cancer risk among women was not associated with ever working at night in our study. The association with longer sleep duration is intriguing and warrants further scrutiny.

0-384 THE ASSOCIATION BETWEEN NIGHT SHIFT WORK AND RISK OF BREAST CANCER: RESULTS FROM THE NIGHTINGALE STUDY

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Introduction and Objectives The International Agency for Research on Cancer confirmed night shift work as a 'probable' carcinogen in an updated evaluation (2019). Noting that evidence from human studies is still inconclusive, in particular due to the lack of prospective cohort studies with detailed exposure assessment. We prospectively examined different metrics of night work (e.g. duration, lifetime mean no. nights per month and cumulative no. nights) and risk of breast cancer, and whether the association was dependent on age or change in body weight.

Methods Overall, 55,350 female nurses completed extensive questions on shift work and were followed for incident breast cancer. Cox regression yielded multivariable-adjusted breast cancer incidence hazard ratios (HRs) and 95% confidence intervals (CIs) for night work groups vs never night work, and Wald tests were used to assess potential interaction with age and change in body weight.

Results During 5,5 years of follow-up, 687 cases of incident invasive breast cancer were registered. The age adjusted HRs were 1.26 (95% CI 1.01–1.57) for ever vs never night work, and 1.32 (95% CI 1.01–1.74) for the tertile with the greatest cumulative no. nights (\geq 991 nights) vs never night work. No trends were observed with increasing levels of different exposure metrics. There was a statistically significant interaction between night work and weight gain on risk of breast cancer; among women with 12–18 kg weight gain since age 18, the HR for ever vs never night work was 2.45 (95% CI 1.28 to 4.68).

Conclusion Higher duration, mean no. nights per month and cumulative no. nights were associated with a moderately increased risk of invasive breast cancer. Particularly for night shift workers with weight gain of 12–18 kg, the risk was increased. Our results point towards a potential interaction between change in body weight and night shift work on breast cancer risk.

Specific Occupations

O-57 ALUMINUM DUST EXPOSURE AND RISK OF NEURODEGENERATIVE DISEASES IN A COHORT OF MALE MINERS IN ONTARIO, CANADA

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Introduction McIntyre Powder (MP), a fine-sized aluminum and aluminum compound powder, was administered to Ontario miners from 1943 to 1979 as purported prophylaxis against silicosis. Aluminum has long been suspected of having a role in the development of neurological diseases. However, very few studies have examined the risk of neurological disease among miners with exposure to aluminum dust, and previous findings were inconclusive.

Objectives We estimated associations between respirable aluminum exposure through MP and neurological disease in a retrospective cohort of mining workers from Ontario, Canada. Outcomes included Alzheimer's disease, Alzheimer's with other dementias, Parkinson's disease, parkinsonism, and motor neuron disease.

Methods The cohort was created by linking a database of mining workers' work history to health care records. This analysis included 36,826 male miners potentially exposed to MP between 1943 and 1979, followed up for disease diagnosis between 1992 and 2018. Exposure was assessed using two approaches, self-reported and historical records. Neurological diseases were ascertained using physician billing and hospital discharge records. Poisson regression models were used to

estimate associations between MP exposure and neurological outcomes using incidence rate ratios and 95% confidence intervals (RR, 95% CI).

Results Exposure to self-reported MP was associated with an elevated incidence rate of Parkinson's disease (RR 1.34, 95% CI: 1.14, 1.57). The rate of Parkinson's disease appeared to increase with the duration of exposure assessed by historical records. Ever-exposure to MP was positively associated with an elevated rate of Alzheimer's with other dementias (RR 1.12, 95% CI 1.06, 1.19), but not Alzheimer's disease alone.

Conclusion This study found that miners who were exposed to respirable aluminum, as McIntyre Powder, had elevated rates of Parkinson's disease. The rate of Parkinson's disease appeared to increase with the duration of exposure assessed by historical records.

O-105 MATERNAL OCCUPATION AS A NAIL TECHNICIAN OR HAIRDRESSER DURING PREGNANCY AND BIRTH DEFECTS, NATIONAL BIRTH DEFECTS PREVENTION STUDY, 1997–2011

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10.1136/OEM-2021-EPI.145

Introduction Nail technicians and hairdressers may be exposed to products containing chemicals with potential reproductive effects. While studies have examined birth defects in children of cosmetologists and hairdressers, nail technician work has not been individually evaluated as a risk factor for birth defects.

Objectives We investigated associations between maternal occupation as a nail technician or hairdresser during pregnancy (versus non-cosmetologist) and selected birth defects.

Methods We analyzed population-based case-control data from the multisite National Birth Defects Prevention Study, 1997– 2011. Cases were fetuses or infants with major structural birth defects; controls were liveborn infants without major birth defects. For 31,652 case and 11,613 control mothers, expert raters classified self-reported maternal jobs into discrete categories as nail technician, hairdresser, combination nail technician-hairdresser, other cosmetologist, or non-cosmetologist. We used logistic regression to calculate odds ratios (ORs) and 95% confidence intervals (CIs) for associations between occupation during the first trimester of pregnancy and birth defect type, controlling for age, smoking, education, and race/ ethnicity.

Results Sixty-one mothers worked as nail technicians, 196 as hairdressers, 39 as combination nail technician-hairdressers, and 42,810 as non-cosmetologists during pregnancy. Strongest associations among nail technicians included multiple congenital heart defect (CHD) groups: any CHD (OR=2.7; CI: 1.3–5.9); conotruncal (OR=3.0; CI: 1.0–8.8) (Tetralogy of Fallot [OR=3.5; CI: 1.0–12.9]); right ventricular outflow tract obstruction (OR=3.2; CI: 1.0–10.4); and septal (OR=3.1; CI: 1.2–8.1). Cleft lip with cleft palate was associated with occupation as a hairdresser (OR=2.0; CI: 1.1–3.7). All oral cleft groups were associated with combination nail technician-hairdresser work (ORs ranging from 4.2 to 5.3).

Conclusion Despite small samples, results suggest associations between maternal nail technician work during pregnancy and

various CHDs and similarly between hairdresser work and oral clefts. Future research could aim to identify potential workplace reproductive hazards and interventions in these occupations.

O-147 SENSITIZATION AND DERMATITIS AMONG EPOXY EXPOSED LAMINATION WORKERS PRODUCING WIND TURBINE BLADES

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Introduction Epoxy resin systems (ERS) are well-known sensitizers of the skin. A high prevalence of sensitization and dermatitis has been reported among workers exposed to ERS. Due to this, comprehensive personal protective equipment is required when working with ERS. No recent studies have evaluated the effect of the use of such safety equipment.

Objectives The aim of this study was to estimate the occurrence of dermatitis and sensitization to ERS among epoxyexposed workers producing wind turbine blades in Denmark while using up-to-date protective measures.

Material and Methods A cross-sectional study was performed at two Danish factories producing rotor blades for wind turbines. A screening questionnaire regarding recent and former skin rashes, allergies, atopic dermatitis, and asthma was answered by 181 epoxy-exposed production workers and 41 non-exposed office workers. Physical examination of the skin was followed by testing with a tailored patch test series based on toxicological assessments of possible sensitizing chemicals in the work materials including epoxy resins and hardeners as well as 35 allergens from the European Standard Series (TRUE test). Atopy was defined as elevated serum levels of IgE for standard inhalation allergens.

Results In total, 16 (8.8%) of the exposed workers were sensitized to one or more epoxy compounds, whereas none of the non-exposed office workers were sensitized. Non-atopic participants exposed to epoxy products showed an increased odds ratio (OR=2.02; CI 0.56–7.34) of dermatitis while the opposite was seen for atopic participants (OR=0.08; CI 0.02–0.4). A 4-fold increased odds ratio (OR=4.5; CI 1.57–13.13) of dermatitis was observed among workers sensitized to epoxy resins. Atopy was not associated with epoxy sensitization (OR=0.73, CI 0.22–2.42).

Conclusion Despite up-to date skin protection dermatitis and sensitization to ERS remain high among epoxy exposed lamination workers. These findings document the need for new and efficient preventive efforts.

0-217 ASBEST CHRYSOTILE COHORT STUDY PROFILE, EXPOSURE DISTRIBUTION AND OUTCOMES

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Introduction A historical cohort study in workers occupationally exposed to chrysotile was set up in the town of Asbest, the Russian Federation, to study their cause-specific mortality, with a focus on cancer.

Objective Describe the Asbest Chrysotile Cohort established in 2013.

Methods Cohort enrolment was based on employment records from JSC Uralasbest chrysotile mine and processing factories. Exposure assessment was based on detailed occupational histories extracted from company archives and personal workbooks linked to > 90,000 measurements, and conversion factors derived using a subset of parallel dust/fibre measurements. This resulted in yearly dust and fibre estimates for each employed calendar year. Vital status was ascertained from multiple sources including company records, the Pension Fund, the Federal Migration Service, and Civil Act Registration Office providing the date and cause of death of those deceased in Sverdlovsk Region.

Results The cohort comprises 22,463 men and 13,374 women working ≥ 1 year between 01/01/1975 and 31/12/2010 in JSC Uralasbest and followed until 31/12/2015. Cumulative exposure of exposed women was higher than for men (49 mg/m3 dust years and 33 fibres/cm3 years vs. 31 mg/m3dust years and 19 fibres/cm3years). At the end of follow-up, 52% of the cohort was alive, 36% deceased, and 12% censored at last date known to be alive in the Sverdlovsk Region. For those who died the mean age at death was 59.4 years for men and 66.5 for women. The most frequent underlying cause of death for all was circulatory diseases, followed by external causes and cancer in men, and cancer and external causes in women. Cancer mortality was dominated by lung cancer in men and breast cancer in women.

Conclusion The cohort is unique in its size, long follow-up, and substantial proportion of female workers. The cohort is relatively young, and the mortality patterns follow those of the Russian population. Risk analyses are underway.

0-231 HEALTH, LIFESTYLE AND OCCUPATIONAL RISKS IN 10,931 INFORMATION TECHNOLOGY WORKERS

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Introduction Informational technology (IT) and the IT workforce are rapidly expanding with potential occupational health implications. Yet to date, IT worker health is under-studied and large-scale studies are lacking.

Objectives To investigate health, lifestyle and occupational risk factors of IT workers.

Methods We evaluated self-reported health, lifestyle and occupational risk factors for IT workers in the UK Biobank database. Using logistic regression, we investigated differences between IT workers and all other employed participants. Regression models were repeated for IT worker sub-groups (managers, professionals, technicians) and their respective counterparts within the same Standard Occupational Classification (SOC) major group (functional managers, science and technology professionals, science and technology associate professionals).

Results Overall, 10,931 (4%) employed participants were IT workers. Compared to all other employed participants, IT workers reported similar overall health, but lower lifestyle risk factors for smoking and obesity. Sedentary work was a

substantially higher occupational exposure risk for IT workers compared to all other employed participants (OR=5.14, 95% CI:4.91-5.39) and their specific SOC group counterparts (managers: OR=1.83, 95%CI:1.68-1.99, professionals: OR=7.18, 95%CI:6.58-7.82, technicians: OR=4.48, 95% CI:3.87-5.17). IT workers were also more likely to engage in computer screen-time outside work than all other employed participants (OR=1.42, 95%CI:1.35-1.51).

Conclusions Improved understanding of health, lifestyle and occupational risk factors from this, the largest to date study of IT worker health, can help inform workplace interventions to mitigate risk, improve health and increase the work participation of this increasingly important and rapidly growing occupational group.

Work Organization

0-161 WORK ENVIRONMENT CHARACTERISTICS AMONG MARGINAL PART-TIME WORKERS IN DENMARK

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Introduction In 2015, around 15% of the Danish workforce had marginal part-time work (<15 hours/week). Yet, not much is known about marginal part-time worker's work environment.

Objectives This study assessed characteristics of the work environment among marginal part-time workers (8.00–14.99 hours/week) compared with full-time workers (32.00–40.00 hours/week).

Methods Employees between 18-65 years old, who responded to the survey Work Environment and Health in Denmark (WEHD) in 2012, 2014, or 2016 were included in the study (n = 34,960). Average working hours per week, based on register information obtained from the Labour Market Account (LMA), in the three months prior to responding to the WEHD survey, was linked at an individual level with work environment characteristics obtained from the WEHD survey. Logistic regression models, adjusted for age, gender, and socio-economic status, were used to analyse the associations between marginal part-time work and the work environment characteristics.

Results Compared with full-time workers, marginal part-time workers less often reported too little time for their work tasks (OR 0.81, 95%CI 0.67–0.97) and struggling to keep deadlines (OR 0.79, 95%CI 0.69–0.91). However, marginal part-time workers more often reported lower influence on how and when to solve work tasks and lower authority. Furthermore, they reported less help and acknowledgement from colleagues, and less interesting and inspiring work tasks, and low job satisfaction. In addition, marginal part-time workers more frequently reported having an occupational accident in the past year (OR 1.31, 95%CI 1.03–1.68) and poor guidance and instructions to work safely (OR 1.32, 95%CI 1.10–1.59). Results on negative social relations in the workplace and physical workload were ambiguous.

Conclusions Marginal part-time workers report less quantitative job demands, but also less influence at work, less support from colleagues, less job satisfaction, and poorer safety. Future studies with prospective designs are needed to determine the direction of these associations.

O-221 CHANGES IN WEEKLY WORKING HOURS AND TIME SPENT ON DIRECT PATIENT CARE FOR DOCTORS IN NORWAY FROM 2016 TO 2019: A STUDY BASED ON REPEATED SURVEYS

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10.1136/OEM-2021-EPI.150

Introduction The balance between adequate time spent on patient care and maintaining work-home balance is challenging for doctors. Both for treatment outcomes and for doctors' wellbeing we need longitudinal studies of total work hours and of time spent on direct patient care.

Objectives To compare the weekly working hours and time spent on direct patient care in 2016 and 2019 for doctors working in different job positions in Norway.

Methods Repeated postal surveys (2016 and 2019) based on representative samples of approximately 2,200 doctors in Norway. Main outcome measures were self-reported weekly working hours and time spent on direct patient care. Analyses included linear mixed models and proportions with 95% CI. Response rates were 73% both years.

Results From 2016 to 2019, the weekly working hours increased significantly for male GPs (48.7 h to 50.9 h) and male doctors in hospital management (48.2 h to 50.5 h). It remained significantly unchanged for female GPs (48.3 h to 49.3 h), female doctors in hospital management (45.8 h to 49.3), female senior consultants (45.4 h to 45.6 h), and for female (44.4 h to 43.6 h) and male (44.9 h to 46.6 h) specialist registrars. The proportion of the total work time spent on direct patient care were similar between genders and did not change significantly from 2016 to 2019. In 2019 it was highest for GPs (65.5%) followed by senior hospital consultants (43.5%), specialty registrars (39.8%) and doctors in hospital management (34.3%).

Conclusion Compared to stipulated work hours in Norway (37.5 h/week), doctors of both genders work long hours, and length has increased significantly for some groups from 2016 to 2019. Hospital doctors spend less than 50% of the time on direct patient care. Monitoring and regulating work hours can be a useful intervention for patient care and for doctor well-being.

O-297 THE IMPACT OF WITHIN-INDIVIDUAL CHANGES IN WORKING CONDITIONS, HEALTH BEHAVIOUR AND BMI ON WORK ABILITY AND SELF-RATED HEALTH: A FIXED-EFFECTS ANALYSIS AMONG DUTCH WORKERS

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10.1136/OEM-2021-EPI.151

Introduction Insight in the impact of within-individual changes in working conditions, health behaviour and body mass index (BMI) on work ability and self-rated health is essential to develop effective policies aimed at prolongation of working lives. **Objectives** This study assessed the impact of 1) within-individual improvements, and 2) within-individual deteriorations in working conditions, health behaviour and BMI on changes in work ability and self-rated health among workers.

Methods The Dutch Study on Transitions in Employment, Ability and Motivation (STREAM) was used to identify participants whose working conditions, health behaviour, and BMI improved (N=14,045) or deteriorated (N=14,066) at least once during seven year follow-up (2010–2017). The impact of within-individual improvements and deteriorations in health behaviour (moderate- and vigorous physical activity, smoking status), BMI, psychosocial (psychological- and emotional job demands, autonomy, social support) and physical working conditions in a given year on changes in work ability (0–10 scale) and self-rated health (1–5 scale) in the same year were analysed with fixed-effects regression models.

Results Workers with deteriorated physical or psychosocial working conditions decreased in work ability (β 's: -0.21 (95% CI: -0.25;-0.18) to -0.28 (95%CI: -0.33;-0.24)) and health (β 's: -0.07 (95%CI: -0.09;-0.06) to -0.10 (95%CI: -0.12;-0.08)), whereas improvements in working conditions were to a lesser extent associated with increased work ability (β 's: 0.06 (95%CI: 0.02;0.09) to 0.11 (95%CI: 0.06;0.16)) and health (β 's: 0.02 (95%CI: 0.00;0.03) to 0.04 (95%CI: 0.02;0.06)). Workers with increased BMI or decreased physical activity had reduced work ability and health. Likewise, decreased BMI or increased vigorous physical activity was associated with improved health. An increase in moderate or vigorous physical activity was modestly associated with a reduced work ability. Quitting smoking was associated with reduced work ability and health.

Conclusion Preventing deteriorations in working conditions, health behaviour and BMI could be of importance for sustainable employability.

0-357 EXAMINING VARIATIONS IN WORK DISABILITY DURATION BY FIRM SIZE: A COMPARATIVE STUDY OF WORKERS' COMPENSATION CLAIMS IN CANADA AND AUSTRALIA

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Introduction Small firms, while more numerous than large firms, often face greater challenges in implementing effective occupational health and safety and return-to-work programs. Research has rarely looked at firm size as a determinant of work disability duration and has been limited to single jurisdictions.

Objectives To identify whether there were differences in work disability duration between injured workers employed by small, medium and large firms and whether these differences varied between workers' compensation jurisdictions in Canada (CAN) and Australia (AUS).

Methods Workers' compensation data were used to identify comparable lost-time, work-related injury and musculoskeletal disorder claims in five Canadian and five Australian jurisdictions between 2011 and 2015. Work disability duration was measured using cumulative days in receipt of disability benefit payments up to one-year post-injury. Jurisdiction-specific quantile regression models were used to compare cumulative disability days paid from small (< 2 0 full-time equivalents (FTEs), medium (20–199 FTEs), large (200+ FTEs) firms at 25th, 50th, and 75th percentiles in the disability distribution, adjusting for confounders.

Results Differences in work disability duration by firm size were observed in all jurisdictions except the Northern Territories (AUS). Compared to large firms, small firms were paid the most disability days at each percentile, particunarly in Victoria (AUS), Saskatchewan (CAN), the Australian Capital Territory, and Tasmania (AUS), where an additional 63.0, 31.1, 37.0, and 27.4 days were paid at the 75th percentiles of the distributions, respectively. Claims from medium-sized firms were generally paid more disability days than large firms except in Western Australia and Tasmania, where they were paid less.

Conclusions Small firms were shown to have the longest work disability durations in 9 of the 10 study jurisdictions. Claims management processes need to be sensitive to the challenges that small firms face in accommodating and returning injured workers back to work.

Oral

0-366 VACCINE HESITANCY AMONG CANADIAN PARAMEDICS DURING THE COVID-19 PANDEMIC

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10.1136/OEM-2021-EPI.153

Introduction Paramedics may be at an increased risk of interacting with COVID-19-positive individuals, making understanding the factors that influence paramedics' vaccination decisions increasingly important.

Objectives We aim to investigate factors that may influence paramedics' likelihood of COVID-19 vaccination.

Methods Canadian paramedics from five provinces (Alberta, British Columbia, Manitoba, Ontario, Saskatchewan) working during the COVID-19 pandemic were voluntarily recruited through posters, social media, and emails from collaborating paramedic organizations. Participants completed online questionnaires between January and May of 2021 that assessed COVID-19 vaccine status, vaccine hesitancy, and intent to be vaccinated. Differences in proportions tests were used to compare agreement scores, calculated by combining proportions of participants who responded 'strongly agree' and 'agree' to questionnaire items.

Results Of the 2178 paramedics recruited, 95.7% completed the questionnaire (76.6% vaccinated). While most participants (89.4%) agreed that people should be vaccinated against COVID-19 and that vaccinations are necessary (94.7%), fewer participants agreed that COVID-19 vaccines are safe (78.5%) as compared to routine vaccines (86.1%, p<0.001), such as influenza vaccinations. However, vaccinated participants were more likely than unvaccinated participants to agree that routine vaccines are safe (90.5% vs. 76.2%, p<0.001) and that COVID-19 vaccines are safe (87.3% vs. 52.4%, p<0.001). Unvaccinated participants were more likely than vaccinated participants to report no intention of being vaccinated (14.2% vs. 0.1%, p<0.001), to report that they would get vaccinated but would wait (22.5% vs. 9.4%, p<0.001), and to report competing priorities were preventing them from getting vaccinated (9.0% vs. 2.4%, p<0.001). Vaccinated participants were more likely to report that they would get a COVID-19 vaccine if recommended by public health experts (90.5% vs. 55.9%, p<0.001).

Conclusion Most paramedics believe COVID-19 vaccines to be safe and necessary. However, a sizeable proportion of paramedics reported no intention of getting vaccinated. Further analyses are needed to determine which factors influence their vaccination decisions.

O-403 VALIDITY AND RELIABILITY PROPERTIES OF THE MULTIFACETED ORGANIZATIONAL HEALTH CLIMATE ASSESSMENT FOR MEASURING ORGANIZATIONAL HEALTH CLIMATE IN SERVICE, CLERICAL, AND HEALTH CARE WORKERS

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10.1136/OEM-2021-EPI.154

Introduction Total Worker Health[®] programs aim to improve health climate, or employees' perceptions of support for physical and mental health from coworkers, supervisors, and upper management. Health climate is linked to physical and mental health outcomes. The recently developed Multifaceted Organizational Health Climate Assessment (MOHCA) assesses general health climate and three subfactors of workgroup, supervisor, and organizational health climate in working adults and correctional employees. There is little evidence of the MOHCA's validity and reliability properties among service, clerical, and health care workers in a large hospital system.

Objectives To investigate validity and reliability properties of the MOHCA in this sample, we examined: 1) the structural validity of the MOHCA's general and subfactor scales and 2) targeting of items to persons and measurement invariance of items among racial, sex, and income subgroups.

Methods We recruited 1,283 employees (45.9% Caucasian; 67.7% female; 77.9% <Bachelor's degree; 32.2% annual household income <\$30,000). We applied exploratory and confirmatory factor analyses to assess structural validity and Rasch models to assess targeting of items and measurement invariance.

Results A revised general and four-subfactor structure with workgroup, supervisor, organizational, and organizational responsiveness health climate subscales explained 73.7% of response variation with adequate reliability (Cronbach's alpha=0.60–0.91). Compared with the original structure's fit, this revised structure's fit was superior (Chi-square = 33.245, df=16; Root Mean Square Error Approximation=0.029; Comparative Fit Index=0.997). One item demonstrated misfit to Rasch models (Infit Mean Square>1.5). Male and Non-Caucasian workers were less likely to report a workgroup supportive of recovery (p<.01). High-income and Caucasian workers were less likely to report a workgroup that encourages use of sick days (p<.01).

Conclusions A revised four-subfactor MOHCA structure with a new organizational responsiveness health climate subscale demonstrated adequate validity and reliability properties to assess health climate scores among service, clerical, and health care workers in a large hospital system.

Work-Related Stress

0-17 ALL-CAUSE MORTALITY AND THE TIME-VARYING EFFECTS OF PSYCHOSOCIAL WORK STRESSORS

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Introduction The effects of poor-quality work (characterised by high job demands, low job control, job insecurity, and effortreward imbalance) are known to be harmful to health but it isn't clear whether exposure to these psychosocial work stressors over time translates into an increased risk of mortality.

Objectives To examine the effect of time-varying exposures and covariates on mortality, including the effects of unemployment, not in the workforce and retirement and to investigate if gender is an effect-modifier on the relationship between long-term exposure to adverse psychosocial work stressors and mortality.

Methods Over 20,000 participants from the HILDA survey with self-reported repeated exposure measures were followed for up to 15 waves. Survival analysis models with baseline hazard specified by the Weibull distribution were used to examine the association between psychosocial work stressors over time and mortality.

Results Low job control (HR=1.39; 95% CI: 1.06–1.83) and job insecurity (1.36; 1.06–1.74) were associated with increased risk of mortality. High job demands (1.01; 0.75–1.34) and effort-reward unfairness (1.20; 0.90–1.59) were not associated with mortality. The effect of job insecurity was attenuated (1.20; 0.93–1.54) after controlling for sociodemographic and health risk factors. Male participants exposed to low job control and job insecurity had an 81% and 39% increased risk of mortality, respectively, after adjustment for sociodemographic and health risk factors.

Conclusions Long-term exposure to low job control and low job security is associated with increased risk of all-cause mortality. Effects were largely restricted to males and persisted after adjustments for sociodemographic and health characteristics. Awareness of the implications of the adverse effects of psychosocial work stressors on health and mortality in workplaces, and interventions to improve job control and job security could contribute to better health and wellbeing, reducing the effect of psychosocial work stressors on mortality.

0-74 WORK-RELATED PSYCHOSOCIAL RISK FACTORS FOR STRESS-RELATED DISORDERS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction Stress-related disorders are frequently reported in the working population, with varying incidence rates of 13% for psychological distress up to 22% for emotional exhaustion with even higher prevalence rates in specific professions and countries. The objective of this systematic review and metaanalysis is to examine which work-related psychosocial risk factors are associated with stress-related disorders (SRDs). Methods We searched the electronic databases of Medline, Embase and PsycINFO for articles published between 2008 and 12 August 2019 and included the references of a systematic review performed for the period before 2008. Primary longitudinal studies were included when outcome data were described in terms of SRD assessment or a dichotomous outcome, based on a validated questionnaire, and at least two levels of work-related exposure were reported. The selection of the work-related risk factors in the meta-analyses was based on: (1) sufficient contrast between reported exposure categories; (2) effect estimates controlled for other non-work-related factors; 3) homogeneity in definition or measurement of risk factors. The quality of evidence was assessed using the Grades of Recommendations, Assessment, Development and Evaluation framework.

Result Seventeen studies met the inclusion criteria. The metaanalysis revealed moderate evidence for associations between SRDs and effort reward imbalance (OR=1.9, 95% CI 1.70– 2.15), high job demands (OR=1.6, 95% CI 1.41- 1.72), organisational justice (OR's 1.6 to 1.7, CI's 1.44–1.86), social support (OR's 1.3 to 1.4, CI's 1.16–1.69), high emotional demands (OR=1.6, 95% CI 1.35–1.84), and decision authority (OR=1.3, CI 1.20–1.49). No significant or inconsistent associations were found for job insecurity, decision latitude, skill discretion and bullying.

Conclusion Moderate evidence was found that work-related psychosocial risk factors are associated with a higher risk of SRDs. Effort-reward imbalance, low organisational justice and high job demands exhibited the largest increased risk of SRDs, varying from 60 to 90%.

0-218 COGNITIVE IMPAIRMENT AND WORK STATUS AMONG PATIENTS WITH WORK-RELATED STRESS: VALIDATION OF AN OBJECTIVE COGNITIVE SCREENER

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Introduction Many individuals with long-term work-related stress complain that cognitive limitations impede their vocational functioning. Subjective cognitive complaints, however, may not accurately reflect objective cognitive impairment.

Objectives We aimed to evaluate objective and subjective tools for screening of neurocognitive impairment and assess cognitive functioning as a determinant for subsequent work status among patients with work-related stress.

Methods 82 patients with work-related stress participated in a $1\frac{1}{2}$ -hour assessment of demographics, objective and subjective cognitive status, and psychosocial functioning. Objective measures included the Screen for Cognitive impairment in Psychiatry, Danish version, (SCIP-D) comprising five cognitive subtests (administration <20 min.) and standardized neuropsychological tests that tapped into the same cognitive domains. Subjective cognitive impairment was assessed with the Cognitive Failure Questionnaire. Work status was evaluated by telephone 6 months later. A total of 78 patients were matched to pre-existing norm data from 79 healthy controls using bootstrapping with 1000 resamples according to age, sex, and estimated premorbid intelligence (N=78000).

Results Strong correlations with all standardized neuropsychological tests indicated the concurrent validity of the SCIP-D (Total Score: r = 0.76, p). There was no correlation between objective and subjective measures of cognitive status (Pearson's r0.30). Based on logistic Receiver-Operating-Characteristic analysis, the optimal SCIP-D Total-score cut-off was \leq 72, which identified 43.2% of the patients with global objective cognitive impairment (AUC=0.84, 95% CI=0.76–0.93, Sensitivity=0.77, Specificity=0.73). Each one-unit increase in the objective SCIP-D Total score (mean = 74.2, SD = 9.7) was associated with a higher odds ratio of 1.12 (adjusted 95% CI=1.004–1.253) for employment at 6-month follow-up relative to full time sick-leave. Subjective cognitive impairment was not associated with subsequent work status.

Conclusion The SCIP-D was a valid objective cognitive screener predicting employment 6 months later among patients with work-related stress. The SCIP-D offers brief assessment of performance-based cognitive skills for use in occupational clinics and epidemiological research.

O-226 CONTRIBUTORS TO STRESS AND BURNOUT IN JUNIOR DOCTORS DURING THE COVID-19 PANDEMIC

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Introduction Junior doctors have previously reported high levels of burnout; and additional stressors have likely emerged from the COVID-19 pandemic may further accelerate burnout. There is a need to identify which particular stressors are most likely to lead to burnout in junior doctors in order to develop appropriate interventions.

Objectives 1) To develop a comprehensive list of stressors that are relevant to junior doctors, which includes general work and non-work related stressors as well as stressors that have specifically emerged with the pandemic. 2) To assess which of these stressors are most strongly associated with burnout.

Methods An anonymous online questionnaire was sent to 1000 randomly selected junior doctors in the North West of England between 10/07/20 to 04/08/20. It included 37 questions on general and pandemic-specific stressors, and the Maslach Burnout Inventory (MBI) Health Services Survey. Stepwise regression analyses were undertaken to assess associations between stressors and burnout.

Results In total, 326 responses were collected (response rate=33%). Of the top 10 stressors rated by junior doctors, 60% were related to the pandemic. Multiple stressors were found to be associated with the burnout dimensions. Fatigue (β =0.43), pandemic-related workload increase (β =0.33) and feeling isolated (β =0.24) had the strongest associations with Emotional Exhaustion, whereas fatigue (β =0.24), uncertainty around COVID-19 information (β =0.22) and doing unproductive tasks (β =0.22) had the strongest associations with Depersonalisation.

Conclusion Junior doctors experience a combination of general stressors and additional stressors emerging from the pandemic which significantly to impact on burnout. Monitoring these stressors and targeting them as part of interventions could help mitigating burnout in junior doctors.

0-316 TRANSFORMATIONAL LEADERSHIP AND FIREFIGHTERS' WELL-BEING: A STUDY WITH EMERGENCY TEAM PROFESSIONALS

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Introduction Although research on leadership has privileged its effect on performance, there is also some empirical evidence that leadership can have a beneficial effect on the well-being of subordinates. The analysis of this effect in professions with high demands that can affect stress and well-being, as is the case with firefighters, is especially relevant.

Objectives In this study based on the theory of transformational leadership, we considered that with this leadership style, subordinates had more resources to face the situations of high demands that characterize their profession. In this way, we analyzed the effect of leadership on well-being, namely exhaustion and flourishing.

Method With a sample of 90 firefighters from emergency intervention teams, in T1 we assessed transformational leadership and in T2, about 3–4 weeks later we assessed well-being. In this period, we recorded the daily number of critical incidents in which each firefighter intervened.

Results The results obtained allowed us to observe that the different dimensions of transformational leadership were significant predictors of both exhaustion and flourishing and this effect occurred after controlling for the number of critical incidents.

Conclusion There must be tools that invest in the development of transformational leadership skills of the heads of fire-fighters, in order to promote a healthy work context for these professionals.

O-488 ASSESSMENT OF MULTIDISCIPLINARY INTERVENTION OF OCCUPATIONAL MEDICINE AND PHYSIOTHERAPY ON RETURN TO WORK OF PATIENTS WITH MUSCULOSKELETAL DISORDERS

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Introduction Musculoskeletal disorders (MSD), are a major public health concern worldwide, leading to substantial individual and societal burdens, incurring disability, work incapacitation, and absenteeism. Multidisciplinary interventions focusing on rehabilitating MSD are generally effective in facilitating integration and return-to-work (RTW). Israel serves as an ideal milieu for conducting multidisciplinary interventions, because OM service is free, egalitarian, and nationally provided to every worker by four Health Maintenance Organizations (HMOs), comparable to the physiotherapy (PT) service.

Objectives Evaluating the effectiveness of a joint OM and PT intervention program in terms of RTW rates and time to RTW.

Methods A quasi-experiment was conducted among MSD patients referred to the OM clinic of Jerusalem District's Clalit HMO between 1/2016 and 6/2018. Patients allocated to OM-OT multidisciplinary intervention were matched to usualcare OM patients, receiving uncoordinated OT. Work status was followed-up using electronic medical records, employers' communication, and phone interviews in 1/2019 assessing RTW. Multivariate adjusted regression and survival analyses were performed to evaluate associations between the intervention and RTW rates or time to RTW, including stratified analyses for symptom anatomy.

Results Of 249 patients included in the study, 94 (38%) were treated by the multidisciplinary OM-OT intervention which demonstrated higher proportions of full-RTW (71.2%) compared to the usual care (51.6%). The intervention proved effective in RTW (OR=2.6, CI=1.4-4.8), which was earlier (HR=1.7, CI=1.2-2.4), with a median time to full-RTW of three months (SE=0.44) in the intervention group versus nine (SE=6.6) in the usual-care group. Higher odds for RTW were demonstrated among intervention patients with back/neck symptoms (3.3) compared to limbs (1.9).

Conclusions Our field study proves the effectiveness of OM-OT collaboration in RTW, coordinating existing public medical systems that provide holistic treatment approaches. OM physicians' involvement assists in tailoring rehabilitation OT treatment towards occupational-oriented goals. Additional multidisciplinary collaborations which include psychotherapists, occupational therapists, etc. should be further studied.

Poster Presentations

Poster



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Introduction The female labor force participation rate is increasing or has remained in high proportion in many countries, and there has been a marked rise in the participation of women with infants in the labor market. In Taiwan, an effort was made to make the workplace friendly for females, especial for mothers-to-be and breastfeeding mothers, under the legal protection. However, some women could not successfully return to work (RTW) after giving birth right after maternity leave.

Objective This study aimed to explore the possible risk factors in the work environment associated with maternal postpartum RTW.

Methods We used the Taiwan Birth Cohort Study, recruiting representative mother-infant pairs using multistage stratified sampling. Participating mothers underwent two home interviews at 6 and 18 months after delivery using structured questionnaires. Mothers actively employed at the beginning of their pregnancy were included. Self-reported 5-point severity gradation of job stress pre- and during pregnancy and time of RTW after childbirth were recorded. Multiple logistic regression analysis was performed to calculate adjusted odds ratios (aOR) and 95% confidence intervals (CI). **Results** 9,369 women returning to the same job within 1 year after delivery were included. Among them, 8,478 (90.5%) mothers returned to work after no more than 2 months, when they would be assumed to have a full-paid maternity leave. Compared with those having stationary workload, those suffering from increased job stress during pregnancy had a 1.72 times greater risk of later RTW - between 6 and 12 months, after adjusting for potential confounders. Moreover, among those not returning to work more than 2 months after delivery, the aOR of later RTW was 2.0 (95% CI: 1.25, 3.19) among those with increased job stress.

Conclusions In this prospective birth cohort study, mothers' prenatal work conditions were significantly related to later RTW for those returning to work within 1 year after childbirth.

P-7 WHICH ARE THE DETERMINANTS INFLUENCING THE INTENSION OF NURSES TO STAY AT THEIR INSTITUTION

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10.1136/OEM-2021-EPI.162

Objective This study aimed to investigate the main determinants related to their intension to stay at an institution, by years of clinical experience, among nurses in Japan.

Method A cross-sectional survey was conducted at 12 hospitals in the Tohoku and Kanto regions of Japan. Of the 1,034 nurses working in those hospitals, 481 nurses (response rate: 46.5%) completed a questionnaire and contributed to the analyses. The participants identified the determinants strengthening their intention to stay at the current hospital ('comfortable workplace environment,' 'passive motivational factors,' 'convenience of hospital location,' 'favorable worklife balance,' and 'fulfilment in nursing'), and individual attribution. The radar charts were shown to assess the determinants strengthening the intention to stay based on the standardized scores of determinants strengthening the intention to stay.

Results Nurses having less than 9 years of clinical experience and having 10-19 years of clinical experience showed higher scores of 'passive motivational factors' than the scores for the other determinants. Nurses having less than 9 years of clinical experience rated the lowest scores for 'favorable work-life balance' among all the determinants. On the other hand, nurses having more than 20 years of clinical experience gave the highest scores to 'favorable work-life balance', and the lowest scores to 'passive motivational factors.' Nurses having less than 9 years of clinical experience gave lower scores to 'comfortable workplace environment,' 'convenience of hospital location,' 'favorable work-life balance,' and 'fulfilment in nursing' than the other nurses. Nurses having more than 20 years of clinical experience showed opposite response trends compared to nurses having less than 9 years of clinical experience.

Conclusion Which determinants nurses emphasized in relation with their intention to stay would depend on the duration of clinical experience. Nurses having less than 9 years of clinical experience would be likely to stay at their current institution with passive motivation.

P-9

THE COMBINED EFFECTS OF A HIGH PHYSICAL WORKLOAD AND EITHER OVERWEIGHT/OBESITY OR INSUFFICIENT VIGOROUS PHYSICAL ACTIVITY ON SELF-RATED HEALTH

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Introduction High physical workload and unhealthy lifestyle behaviors are common among blue-collar workers, both being separate risk factors for self-rated health. It may however be that the combination of high physical workload and an unhealthy lifestyle have a stronger effect than the sum of these factors, but studies to the combined effects are scarce.

Objective To investigate the combined effects of a high physical workload and either overweight/obesity or insufficient vigorous physical activity on self-rated health.

Methods A longitudinal study was performed among 29,987 construction workers using data of two Workers&trsquo; Health Surveillance Programs. Self-reported physical workload involved strenuous work postures and manual material handling. Insufficient vigorous physical activity was defined as self-reported vigorous activity for less than 3 times per week. Overweight/obesity was measured by physical examination. Self-rated health was measured using a single item question. Logistic regression analysis was used to investigate the associations between the separate risk factors at baseline and selfrated health at follow-up. The combined effects of physical workload and overweight/obesity or insufficient vigorous activity on self-rated health were analyzed using the relative excess risk due to interaction (RERI).

Results Construction workers with strenuous work postures (OR 1.35 95%CI 1.25–1.46) or manual material handling (OR 1.29 95%CI 1.19–1.40) were more likely to report poor self-rated health at follow-up. Overweight was not associated with poor self-rated health at follow-up, but obesity (OR 1.31 95%CI 1.17–1.47) and insufficient vigorous activity (OR 1.13 95%CI 1.01–1.25) were. However, no statistically significant interaction effects were found for physical workload and obesity or insufficient vigorous activity.

Conclusions Physical workload, obesity and insufficient vigorous activity were separate risk factors for poor self-rated health, but did not appear to have a synergistic effect. Worksite health promotion interventions focusing on improvement in physical workload and lifestyle both can have beneficial health effects.

P-13 THE UTILITY OF OCCUPATIONAL HEALTH DATA IN THE CANADIAN PARTNERSHIP FOR TOMORROW'S HEALTH (CANPATH)

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Introduction The Canadian Partnership for Tomorrow's Health (CanPath) is a multi-centered prospective cohort study, and represents Canada's largest population health research

platform. CanPath holds data and biosamples on more than 330,000 participants from five regional cohorts representing British Columbia, Alberta, Ontario, Quebec, Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador. A sixth cohort representing Manitoba has begun recruitment and Saskatchewan is in the planning stages.

Objectives To examine the genetic, environmental and lifestyle factors that may influence the development of cancer and chronic disease.

Methods A standardized baseline questionnaire was implemented across CanPath between 2009–2015. Participants also provided biosamples including blood, saliva, urine, and toenails, and non-invasive physical measures (height, weight, hip and waist circumference, body composition, and blood pressure). Subsequently, the first follow-up questionnaire was implemented between 2016–2018. Data from supplementary questionnaires are also available from regional cohorts.

Results CanPath holds a harmonized dataset with 1,477 variables including demographics, history of cancer and other chronic disease, lifestyle and health behaviours, and physical measures. Variables of particular relevance to occupational health research include geographic location, sleep, job title, occupational history, work status, and work schedule. In addition, >150,000 participants provided blood and/or other biosamples.

Conclusions CanPath represents a powerful tool for population health research. The survey data and biosamples are available to researchers for future use to gain a more in-depth understanding of the causes and consequences related to occupational health among Canadian residents.

P-16 EFFECTIVENESS OF THE BRAZILIAN VERSION OF THE DANGEROUS DECIBELS PROGRAM FOR WORKERS

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Introduction Noise-induced hearing loss can be avoided by taking preventive measures.

Objective To assess the effectiveness of the Brazilian version of the Dangerous Decibels[®] program for noise-exposed workers, using the ecological model as an educational intervention plan.

Method Randomized interventional study with a quantitative, experimental trial design, conducted at a meatpacking company. The participants were divided into two groups – the first one (n=132, divided into 6 subgroups) received the Dangerous Decibels[®] educational intervention (DDEI) adapted to workers (REDDY et al., 2017), while the second group (n=138, divided into 5 subgroups) received a conventional educational intervention (CEI). The interventions lasted 50 minutes. The Hearing Protection Assessment Questionnaire (HPA-5) was administered before and after the interventions. The five dimensions (attitude, behavior, knowledge, supports, and barriers) were compared using the Student's t-test for paired data (<0.05).

Results After the DDEI training, workers improved significantly in barriers, supports, knowledge, attitudes, and behavior around noise. For knowledge, attitudes and behavior, the improvement was greater for those trained with the DDEI than the CEI. **Conclusions** The Brazilian version of the Dangerous Decibels[®] program for noise-exposed workers was effective, influencing positively the factors at different levels of the ecological model.

P-18 SEX AND GENDER DIFFERENCES IN OCCUPATIONAL HAZARD EXPOSURES: A SCOPING REVIEW OF LITERATURE FROM THE LAST 10 YEARS

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Introduction Comparative research on sex and/or gender differences in occupational hazard exposures is necessary for effective work injury and illness prevention strategies that integrate individual and social context in their design, especially as women make up half of the labour force in high-income countries.

Objective To summarize the peer-reviewed literature on exposure differences to occupational hazards between men and women, across occupations and within the same occupation.

Methods A scoping review was conducted on studies from 2009 to 2019, from 8 databases. Studies were required to quantify the exposure of men and women to an occupational hazard. The analysis of hazard exposure differences within the same occupations was based on whether studies stratified or matched their results by occupation for men and women, or mentioned in the article. Studies were not limited by language or study design.

Results Fifty-eight studies met our inclusion criteria. Of these, 30 studies were on physical hazards, 38 studies on psychosocial hazards, 5 studies on biological hazards, and 17 studies on chemical hazards. The majority of studies reported that men were exposed to noise, vibration, radiation, physical work, biomechanical and chemical hazards; while women were exposed to wet work, bullying and discrimination, work stress, and biological agents. Within the same occupations, men were more likely to be exposed to physical hazards, with the exception of women in healthcare occupations and prolonged standing exposure. Women compared to men in the same occupations were more likely to experience harassment, while men compared to women in the same occupations reported higher stress. Men reported more exposure to hazardous chemicals in the same occupations as women.

Conclusions Men and women have different exposures to occupational hazards, and these differences are not solely due to the gendered distribution of the labour foce by occupation. Future research is needed to explain the reasons for sex/gender inequalities and differences in exposures within the same occupations.

P-25 ASSESSMENT OF LIGHTING INTENSITY AT WORKSTATIONS AND INCIDENCE OF SHOULDER PAIN AMONG ELECTRONIC MANUFACTURING WORKERS

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Introduction Electronic assembly manufacturing has a working process which includes machine operation, assembly and fine work inspection of products with a microscope.

Objectives This study aimed to assess lighting intensity at workstations compared to the standards and the incidence of shoulder pain among electronic assembly workers.

Methods There were 167 electronic workers in one site of electronic manufacturing. The measurement of lighting intensity was performed with a lux meter at four types of job function, i.e. machine operation, assembly of parts, and two inspection types of moderate fine work and very fine products. The quarterly incidence of shoulder pain was calculated from monthly follow-up.

Results Insufficient lighting intensity was found in the highest proportion at the microscope station of lighting intensity zone 1 (eye-focusing zone) at >2,000-5,000

lux (81.12%), followed by the inspection with a monitor/ profile projector (64.29%), and lighting intensity zone 1 at <1,000 lux (57.89%). The insufficient light was mostly identified within an arm's length of the worker (zone 2) and outside an arm's length (zone 3). The three-month incidence of shoulder pain was 85.3% and it was found that all workers had experienced shoulder pain at the fourmonth follow-up.

Conclusion This lighting intensity measurement method is suitable for identifying problems of the working environment of inspection stations, which is useful for further implementation. The high incidence of shoulder pain suggests that electronic assembly workers should be aware of the need to take frequently short breaks from eye-focusing work and stretch muscles for prevention of eye fatigue and shoulder pain.

P-28 THE DIAGNOSTIC AND HEALTH SERVICE PROBLEMS OF DISTINGUISHING TB AND SILICOSIS CLINICALLY AND RADIOLOGICALLY AMONG EX-GOLD MINERS IN LESOTHO

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Background Between January 2017 and November 2018, 2678 former gold miners from South African mines were examined and sputum screened with GeneExpert at Mafeteng Occupational Health Service Centre in Lesotho. Mean duration since last exposure was 12 years. A high prevalence of silicosis (42.5%), HIV (30.7%) and tuberculosis (active TB 6.8%, history of past TB treatment 53.4%) was found. Of the TB cases, 54,7% were symptom screen negative (had no TB symptoms in WHO Guidelines), and 9,3% had normal chest x-rays. In total, 60% of the sample had lung features on x-ray read as either silicosis, silicotuberculosis, or tuberculosis. It was observed that many silicosis cases had been repeatedly treated for TB, and some even documented as MDR-TB, on the basis of x-ray alone, even when bacteriologic tests gave negative results.

Objectives To illustrate the challenges in diagnosing active TB in this setting, including distinguishing pulmonary TB (past and current) from pneumoconiosis (silicosis, CWP, asbestosis).

Methods Several cases will be discussed. For each case, a complete medical scenario is described, including occupational history, past and current medical history, physical examination, radiological and laboratory findings.

Results

The following were noted (1) Poor agreement between radiological findings and clinical presentation; (2) Poor agreement between radiographs suggestive of TB and positive GeneExpert sputum results; and (3) Similarity of clinical and radiological presentation of silicosis and tuberculosis.

Conclusion TB screening of former gold and other miners needs to take these diagnostic challenges into account. There should be systematic digital record keeping of chest x-rays. Records, including those from the mines, should be accessible to all healthcare providers who attend to former miners in the community. Training on occupational lung disease with emphasis on pneumoconiosis and TB is needed for all community healthcare providers.

P-29 REGISTERED HEALTH PROBLEMS AND DEMOGRAPHIC PROFILE OF INTEGRATED TEXTILE FACTORY WORKERS IN ETHIOPIA: A CROSS-SECTIONAL STUDY

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Background Integrated textile and garment factories are growing in low and middle-income countries, where workers expose to workplace hazards. However, workers' health condition in the sector is inadequately investigated.

Objective This study describes the magnitude of registered health problems and associated work-related and personal factors among workers in integrated textile factories in Ethiopia.

Methods Institution-based cross-sectional study design was employed. A one-year recording of worker's clinical diagnoses (between March 2016 and February 2017) were gathered from the respective factory clinics of three integrated textile factories. Clinical diagnosis data on various diseases were obtained when factory workers visit the clinic for feeling unwell or ill. Sociodemographic characteristics and workrelated information were obtained from the factory's human resource departments. Sociodemographics and clinical diagnosis statuses of 7992 workers were analyzed. The association between diagnoses and workplace factors (textile production, garment production and support process) and personal factors (age, gender and educational status) were studied using logistic regression analyses.

Results The average workers' age and years of service were 40 years and 11 years respectively. 4778 (60%) of workers, were female. 66% of the workers (n=5276) were diagnosed with one or more types of diseases among the 27,320 clinical diagnoses in total. This caused 16,993 working days absence due to sick leave. Respiratory diseases (34%) and musculoskeletal disorders (29%) were the most prevalent diagnoses; while injuries caused the highest number of days of work absence. Work department, gender and educational status were the variables that were statistically significantly associated with higher prevalence of disease groups.

Conclusions About two-thirds of the integrated textile factory workers were diagnosed with different types of diseases. The textile and garment production department workers were more affected than the support process workers, indicating that some diseases may be related to workplace exposure. Further study should investigate on rare chronic diseases such as

cancer, heart diseases, renal diseases, and diabetics based on workers exposure profile.

P-31 FACTORS ASSOCIATED WITH MUSCULOSKELETAL SYMPTOMS IN WORKING WOMEN OF FLOWER CROPS OF LA SABANA NORTH OF CUNDINAMARCA.

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Introduction Musculoskeletal disorders are multifactorial and a public health problem. They occur in different production sectors, but information is scarce in the flower-producing industry.

Aim To analyze factors associated with musculoskeletal symptoms in floriculture workers of the northern savannah of Cundinamarca in 2016.

Materials and Method This cross-sectional study was carried out in a non-random sample of 84 cultivators (production, packing and storage) of ornamental flowers for export in the savanna north of Cundinamarca. The sociodemographic variables, the informed consent and the Nordic questionnaire were obtained through a survey. Statistical analyses were performed in SPSS version 24.

Results Participating women had a mean age of 41.744 (SD = 10.64) and seniority in the development of activities between 1 to 27 years. Statistically significant correlations were found between head/eye symptoms and active pauses r = -0.491, p < 0.05; neck and race R 0.234 p < 0.05; neck and have free time at home r = -0.391, p < 0.01; Shoulder and workplace (less exposure) r = -0.257, p < 0.05; wrist hand and active pauses r = -0.283, p < 0.01, active pauses with stretching (exposure) r = 0.283, p < 0.01; upper back and have time for active breaks r = -0.218, p < 0.05; upper back and being able to sit up during breaks r = 0.235, p < 0.05; upper back and being and have free time at home r = -0.235, p < 0.05; right knee and lifting load r = 0.323, p < 0.01; right knee and have free time at home r = -0.391, p < 0.01.

Conclusion Findings indicate positive correlations between race, sitting during breaks, lifting, and musculoskeletal symptoms; and negative correlations between taking active breaks, having free time at home, workplace, taking active breaks, taking active breaks with stretching, having time for active breaks, having free time at home, and musculoskeletal symptoms in flower women.

P-36 ORGANIZATIONAL INDICES OF BURNOUT INVOLVING NATURE OF TASK, HAZARD EXPOSURE, AND NATURE OF MANAGEMENT AMONG FEMALE FACTORY WORKERS

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Objectives This study aims to look at the organizational indices of 'burnout' among Filipino female factory workers in the Philippines. They have been faced with multiple work arrangements coupled by exposure to hazards in the workplace that may compound their perception and experience of burnout.

Methods Secondary analysis on a research study was conducted on a wide range of socio-demographic, health and occupational data on 344 female factory workers. The database was a cross-sectional study involving 344 female factory workers. Multiple logistic regressions were used to study the overall association of interest, simultaneously controlling for all confounders.

Results The results of the study showed that 60% of female workers reported burnout. The highest mean scores for nature of tasks were obtained for repetitive works (1.3172 ± 0.8905), and works that regularly require new quality (1.6193 \pm 0.7628). In terms of self-reported illnesses, the following yielded the highest means which implies greater occurrence; headaches (0.7733 \pm 0.4193), body aches (0.7442 \pm 0.4370), and coughs and colds (0.6948 \pm 0.4612). The number of illnesses in the last 6 months was found to be associated with organizational correlates of burnout namely- Nature of Task Component 1 (β =1.298; p < 0 .01); Job Autonomy Component 1 (β =1.112; p < 0 .05); Workplace Hazards Component 1 (fumes, vapors, noise) (β =1.147; p < 0 .01); Workplace Hazards Component 2 (odors, high temperatures) (β =1.153; p < 0 .05); and Workplace Hazards 3 (dust, standing) $(\beta = 1.091; p < 0.01)$. It was observed that an increase of 1 in the score for Workplace Hazards 1 implies 121.4% increase in the odds of having sickness often as opposed to seldom.

Conclusion The results of this study revealed that the nature of a factory worker's work is causing burnout and adverse health.

P-40 OCCUPATIONAL EXPOSURE TO PESTICIDES AMONG VEGETABLE FARMERS IN AKUAPEM NORTH MUNICIPALITY

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Introduction According to the Stockholm convention on persistent organic pollutant, 9 of the 12 most dangerous persistent chemicals are pesticides (Chekroun et al., 2014).

Objectives To assess knowledge, practice and attitudes regarding safe use of pesticides and toxicity awareness among vegetable farmers.

Methods A cross-sectional study of 100 vegetable farmers was conducted between November to December 2016. Data collection involved administration of standardized questionnaire to farmers on knowledge, safe use of pesticides and toxicity awareness.

Results Results of the field survey indicated that 48% (95% CI=38–58) did not use any protective clothing such as googles, gloves, long boots. Among the respondent 93% (95% CI=85–96) go back to the farm in less than 24 hours after pesticide application. As a result of pesticide exposure, about 67% (95% CI=56–75) of farmers experienced various kind of discomfort including headache, tingling or burning of skin, irritation of skin and or eye. Most farmers 65% (95% CI 54–73). Apply pesticides in mixtures that is farmers mix pesticides with different active ingredients in one machine for application. Farmers were exposed to 12 pesticides active ingredient.

Conclusion Based on the analyses it can be concluded that most of farmers' involved in vegetable farming in the Akwapim North Municipality are in the middle age group. Almost all the farmers use pesticides in their farming activities. Pesticides and other agrochemical were found to be within reach of farmers who get their supplies from agrochemical dealers at their farms and homes. Farmers who apply pesticides in mixtures were of the view that tank mixing was favourable because it saves time, labour and cost since more than one pesticide could be applied in a single supply. Farmers generally were aware of the potential adverse impacts of pesticide deposition on the environment but didn't know it have adverse health effect on human. Most farmers stored agrochemicals in multipurpose storage structures together.

P-44 THE ASSOCIATION BETWEEN NIGHT SHIFT WORK AND CARDIOVASCULAR AND ENDOCRINE DISEASES IN HEALTHCARE WORKERS IN BULGARIA

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Introduction The prevalence of shiftwork is especially high with hospital healthcare workers. A number of epidemiological studies have found an association between night shift work, and cardiovascular (CVD) and endocrine diseases, involving circadian, behavior and social characteristics.

Objectives The aim of the study was to investigate the association between night shift work and cardiovascular and endocrine diseases in hospital healthcare workers in Bulgaria and possible mediating factors.

Methods The study included 2690 healthcare workers with an average age of 48.0 ± 12.0 years and an average length of service 24.8 ± 12.7 years, from 19 hospitals with >150 beds in Sofia, Bulgaria. A self-administered questionnaire was used to gather information about demographic, physical and behavioral characteristics, previous and current work schedules, and the health status of healthcare workers.

Results The worker group with the highest prevalence with CVD was ex-night shift workers (35.3%), followed by night shift workers (24.4%) and the lowest with day workers (16.3%). The OR for developing a CVD for night workers was 1.98 (95% CI: 1.26–3.13); and endocrine diseases, 1.33 (95% CI: 0.83–2.12). The development of CVD was related to age, family history for hypertension and coronary heart disease, body mass index (BMI), heavy smoking and sleep disorders, while endocrine diseases with BMI, shift system, alcohol consumption and family history for diabetes.

Conclusion Data from our study strongly support the evidence for an increased risk and higher prevalence of cardiovascular and endocrine diseases in night shift workers. Actions for improvement of shiftwork organization and health promotion are needed for tackling CVD and endocrine diseases for a better health status of health care workers.

P-46 INDICATORS OF ABSENTEEISM DUE TO MENTAL ILLNESS IN THE JUDICIAL SECTOR: A DESCRIPTIVE APPROACH OF A RETROSPECTIVE COHORT

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Introduction Sickness absence is characterized by individual's withdrawal from work, for reasons of health and can be indicator of existing problems with the context work, in addition to triggering consequences and damages for the worker and society. An analysis of sickness absence due to mental and behavioral disorders contributes to the dimensioning of the problem and to the search for factors related to work that are potentially stressful, in addition to favoring the identification of possible exposure scenarios for illness due to mental disorders, to which workers may have been submitted.

Objective To describe the indicators of sickness absence due to mental disorders of public servants in the judicial sector in Brazil in the period from 2011 to 2016.

Methods This is a retrospective cohort study on the casuistry of absenteeism. Workers who were on sick leave at the time of the study were excluded. The sociodemographic and occupational profile was observed, in addition to estimated epidemiological indicators (prevalences, cumulative incidence, prevalence ratios and risk ratios).

Results There was a total of 1023 events, with a greater number of episodes among servers with more than 10 years of service. The magnitude and occurrence of incident cases of absenteeism tended to decrease over the years, yet women were the most affected group, with prevalences higher than those of the men. Mood disorders, neurotic and stress-related disorders were the clinical diagnoses with the highest prevalences attributed to absenteeism.

Conclusion This approach and considerations are valid externally for the analysis of other services and pose challenges for the health services of the institutions, especially in the early detection of the risk of withdrawal and monitoring of working conditions.

P-49 OCCUPATIONAL HAZARD EXPOSURES, SHIFTWORK AND PHYSICAL HEALTH OF FEMALE FACTORY WORKERS

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Objectives This study aimed to look into the association between occupational hazards and shift work with the frequency of occurrence of adverse physical health symptoms among 500 female factory workers in the Philippines.

Methods This is a meta-analysis of a database of a research study on female factory workers. Data on a wide range of socio-demographic, health and occupational characteristics were analyzed. The health data collected were the selfreported frequency of occurrence of various mental and physical health symptoms and injuries. Regressions were also used between factors affecting female worker's shiftwork and physical health.

Results Associations were observed between shift schedule, workload, sex, occupational risk, harassment, injuries, use of personal protective equipment, benefits, unions, employer-employee relations, and employee-employee relations, with the frequency of onset of physical health symptoms. The odds ratio for the association between shift schedule and occurrence of physical health symptoms was 1.82 (0.66–4.97; p=0.39) implying that female workers who worked in the evening were 1.82 times more likely to have frequent physical health symptoms. Having seminars on occupational health may modify the association between shift schedule and physical symptoms. In the final model, the ergonomic and occupational health factors that affected physical health were employee-employee relations, harassment, workload, and work benefits.

Among night shifters, those who perceived that they frequently had excess workload were 4.54 (1.03 - 20.00) times more likely to frequently experience physical symptoms.

Conclusion This study has shown that there is an association between specific occupation hazards and shiftwork with adverse physical health among Filipino female factory workers.

P-50 OCCUPATIONAL MOVEMENTS AND POSTURES OF THE NECK AS RISK FACTORS FOR CERVICAL DISC HERNIATION (CDH).

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Introduction Some observational and in vivo studies suggest dynamic neck movements and positions as causes of cervical disc disease. However, epidemiological evidence using objective measurements on neck position and movements as exposure is limited.

Objectives We studied the associations between objectively measured occupational neck movements and postures and CDH.

Methods We formed a cohort of 852,625 Danish workers who ever held at least one of 29 jobs (e.g. dentists, hairdressers, childcare, carpenters) from 1981 to 2016. Representative whole work-day inclinometric measurements using triaxial accelerometers measuring neck angular velocity and posture of the neck were used as exposure. Job titles were retrieved from the Danish Occupational Cohort with eXposure data (DOC*X) database. First diagnosis of CDH was retrieved from the Danish National Patient Register. The risk of CDH by quintiles of cumulated exposure was assessed by incidence rate ratios (IRR), adjusted for age, sex, calendar -year, previous lumbar disc herniation and education, using Poisson regression models.

Results We found 14,000 cases of CDH during 20.2 million person-years of follow-up. Crude analyses showed an increasing IRR of CDH with increasing angular velocity of the neck. However, in the fully adjusted model increasing levels of neck angular velocity showed a decreasing risk with IRR 0.90 [95% confidence interval (CI) 0.86–0.95] when the highest quintile (dynamic work) was compared to the lowest (static work). Similar results were found for extension and flexion of the neck. Multiple sensitivity analyses did not change the results. **Conclusion** In this large register-based study, we found no evidence of an increased risk of CDH in jobs with high velocity of movements or extreme positions of the neck. Other factors than dynamic neck movements and bent neck position seem

P-51 REPETITIVE AND FORCEFUL MOVEMENTS OF THE HAND AS PREDICTORS FOR PAIN IN THE DISTAL UPPER EXTREMITIES

to be important in the development of CDH.

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10.1136/OEM-2021-EPI.177

Introduction Some evidence exits of an association between measures of occupational use of hand force and repetition and

tendinitis of the wrist and epicondylitis of the elbow. However, these studies have often been limited by bias because of self-reported exposure and an outcome sensitive to time fluctuations.

Objectives To investigate occupational repetitive movements and the use of hand force as causes of distal upper extremities musculoskeletal disorders (D-UEMSD).

Methods A cohort of 202,735 workers in a private pension health scheme from 2005 to 2017 in one of 17 jobs (e.g. office work, carpentry, cleaning) was formed. Representative electro-goniometric measurements of wrist angular velocity as a measure for repetition and expert-rated use of hand force were used as exposures. Job titles were retrieved from the Danish Occupational Cohort with eXposure data (DOC*X) database. Outcome was first treatment for D-UEMSD. In a Poisson regression model, the incidence rate ratios (IRRs) of D-UEMSD were adjusted for age, calendar-year, diagnosis of rheumatoid arthritis and arm fractures. In further analyses, wrist velocity or hand force was added.

Results In men, wrist velocity had an IRR of 1.48 (95%CI 1.15–1.91) when the highest exposure level was compared to the lowest but with no clear exposure-response pattern. The effect became insignificant when adjusted for hand force. Hand force had an IRR of 2.65 (95%CI 2.13–3.29) for the highest vs. the lowest exposure with an exposure-response pattern, which remained after adjustment for wrist velocity. Among women, no increased risk was found for hand force, while wrist velocity showed a significantly protective association with D-UEMSD.

Conclusions In men, occupational exposure to hand force more than doubled the risk of seeking treatment for D-UEMSD. The results for exposure to repetition were less clear. In women, we could not find any indications of an increased risk neither for force nor repetition.

P-52 PROSPECTIVE ASSOCIATIONS OF MULTIPLE EXPOSURES TO PSYCHOSOCIAL WORK FACTORS WITH WELL-BEING AMONG EMPLOYEES IN FRANCE

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Objective Literature reviews showed adverse effects of high job demands, low job control, and low social support at work on well-being in working populations. Other psychosocial work factors (PWFs) remain understudied in association with well-being. We aimed to examine the prospective associations of a large variety of PWFs and other occupational exposures with poor well-being, as evaluated by the WHO-5 well-being index. An additional objective was to explore the effects of multiple occupational exposures on this outcome.

Methods The study sample consisted of 15776 employees aged 15–65 years (9181 women, 8579 men) included in the representative sample of the French national survey on working conditions and followed up from 2013 to 2016. Participants were classified as having poor well-being if they had a WHO-5 score below 13. Occupational exposures included 20 PWFs which were studied separately and then grouped into five dimensions (work demands, work organization and job content, interpersonal relations and leadership, work-individual interface, workplace violence), 4 factors related to working

time/hours, and 4 physico-chemical exposures. Weighted robust Poisson regression models were used to investigate the associations between occupational exposures in 2013 and incident poor well-being in 2016 after adjustment for covariates, in men and women separately.

Results The incidence rate of poor well-being in 2016 was 10.3% among men and 16.8% among women. Significant prospective associations were found between a wide range of PWFs and poor well-being, and the risk increased with the number of these factors globally and within almost all psychosocial dimensions (except work demands in men and work-place violence in both genders). Among the other studied occupational exposures, noise was prospectively associated with poor well-being in women.

Conclusion Working conditions, especially PWFs, could have a negative impact on well-being and exposure to multiple PWFs could increase the risk of poor well-being still further.

P-53 MULTIPLE EXPOSURES TO OCCUPATIONAL FACTORS AND SLEEP PROBLEMS AMONG EMPLOYEES IN FRANCE

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Objective Many studies suggest that working conditions may have an impact on health, including sleep. One of the main limitations inthe literature, however, is that studies have explored a limited number of occupational exposures and have not addressed the issue of multiple exposures. Our objective was to study the associations of a large variety of occupational exposures with sleep problems, and to assess the impact of multiple occupational exposures on this outcome.

Methods The study sample consisted of 20430 employees aged 15–65 years (8579 men, 11851 women) included in the representative sample of the working population from the 2016 French national survey on working conditions. Participants were classified as having sleep problems if they reported sleep disturbances and/or sleep medication, at least several times a week. Occupational exposures were: 21 psychosocial work factors (PWFs) further grouped in five dimensions (work demands, work organization and job content, interpersonal relations and leadership, work-individual interface, workplace violence), four working time/hours factors and four physico-chemical exposures. Weighted robust Poisson regressions were performed to study the associations between occupational exposures and sleep problems after adjustment for covariates, in men and women separately.

Results Among the studied working time/hours factors, only night work among women was associated with sleep problems, while most of psychosocial work factors and physico-chemical exposures were significantly associated with sleep problems. Stronger exposure-outcome associations were found in men for some PWFs. The odds of sleep problems increased with increasing number of exposures for most dimensions of PWFs, and with increasing number of physico-chemical exposures (non-significant trend in women).

Conclusion Psychosocial and physico-chemical exposures were found to be associated with sleep problems, and the higher the number of exposures, the higher the odds of sleep problems. More studies are needed on multiple occupational exposures in association with sleep problems among working populations.

P-54 MULTIPLE EXPOSURE TO PSYCHOSOCIAL FACTORS AT WORK AND OTHER OCCUPATIONAL FACTORS AND COMMON MENTAL DISORDERS AMONG EMPLOYEES IN FRANCE

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Objective Knowledge on the cumulative effects of psychosocial work factors on mental health is sparse, and other occupational exposures such as those from the physical work environment remain understudied in this topic. Therefore, this study aimed to examine the associations between various types of occupational factors, including a large variety of psychosocial work factors (PWFs), and major depressive episode (MDE) and generalized anxiety disorder (GAD) in the French working population.

Methods The study was based on data from the 2016 national survey on working conditions conducted on a representative sample of workers, including 20430 employees aged 15–65 years (8579 men, 11851 women). The MINI standardized diagnostic interview was used to assess MDE and GAD. The following occupational exposures were studied: 21 PWFs grouped in five dimensions (work demands, work organization and job content, interpersonal relations and leadership, workindividual interface, workplace violence), four working time/ hours factors and four physico-chemical exposures. The associations between occupational exposures and MDE/GAD were assessed in each gender separately using weighted logistic regression models.

Results We found a higher prevalence of MDE and GAD among women than among men (8.6% and 8.7% respectively versus 4.3% and 4.6%). There were significant associations between most psychosocial work factors, andMDE and/or GAD. The odds of MDE/GAD increased with the number of exposures for all psychosocial dimensions, except workplace violence. The odds of MDE also increased with multiple physico-chemical exposures. No association was found between working time/hours factors and MDE/GAD, except between unsocial work days, shift work and MDE in women.

Conclusion Our results highlighted the negative impact of being exposed to multiple PWFs for depression and anxiety, and showed a cumulative association of the four studied physico-chemical exposures with depression. More research is needed on the effect of the accumulation of occupational exposures on these outcomes in working populations.

P-60 RELATIONS BETWEEN WORK-RELATED FACTORS AND STRESS AND INJURY AMONG JANITORS

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Introduction While a body of literature identifies relations between injury occurrence and resulting stress, literature relevant to relations between work factors and stress and injury occurrence is limited.

Objectives To identify the potential relations between: 1) work-related factors and stress and 2) stress and depression and injury outcomes in a high risk, understudied population.

Methods Specially designed questionnaires were disseminated to 1,200 full-time unionized janitors to collect information on their injury occurrences, personal characteristics, health history, and work-related exposures, for two sequential six-month periods. Risk ratios (RRs) and 95% confidence intervals (CIs) were calculated using multivariable Poisson regression with robust error variances, and included bias adjustment for non-response and adjustment for within-person correlation using general estimating equations (GEEs).

Results 527 total observations among 390 janitors identified associations between the following exposures and high/low stress outcome (collapsed 5 point Likert scale – often/very much versus (vs) not at all/very little/sometimes): work environment factors (range = 1, terrible/unhappy/mostly dissatisfied; 2, mixed feelings; 3, mostly satisfied/pleased delighted) how they felt about their job (1 vs 3 - RR 4.50; CI 2.38, 8.52); where they worked (1 vs 3 - RR 3.46; CI 2.03, 5.92); resources available for their job (1 vs 3 - RR 1.77 CI 1.14, 2.76); and job mentally or physically demanding (high/very high vs very low/low/medium demand) RR 2.49; CI 1.26, 4.93 and RR 3.74; CI 1.37, 10.25, respectively. High vs low stress exposure was associated with outcomes: diagnosed depression yes/no (RR 4.79; CI 2.22, 10.36); and risk of injury (RR 1.45; CI 1.00, 2.10).

Conclusions This analysis enabled identification of: workrelated factors associated with reported stress; the relation between stress and depression; and risk of injury among those reporting stress levels. These findings serve as a basis for future research and relevant interventions to facilitate optimal working environments.

P-62 SICKNESS ABSENCE AND PSYCHOSOCIAL CONSTRAINTS AT WORK: A CROSS-SECTIONAL STUDY AT A UNIVERSITY HOSPITAL IN TUNISIA

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Background The relationship between work and health is complex and bidirectional. It has individual and collective aspects resulting from working conditions and interpersonal relationships. Absenteeism, a complex phenomenon, represents for some workers the expression of health and work relationship. It is considered as an indicator of a person's physical and mental health status. Aims: To identify determinants of sickness absence among nurses in a Tunisian university hospital.

Methods A cross-sectional study carried out in a Tunisian University Hospital. We included medical absences declared to the employer by nurses during one year. The study was conducted in two successive phases: data collection of absence from the hospital direction (human resources), then a standardized self-administered questionnaire was distributed to the target population. This questionnaire included a socioprofessional survey and a questionnaire on Psychological and Organizational Constraints (POC), using a version applicable to nurses (IDE).

Results The global absence rate was 6.58. Absenteeism was statistically associated with age (p = 0.035), marital status (p= 0.005) and the presence of medical and surgical history (p $< 10^{-3}$). The number of absence days was statistically higher among nurses with a pathological professional history (p = 0.019) and among those with an occupational tenure higher than 15 years (p = 0.034). For the psycho-organizational constraints studied, the period of absence was statistically associated with the organization that did not allow communication (p = 0.001), the lack of support from the health manager (p = 0.001) and a shortage of staff ($p < 10^{-3}$). The multivariate regression analysis showed as determinants of absenteeism: medical history (p < 10⁻³; 95% CI = [2.21; 8.18]), surgical history (p = 0.001; 95% CI = [1.71; 9.12]) and the lack of support from the health manager (p = 0.001; 95% CI = [1.58; 6.34]).

Conclusion This study allowed us to identify some determinants of absenteeism among nurses.

P-63 SOCIO-ECONOMIC ISSUES OF OCCUPATIONAL MUSCULOSKELETAL DISORDERS

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Aims To assess determinants of absenteeism among employees with occupational musculoskeletal disorders (MSDs).

Methods A descriptive cross-sectional study carried out at the Department of Occupational Medicine in the University Hospital of Tunisia. The survey took place during the year 2019 and was conducted using a pre-established questionnaire, relating to the description of socio-demographic data and the assessment of work capacity by the Work Ability Index questionnaire 'WAI'. The study of absenteeism linked to MSDs was carried out using the Work Performance Questionnaire 'WPQ'.

Result A total of 63 participants, all females, mean age 41 ± 8 years, had consulted for a musculoskeletal problem. In this series, 58% of these women had a low level of education (primary). They were married in 77% of cases with more than two children in charge in 61% of cases. The average professional length was 20 \pm 7 years. Sectors of activity were clothing (92%), food processing (4%), and the automotive wiring industry (4%). The capacity for work perceived by all the operators was low in 85% of cases and average in 15% of the cases. The mean relative absenteeism of the study population was 31%. Absenteeism was significantly correlated: with age (p = 0.03), with the work of the spouse (p =0.006), with the distance between the place of work and the residence (p = 0.015), with the sector (p = 0.001) and professional seniority (p = 0.032). In this work, the explanatory model of medical absenteeism linked to work-related MSDs was statically linked to professional length of service (p =0.02; OR =2.3, IC = [1.3-4.5]).

Conclusion Musculoskeletal disorders have various repercussions in terms of suffering and interruption of professional careers of employees, but also high economic costs. As a result, a comprehensive and integrated prevention approach must be put in place.

P-65 MENSTRUAL DISORDERS IN HAIRDRESSERS: A CROSS-SECTIONAL STUDY

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Aims Determine the frequency of menstrual disorders and identify their risk factors in hairdressers of childbearing age.

Methods In a cross-sectional study, participants were all female hairdressers below 50 years of age working in the region of Mahdia in Tunisia (n=80). A control group comprised female office workers (n=80), with respective matching criteria. Menstrual disorders were defined as short cycles, long cycles, irregular cycles and bleeding or spotting between periods (intermenstrual bleeding). The data were analyzed by logistic regression calculating odds ratios (OR).

Results The frequency of menstrual disorders was significantly more frequent in the hairdressing population with a predominance of irregular menstrual cycle type disorders (51.3%), followed by short cycle type disorders (20%). Menstrual disorders were significantly associated with occupation (p = 0.00), non-use of gloves (p = 0.00), ventilation (p = 0.00) and the presence of a closed waste cycle (p = 0.00). After applying logistic regression, hairdressers were significantly more at risk of menstrual disorders (p = 0.001) than female office workers with an OR = 4.31 (95% CI = 1.8–10.33).

Conclusion A disruption of the menstrual cycle can interfere with the fertility of workers and be the cause of delayed contraception. This is why preventive actions at different scales need to be applied.

P-68 OCCUPATIONAL HEALTH AND SAFETY PRACTICES IN A SMALL CONSTRUCTION COMPANY IN PIURA, PERU

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Introduction Participatory programs for occupational risk management are becoming more important in small workplaces in developing countries such as Peru. The current legislation on occupational health and safety (OHS) in Peru is more focused on occupational exposure in big enterprises, however. In small construction companies, workers have significant high-risk occupational exposure to suffer accidents and diseases related to physical, locative, ergonomic and mechanical factors. Most of these companies do not have an OHS system adapted to their reality.

Objectives The purpose was to describe the implementation of the OHS System and its progressive improvement during 3 years in a small construction company in Peru and to show how it turned out to be a good investment and a competitive advantage.

Methods This research was a case report study. The unit of study was the economic indicators of expenses and income of a small construction company, related to OHS activities as training programs, involving workers in safety inspections, performing medical examinations for workers, performing internal audits, among others. Besides, the impact of the system on the frequency of accidents and illnesses among workers, on absenteeism, on labour inspections, on getting clients, etc. was analyzed. The instrument used was a data collection sheet. A database was created in Microsoft Excel 2007. SPSS software package was used.

Results After 3 years since the OHS system implementation, the frequency of accidents was reduced by 25%. Absenteeism was reduced by 30%. The enterprise got its OHS system certified and got more clients due to its OHS standards, which implied more economic income and a worth difference compared to other companies.

Conclusion It was a good investment to implement and improve the OHS system. It is necessary to implement studies in other small enterprises in developing countries.

P-69 TEACHING INTERVENTIONS IN OCCUPATIONAL HEALTH AND SAFETY SYSTEM IN A SMALL METAL MECHANIC COMPANY IN PIURA, PERU

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10.1136/OEM-2021-EPI.186

Introduction There are several small enterprises in Peru that provide services to mining, construction and oil companies which increase the probability of accidents and diseases. Interventions to educate and train workers in prevention, especially participatory programs for occupational risk reduction, are becoming very important in small workplaces in developing countries like Peru, where there is a significant work population which is underserved and includes people with some issues such as low-literacy and limited professional academic training.

Objective The purpose of the present study was to describe the implementation of teaching interventions and its progressive improvement during 3 years in a small metal mechanic company in Peru and to show its impact in the prevention culture.

Methods The unit of this case report study was the indicators of teaching interventions as number of participants, professions, time working in Occupational Health and Safety (OHS), education methods used and a survey at the end of intervention. Besides, the impact of the intervention on the frequency of accidents and illnesses in workers, on absenteeism and on labor inspections was analyzed. The instrument used was a data collection sheet.

Results During 3 years, the teaching interventions implemented were case discussions, role games and performance-feedback. The frequency of accidents was reduced by 22%. Absenteeism was reduced by 33%.

Conclusion Teaching interventions had goods results in prevention culture by reducing accidents and absenteeism in this small metal mechanic company. It is necessary to implement studies for assessing the effect of teaching interventions in OHS in other small enterprises in developing countries.

P-75 CORRELATES OF POST-TRAUMATIC STRESS DISORDER (PTSD) AMONG AMBULANCE PERSONNEL IN THE WESTERN CAPE PROVINCE, SOUTH AFRICA

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Introduction Ambulance personnel are exposed to various occupational stressors which predispose to the development

of stress reactions such as PTSD. Increased prevalence of PTSD in ambulance personnel has been found compared with the general population and other emergency frontline workers.

Objectives To determine the factors associated with an increased risk for PTSD in ambulance personnel and the barriers faced in accessing support for work related stress (WRS). **Methods** A cross-sectional study of voluntary participants comprising 388 ambulance personnel was conducted. Participants completed self-administered questionnaires: Impact of Event Scale-Revised (IES-R), EMS Critical Incident Inventory (CII), EMS Chronic Stress Questionnaire (EMS-CSQ), SF-36 Quality of Life questionnaire (SF-36) and Connor-Davidson Resilience Scale (CD-RISC). There were used to assess PTSD and level of occupational stressors.

Results The prevalence of PTSD in the study population was 30%. Participants were predominantly female (55%), with a median age of 38 (Interquartile Range [IQR] 31-44) years. 83% had a professional qualification. Those with PTSD were more likely to be current smokers (Odds Ratio [OR]=1.76, 95% Confidence Interval [CI]: 1.05 - 2.95), to be current illicit drug users (OR=16.4, 95% CI: 1.87 - 143.86) and to have drinking problems (OR=3.86, 95% CI: 1.80 - 8.23). Self-reported mental health condition (OR=3.76, 1.96 -7.21), being treated for a medical condition (OR=1.95, 1.22 - 3.11), chronic WRS exposure (OR=1.05, 1.04 - 1.07) and high critical incident stress score (OR=1.03, 1.02 - 1.04) were positively associated with PTSD risk. Barriers to seeking help for WRS included concerns that services were not confidential, and that the participant's career would be negatively affected.

Conclusion PTSD prevalence in ambulance personnel is considerably higher than those found in previous studies conducted among this occupational group in the Western Cape. Identified risk factors and exposures should inform prevention strategies and interventions designed to support ambulance personnel with a greater focus on addressing barriers to accessing care.

P-77 WORK-RELATED TRAUMATIC FATALITY IN THE CANADIAN PROVINCE OF SASKATCHEWAN, 2007–2018: TRENDS AND ASSOCIATION WITH ECONOMIC FACTORS

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Background Understanding the extent of work-related fatality (WRF) burden can provide insight into prevention efforts. The Canadian province of Saskatchewan demonstrates an increased WRF burden over other provinces. Still, the evolution of this WRF burden over time remains unclear and this limits understanding of the true pattern of fatalities at the workplace and identification of potential WRF leading indicators. This study examined the WRF rate in Saskatchewan over the past decade, as well as potential risk factors.

Methods Retrospective linked Saskatchewan workplace traumatic fatalities and Statistics Canada labour force survey data were used. Fatality cases were then aggregated by year, season, worker characteristics (e.g., age, sex, and industry type), total employment, total labour force, and the number of unemployed workers. Yearly WRF rates were calculated using the number of fatalities as the numerator and yearly total employment numbers as the denominator. A generalized additive model with Poisson distribution was carried out to examine the association of WRF rates to personal characteristics and economic indicators.

Results The study identified 220 traumatic WRF cases from 2007 to 2018. The average twelve-year WRF rate was 0.28 \pm 0.07 per 100,000, with a stable WRF rate observed between 2013–2014 and 2015–2017 and an increasing trend between 2017–2018. Men were 13 times more likely to have WRF than women (RR=13.7, 95% CI: 10.48–17.9), and participants aged 60+ years were disproportionately affected by WRF (0.70 \pm 0.21 per 100,000). The construction industry experienced the highest WRF risk (RR=9.2, 95%CI 6.1–13.8). Risk of WRF was found to increase with unemployment rate, but dropped when unemployment rate was highest.

Conclusion The study findings show a rising trend in recent (2017–2018) WRF rate, with transient increases in unemployment rate compounding the problem. Targeting prevention strategies towards high-risk population and age groups and during periods of economic downturn could help address fatalities at work.

P-79 PHYSICIANS' EXPERIENCES OF WORK, SUPPORT AND LEADERSHIP DURING THE FIRST WAVE OF THE COVID-19 PANDEMIC: STORIES FROM SWEDISH HOSPITALS

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Introduction Positive work engagement can increase in times of hard pressures, and especially when organisational resources are at place. Nevertheless, such hard pressure as the COVID-19 pandemic on care processes is not seen in modern times in Sweden. Inherent unpredictability of a pandemic together with the initial lack of reliable scientific data have posed major challenges to healthcare professional.

Objective The aim of this study is to describe hospital-based physicians experiences of work, support and leadership in the health organisation they worked in during the first wave of the COVID-19 pandemic.

Methods A total of 25 physicians from different clinical units, and different hospitals in Sweden were interviewed between July and October of 2020. Interviews were transcribed verbatim and analysed using a qualitative content analysis as described by Graneheim, Lindgren and Lundman (2017). Analysis was inspired by a system approach sorting experiences on micro, meso and macro levels.

Results Preliminary results show that physicians experienced on micro level physicians struggled to keep their health and control over their work situation. On meso level, physicians described trust in and support from first line managers. However, organisational and health service leadership were lacking. Physicians led the transition from regular to pandemic care, which was perceived as positive.

Conclusions Health service organisation can learn from the physicians' experience both in preparation for the next crisis and the importance of including medical professions in the organisation of care.

P-82 SUICIDE IDEATION IN ASSOCIATION WITH MULTIPLE EXPOSURES TO PSYCHOSOCIAL WORK FACTORS IN THE FRENCH NATIONAL WORKING CONDITIONS SURVEY

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Objective The objective of this study was to explore suicide ideation in association with multiple occupational exposures, especially those related to the psychosocial work environment, in the French working population.

Methods The study relied on the data of the 2016 national working conditions survey, including a sample of the French working population of 20,430 employees, 8,579 men and 11,851 women. The outcome was suicide ideation within the 12 last months. All types of occupational exposures were explored including psychosocial work factors, working time/ hours and physico-chemical exposures. The exposures-outcome associations were examined by weighted logistic regression models with adjustment for covariates. Sensitivity analyses were performed to check the robustness of the results.

Results The prevalence of suicide ideation was of similar magnitude among men and women (5.2% and 5.7% respectively). A large number of psychosocial work factors were associated with suicide ideation: quantitative and cognitive demands, low influence and possibilities for development, low meaning at work, low sense of community, role conflict, job insecurity, temporary employment, changes at work, and internal violence. The risk of suicide ideation increased with the number of psychosocial work exposures linearly. There were some differences in the exposure-outcome associations between genders. No association was observed for working time/hours and physico-chemical exposures with suicide ideation. Sensitivity analyses provided similar results.

Conclusion Psychosocial work exposures were associated with suicide ideation, and displayed cumulative effects on this outcome. Our study is one the first to study multiple occupational exposures in association with suicide ideation. More research and prevention are needed on psychosocial work exposures and their cumulative effects on suicide ideation.

P-83 OCCUPATIONAL RISK FACTORS FOR DEPRESSION IN THE NATIONAL FRENCH WORKING POPULATION

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Objective Studies exploring occupational exposures comprehensively in association with depression measured using diagnostic instrument are lacking. The present study aimed to examine the associations of occupational exposures with depression in the national French working population.

Methods We used the data from the 2016 SUMER survey including a national representative sample of 25,977 employees, 14,682 men and 11,295 women. The outcome was depression measured using the validated PHQ-9 instrument and algorithm. All types of occupational exposures were studied: psychosocial work factors, working time and hours, and physico-chemical exposures. The exposures-outcome associations were examined using weighted logistic regression analyses for each gender separately. The following covariates were taken into account: age, marital status, occupation, and economic activity of the company.

Results The prevalence of depression was 5.70% for women and 3.78% for men, with a significant difference between genders. Low levels of decision latitude and reward, bullying, work-family conflict and ethical conflict for men and women, and high levels of psychological demands, low levels of social support, and long working hours for women were found to be associated with depression. There was no association between physico-chemical exposures and depression.

Conclusion Our study showed that the main occupational risk factors for depression were psychosocial work exposures. The study had two major strengths: the assessment of the work environment comprehensively and the measurement of depression using a diagnostic instrument and algorithm. Prevention oriented towards the psychosocial work environment may be useful to prevent depression at the workplace.

P-84 THE FRACTIONS OF CARDIOVASCULAR DISEASES AND DEPRESSION ATTRIBUTABLE TO PSYCHOSOCIAL WORK EXPOSURES IN EUROPE

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Objective This study aimed to assess the fractions of cardiovascular diseases and depression attributable to five psychosocial work exposures in Europe (35 countries), for all countries together and each country separately.

Methods We used the data of the sample of 35,571 employees from the 2015 European Working Conditions Survey to assess the prevalence of exposure to job strain, effort-reward imbalance, job insecurity, long working hours, and workplace bullying. The relative risks were extracted from published literature reviews and/or meta-analyses. The outcomes included: coronary/ischemic heart diseases (CHD), stroke, atrial fibrillation, peripheral artery disease, venous thromboembolism, and depression. We calculated individual attributable fractions (AF) for each exposure and overall AFs for all studied exposures together.

Results The highest significant AF was found for job strain and depression (17%). The other AFs for depression were also significant: job insecurity (9%), bullying (7%), and effortreward imbalance (6%). Almost all AFs for cardiovascular diseases were significant but lower than 5% (one exception was the fraction of peripheral artery disease attributable to job strain, 11%). There were differences in the AFs for depression between countries. Differences in the AFs were also observed between countries and between genders for long working hours. The overall AFs related to the five studied exposures together were found to be 17%-35% for depression and 5%-11% for CHD.

Conclusion The fractions attributable to psychosocial work exposures were substantial, especially for depression. Preventive measures oriented towards the psychosocial work environment may contribute to reduce the burden of diseases attributable to these exposures.

P-86 PSYCHOSOCIAL WORK EXPOSURES OF THE JOB STRAIN MODEL AND ALL-CAUSE AND CAUSE-SPECIFIC MORTALITY: RESULTS FROM THE STRESSJEM PROJECT

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Objectives Very little literature is available on the effects of psychosocial work exposures on mortality. The aim of the STRESSJEM project was to explore the prospective associations between these exposures and all-cause and cause-specific mortality.

Methods The STRESSJEM project was based on a French national representative sample of 798,547 male and 697,785 female employees for which data on job history on the 1976– 2002 period were linked to mortality and causes of death data from the national registry. Job strain model exposures were imputed using a job-exposure matrix and three timevarying exposure measures were constructed: current, cumulative, and recency-weighted cumulative exposure. The prospective associations between these exposure measures and mortality were explored using Cox proportional hazards models.

Results 88,521 deaths occurred among men and 28,921 among women between 1976 and 2002. Low decision latitude, low social support, job strain, iso-strain, high strain, and passive job were found to be risk factors for all-cause mortality, cardiovascular mortality, suicide, and preventable mortality (including smoking- and alcohol-related mortality as well as external causes of death). The model with current exposure was the highest relative quality model. The fractions attributable to job strain were 5.64% and 4.13% for all-cause mortality, 5.64% and 6.44% for cardiovascular mortality, 5.29% and 9.13% for suicide, and 5.1% and 3.1% for preventable mortality, among men and women respectively (though non-significantly different from zero for cardiovascular and preventable mortality among women).

Conclusion Our findings underlined the role of the job strain model exposures on all-cause and cause-specific mortality. The burden of mortality attributable to these exposures may be substantial, especially for suicide among women. Prevention oriented towards the psychosocial work environment may reduce mortality among working populations.

P-87 UNEMPLOYMENT DURING PREGNANCY AND EXCESSIVE GESTATIONAL WEIGHT GAIN MEDIATED THE ASSOCIATION BETWEEN MATERNAL SHIFT WORK STATUS AND POSTPARTUM WEIGHT RETENTION

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Introduction Shift work is associated with higher risk for mothers during pregnancy and increases future obesity risk for both mothers and children. However, only limited literature examined the effect of shift work on maternal body weight changes during pregnancy and after delivery.

Objectives To examine the association between maternal shift work and body weight changes during pregnancy periods, and to identify possible mediating factors.

Methods We extracted maternal weight and body mass index (BMI) during pregnancy and maternal shift work status from a population-based cohort study. The associations between maternal shift work and maternal weight retention at six months were evaluated with multivariable linear models, and we examined the mediation and interaction effect from excess gestational weight gain.

Results We included 13 575 mothers giving birth to term singleton in the study population, and maternal shift work before pregnancy was associated with a 0.25-kilogram higher postpartum weight retention at six months after adjusting for confounders (95% CI: 0.11–0.40, p=0.001). Meanwhile, this association was mediated by excess gestational weight gain (Natural indirect effect: 0.12-kilogram increase, 95% CI: 0.07–0.17, p-value < 0 .001) and nonemployment during pregnancy (Natural indirect effect: 0.02-kilogram increase, 95% CI: 0.00–0.03, p-value 0.006). Lastly, a 0.39-kilogram additive interaction (95% CI: 0.12–0.65, p-value 0.005) was identified for excessive gestational weight gain on the association between maternal shift work and postpartum weight gain at six months.

Conclusion Maternal shift work before pregnancy is associated with increased postpartum weight retention at six months, and this association was mediated by nonemployment status during pregnancy. Meanwhile, excessive gestational weight gain exacerbates the effect through additive interaction and mediation.

P-90 MUSCULOSKELETAL DISORDERS BY GENDER AMONG WORKING SYRIAN REFUGEE CHILDREN IN LEBANON

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Background Due to the Syrian war, a massive number of Syrian refugees migrated to Lebanon, which forced children to engage in harmful jobs, mainly agriculture in the Bekaa Valley in the east of Lebanon. Children working in the agricultural sector experience ergonomic hazards associated with musculoskeletal disorders (MSDs).

Methods A survey of 4090 working Syrian refugee children between 8 and 18 years in the Bekaa Valley of Lebanon documented the variation in reporting MSDs between male and female working children. Data were collected on demographic, occupational, and socioeconomic indicators and musculoskeletal disorders. Statistical analyses were done using Stata V.15.0. Means and standard deviations were generated for continuous data, and frequencies and percentages for categorical data. Chi Square and independent t-test were used to test significant differences between males and females.

Results Around 4.4% of the child workers experienced MSDs. The highest prevalence of MSDs was among children working in agriculture (73.2%), with a higher prevalence among females (84.5%) than males (63.2%). The most common MSDs reported were back pain, feet pain, joint pain, and knee pain. Significantly, more females (1.3%) reported wrist or hand pain than males (0.6%).

Discussion The study showed that females and males were differently burdened with MSDs. Females child workers bore a higher burden than males due to working both inside and outside the house. Interventions and policies protecting children from harmful exposure and working conditions are
needed to safeguard the health of Syrian refugee child workers.

P-93 HOW CAN WE GET COMPARABLE EXPOSURE DATA ACROSS COUNTRIES? A WORKERS' SURVEY ON EXPOSURE TO CANCER RISK FACTORS IN EUROPE – AN INNOVATIVE APPROACH

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Introduction With cancer accounting for an estimated 53% of all work-related deaths in the European Union, data on exposure to known cancer risk factors at work are essential to improve the safety and health of workers, support the evaluation of existing policies and foster a productive and sustainable economy.

Objective Recognising the lack of harmonised figures at European level, and having carried out a feasibility study, the European Agency for Safety and Health at Work (EU-OSHA) has started a workers' survey on exposure to cancer risk factors following the Australian Workplace Exposure Studies (AWES) model. The objective of this initiative, which plans to publish first findings in 2023, is to identify the most prevalent cancer risk factors across occupations and sectors in Europe.

Methods EU-OSHA will initially carry out the survey in six European countries, interviewing a representative sample of workers about their current job. Based on the respondent information on specific tasks performed at work, exposure data to one or more cancer risk factors will be derived for each worker, using the occupational exposure assessment tool for epidemiological studies (OccIDEAS), an algorithm using epidemiological data, workplace measurements and expert assessment, which EU-OSHA is adapting to the European context.

Results The survey looks into the number and characteristics of the workers exposed to a range of cancer risk factors, including asbestos, benzene, chromium, diesel exhaust, nickel, silica dust, UV radiation, wood dust, among others. Information on workers' multiple exposures and the use of control and protective measures at work will be available. Results can be analysed by activity sector, occupation, country, gender, etc. **Conclusion** To provide an overview of the methodology and adaptations of the Australian model to Europe, and to discuss the limitations of the survey and the challenges in adapting it to national contexts.

P-98 RELATIONSHIP BETWEEN PRESENTEEISM AND QUALITY OF LIFE: THE ROLE OF SOCIAL SUPPORT

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Presenteeism is defined as the practice of being present at work, but unable to fully perform tasks due to physical and/ or mental health problems. Research on presenteeism highlights its consequences for people's health and quality of life, as well as the loss of productivity of organizations. Social support at work by supervisors and colleagues, can contribute to the minimisation of the wear and health risks of these professionals.

Thus, the purpose of this research is to i) explore the prevalence of presenteeism in higher education professionals, ii) identify the main health problems behind it, and iii) identify personal, professional and social support factors associated with the phenomenon. Additionally, it is intended to evaluate the role of social support at work in relation to presenteeism and quality of life.

The target population will be made up of higher education technicians and it will be developed at the University of Porto, a Portuguese public university located in Porto. The study will be conducted in the form of a survey, with data being gathered via email. We will apply the validated versions for the Portuguese population, the Presenteeism Scale (SPS-6), the subscales, 'social support from supervisors' and 'social support from colleagues' of the Copenhagen Psychosocial Questionnaire, COPSOQ (to measure social support at work) and the Quality of Life Index (EUROSHIS-QOL-8). A sociodemographic questionnaire (with personal and work-related variables) will also be collected.

We expect with this study to contribute to the identification of reduced activity professional patterns associated with presenteeism and that affect professionals quality of life, as well as alerting institutions to the relevance of promoting social support at work.

P-99 RESPIRATORY, AUDITORY AND VISUAL IMPAIRMENT AMONG SPONGE IRON PLANT WORKERS IN GOA, INDIA: A COMPARISON STUDY

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Sponge iron plant workers are exposed to excessive dust at raw material handling section, fumes emitted during the burning process, and to the noise generated throughout till the formation of final product poured in moulds to form sponge iron.

Objective The study was done to compare the respiratory, auditory and visual impairment among the workers exposed to the dust, fumes and noise with those less likely to be exposed to these hazards in the same work place.

Methods The present study was carried out among all the 578 workers in a sponge iron plant in Goa. The spirometry, audiometry and the near and far vision findings were obtained from the routine annual medical examination records for the year 2019. Data was analyzed to compare the morbidity among the exposed group (n=359) i.e., the workers directly exposed to dust, fumes and noise with those less likely to be exposed (n=219) i.e., the executives and the office staff working in closed air-conditioned offices segregated from the site of hazards.

Results Respiratory impairment among those exposed to dust and fumes was 1.6 times higher than the unexposed. The hearing impairment among those exposed to noise was 1.8 times higher than the unexposed. The impairment in near vision in the exposed was 1.3 times higher than the nonexposed whereas the impairment in far vision was 1.3 times higher among the non-exposed as compared to the exposed. **Conclusions** The impairment in respiration and hearing which is higher among the workers exposed to dust, fumes and noise at the workplace shows a need for future research to study if all safety measures are strictly adhered to. The impairment in near vision which was higher among the exposed workers needs detailed investigations into the cause and association with the working environment, if any.

P-100 MEDICAL ACCESSIBILITY AND UNDER-REPORTING OF OCCUPATIONAL DISEASES: EFFECT OF TRAVEL DISTANCE AND TRAVEL TIME

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Introduction In Taiwan, outpatients' average travel distance (TD) is 17.68 km, and workers' TD and travel time (TT) for outpatient services are only 8.2 km and 27.6 mins. Poor medical accessibility of occupational outpatient service can also lead to under-reporting of occupational diseases (ODs).

Methods In Taiwan, Network of Occupational Diseases and Injuries Service (NODIS), composed of 9 major reporting hospitals, is an important surveillance system of ODs. Using NODIS's reporting data and manpower survey from 2008 to 2018, we calculate each town's incidence rate of occupation diseases (IROD) and expected IROD according to workers' occupations and job titles, and each town's shortest TD and TT to 9 major reporting hospitals is estimated by Google Maps' Distance Matrix API. Quasi-Poisson regression model is employed to investigate effect of TD and TT on IROD.

Results There are 8017 cases of suspected ODs in NODIS from 2008 to 2018, and 3306 cases are confirmed as definite ODs. Adjusted by workers' occupations and job titles, as TD/ TT increases by 10 km/10 mins, IROD significantly decreases by 10.90%/10.74%, and less-disabled workers who have never stopped working or lost their jobs are more impeded by long TD and TT.Compared with towns with TD 45 km and off-shore towns decreases by 38.93%, 39.58%, 50.03%, 55.01%, 65.71%, and 84.10%, and IRODs of towns with TT 10–15, 15–25, 25–35, 35–45, >45 mins and offshore towns decreases by 30.94%, 43.57%, 47.41%, 47.70%, 67.81%, and 85.29%. Around 40% ODs are under-reported due to poor medical accessibility.

Conclusion Our study shows how poor medical accessibility leads to serious under-reporting, and up to 40% ODs could be under-reported. Using this method, we can identify areas with poor medical accessibility and evaluate cost-effectiveness of adding reporting hospital.

P-101 OCCUPATIONAL DUST EXPOSURES AND CT FINDINGS OF INTERSTITIAL LUNG DISEASE AND CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Introduction Occupational dust exposure is associated with interstitial lung disease and chronic obstructive pulmonary disease, but little is known about the association with more discrete lung changes detected by lung scans.

Objectives To 1) analyze the relation between occupational dust levels and HRCT (high-resolution computed tomography) detected signs of pulmonary disease, and 2) map the prevalence of these signs in the Danish workforce.

Methods We are carrying out a cross-sectional study of 25,000 adults who underwent HRCT scans of the lungs 2011–2019 in Denmark. We will analyze the extent of emphysema and signs of pulmonary fibrosis such as, but not limited to, reticulation with Imbio Lung Texture AnalysisTM of the HRCT scans. The DOC*X cohort provides annual information on occupation (ISCO-88) and industry for the total Danish workforce since 1976. Individual exposure levels are estimated using quantitative job exposure matrices for asbestos, crystalline silica, wood dust, and endotoxins. We will conduct adjusted analyses of exposure-response relations and tabulate distributions of emphysema and signs of pulmonary fibrosis for all occupations and industries.

Conclusion The study will provide new knowledge on pulmonary effects of current and past occupational dust levels. We will use a new software for objective identification and quantification of signs of pulmonary disease independent of diagnostic traditions. This sensitive and graduated measure of outcome will also enable more sensitive exposure-response analyses that include discrete signs of pulmonary disease. We expect this study to serve as a basis for targeted interventions of importance to the many that still have dusty work.

P-108 POPULATION-LEVEL ESTIMATES OF OCCUPATIONAL EXPOSURE TO CHLOROTHALONIL, 2,4-D, AND GLYPHOSATE IN CANADA'S AGRICULTURAL INDUSTRY (CAREX CANADA)

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Introduction Certain pesticides may lead to adverse health outcomes including cancer; however, little is known about occupational pesticide exposure in Canada.

Objective The purpose of this study was to estimate the prevalence and likelihood of occupational exposure to chlorothalonil, 2,4-D, and glyphosate in Canada's agricultural industry.

Methods Lower and upper estimates were calculated using the Canadian Census of Population (CoP) and Census of Agriculture (CoA). We estimated the number of workers and proportion of farms applying 'herbicides' or 'fungicides' by farm type using CoA survey data. These values were multiplied to yield the number of workers at risk of exposure. Likelihood of exposure (exposed, probably exposed, possibly exposed) was qualitatively assigned using information on crop type, primary expected tasks, crop production practices, and residue transfer data. Agricultural workers who are at risk of exposure but were not captured by the CoA were identified using the CoP.

Results An estimated 37,700 to 55,800 workers (11-13%) of agricultural workers) were exposed to glyphosate in in Canada while 30,800 to 43,600 workers (9-11%) and 9,000 to 14,100 (3%) were exposed to 2,4-D and chlorothalonil,

respectively. Approximately 70–75% of at-risk workers were probably or possibly exposed to any of the pesticides. Glyphosate exposure was most common among workers in oilseed (29%) and dry pea/bean farms (28%), along with those providing support activities for farms (31%). 2,4-D exposure was most common in corn (28%), other grain (28%), and soybean farms (27%), while chlorothalonil exposure was more likely among greenhouse, nursery and floriculture workers (42%) and those working on farms (28%, for occupations not captured by the CEAG). Regional variations reflected differences in farm types by province.

Conclusion This study estimated the prevalence of occupational pesticide exposure in Canada, and findings can support priority setting for future research and data collection.

P-113 AN EXPLORATION OF DISPENSING ERRORS AMONG THE HOSPITAL PHARMACISTS IN TAIWAN

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Introduction Dispensing errors are among the most common medical errors. Previous studies found that environmental factors, educational training, physical and mental health were factors affecting dispensing errors among pharmacists. However, the associations among burnout, sleep quality and dispensing error in pharmacists are still unknown.

Objectives The aims of this study were to investigate the frequency of dispensing errors among the hospital pharmacists in Taiwan and to determine the risk factors associated with it.

Methods This was a cross-sectional study. The electronic questionnaires were sent to the pharmacists from multiple centers. The questionnaire included demographic characteristics, the frequencies of dispensing errors in the past three months, environmental factors, Chinese version of Copenhagen Burnout Inventory, Chinese version of Pittsburgh Sleep Quality Index, and continuing education questions. Logistic regression models were used to assess the association between environmental factors, burnout, sleep quality, continuing education and dispensing errors.

Results A total of 370 pharmacists completed the questionnaire. Among them, 96.5% reported dispensing errors in the past three months. In the univariate logistic analysis, pharmacists experienced dispensing errors were more likely to have shorter working years (Odds Ratio (OR)= 0.91, 95% Confidence Interval (CI) : 0.85-0.98), shift work (OR= 4.75, 95%) CI : 1.51-14.89), shorter working hour per day (OR= 0.80, 95% CI: 0.64-0.99), lower personal burnout score (OR= 0.97, 95% CI: 0.94-0.99) and lower over-commitment score (OR= 0.96, 95% CI: 0.94-0.99) compared with those without dispensing errors. The multivariate logistic regression model indicated that after adjusting for all possible risk factors, shorter working years (adjusted Odds Ratio (aOR)= 0.92, 95% CI: 0.85-0.99) and shift work (aOR= 4.63, 95% CI: 1.39-15.45) was associated with dispensing errors among pharmacists.

Conclusion A significant proportion of pharmacists experienced dispensing errors. Development of stress management programs to enhance pharmacists' physical and psychological wellbeing and to improve job performance is warranted.

P-115 PRO-MENTA: IMPACT OF MAJOR ORGANIZATIONAL CHANGES ON EMPLOYEE MENTAL HEALTH AND WORKPLACE PRODUCTIVITY

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Introduction The health care system of Denmark is currently undergoing major centralizations. Relocation of workplaces as well as mergers and split-ups may impact both health and productivity among employees and managers. The unification of all hospital units in Aarhus, Denmark, poses an opportunity to study the short- and long-term consequences of different degrees of organizational change during a fixed event.

Objectives The primary aims are to: 1) investigate the consequences of major organizational changes on absenteeism and mental health of employees and workplace productivity and staff turnover, and 2) identify risk factors for negative consequences on mental health, sickness absence, productivity, and staff turnover, in order to identify risk groups for targeted prevention.

Methods Using national and regional registers we will establish a cohort of 10,000 individuals employed at Aarhus University Hospital in the period from 2011–2020. Hospital units moving at different time points through 2016–2019 will be aligned on the index date defined by their relocation and followed up to 5 years after and prior to this.

Results Based on the life event literature we expect to find a delayed effect of major organisational change on sickness absence and mental health, and an immediate effect on staff turnover and productivity. We hypothesize these effects as more pronounced for units which in addition to relocating also merge/split, representing greater organisational change. We also expect to identify risk factors for the chosen outcomes based on job titles, age, seniority, and work unit characteristics such as number of employees, patient centred vs. service/ administrative, and out-patient vs. in-patient wards.

Conclusion This project is expected to produce valuable knowledge about the mental health and/or economic consequences of major organizational changes in the health care system. This can inform preventive actions targeting specific employee groups in future centralization projects.

P-118 MANAGEMENT OF CAUSAL UNCERTAINTY : CAN A SICK BUILDING SYNDROM BECOME CHRONIC ?

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Objectives In 2014, the head of a elderly care facility (ECF) alerted the regional health authority for chronic irritative symptoms among office workers. Symptoms started in 2009 for 4 workers back in a newly rehabilitated building. From 2009 to 2014, the first analysis of indoor air quality lead to cleaning and disinfection of the air treatment plant. Furthermore no toxic compounds were identified in the materials used. In 2014, out of 21 office workers, 13 declared irritative symptoms, and the French national public health agency was called to carry out epidemiological investigations.

Methods In 2016, a regional group of experts in sanitary alerts in occupational health was involved as well as experts in air treatment, indoor air quality, building materials, and occupational medicine. Investigations were structured into 4 axes : clinical, epidemiological, environmental and psychosociological, all accepted by a local steering committee, except the psycho-sociological investigations.

Results Out of 130 workers of the ECF, 24 met the case definition. Among them, 18 worked in the newly rehabilitated building. Cases occurred regularly in this building from 2009 to 2016. Symptoms increasing with damp weather were: fatigue (89%), headache (83%) and multi-site irritations (35 to 88%). Medical consultations were reported by 12 workers. Underground springs existed under the building and water ingresses occurred after raining. Molds in high concentrations in indoor air (> 1000 UFC/m³) were identified in some offices. Ventilation systems followed reglementation. A surface disinfectant was withdrawn due to toxic compounds. Alcans disappeared when flooring was replaced in an office.

Conclusion This episode of sick building syndrom had an exceptional duration. Although former remediation measures were undertaken, the dampness of the environnment and symptoms of workers persisted. This suggests 2 possible ways of symptoms chronicization : hyper-sensibilisation of workers due to identified molds and/or psycho-sociological runaway (unfortunately not investigated).

P-119 OCCUPATIONAL RADIATION-INDUCED CANCER IN MEDICAL STAFF (ORICAMS): PROTOCOL FOR A FRENCH NESTED CASE-CONTROL STUDY

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Introduction Currently, medical workers represent the largest group of workers occupationally exposed to ionizing radiation (IR), reaching 7.4 million practitioners worldwide. The risk of radiation associated cancer is still under debate for low-doses IR exposures for these professionals. Some publications have reported an excess of central nervous system (CNS) tumors in interventional cardiologists, but the link with the profession has never been established in a large, properly controlled epidemiological study.

Objectives The ORICAMs (Occupational Radiation-Induced Cancer in Medical Staff) nested case-control study aims to assess the dose-response relationship between IR exposure and CNS tumor.

Methods This study includes medical workers with at least one dosimetric record in the national dose registry called SISERI (Système d'Information de la Surveillance de l'Exposition aux Rayonnements Ionisants) between 2002 and 2012. Follow-up ended in 2019. Individual cumulative doses for each worker will be provided by SISERI. CNS death cases will be matched 1:5 by gender, year of birth, and date of enrollment, with controls alive at the time of case death. Associations between CNS cancer death and cumulative dose will be investigated using conditional logistic regressions. **Results** The study will quantify the relationship between occupational exposure to low doses of IR and CNS tumor mortality risks in medical workers. The inclusion of 45 CNS cases and their matched controls will allow detecting at least an odds ratio of 1.5 for a statistical power of 80% and an alpha significance level of 5%.

Conclusion This study will improve the knowledge of the health risks associated with repeated low-dose IR exposures and will contribute to improve radiation protection strategies for medical workers. This cohort will be part of the international BECOME (Brain cancEr risk in pooled Case-cOntrol study of MEdical workers) project, which will address the same objectives, but using joint analyses of data from France, South Korea and the United States.

P-126 ASSESSMENT OF MORAL HARASSMENT AT WORKPLACE IN TUNISIAN JUNIOR DOCTORS THROUGH A TWO-STEP STUDY.

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10.1136/OEM-2021-EPI.206

Introduction The Tunisian revolution was followed by a flourishing in the freedom of expression, which sometimes exceeds the limits. This resulted in an increase of violence levels, particularly in hospitals, worsening already unfavorable work conditions and exposing young doctors to mental harassment at work (MHW).

Objectives To compare the prevalence and the perception of workplace bullying in interns and residents before and after the revolution and to determine its influence on their quality of life.

Methods A two-step-cross-sectional study, carried out in 2009 and in 2016, among 547 and 667 interns and residents respectively. Data concerning sociodemographic and occupational information were collected using a self-administered questionnaire. Workplace bullying was assessed using the Negative Acts Questionnaire Revised (NAQ-R). A person is considered a victim of psychological harassment if he or she has been suffering of any of these acts at least once per week in the last six months. The impact of MHW on the interns and residents' quality of life was determined using the SF8 'health survey' scale.

Results The prevalence of workplace bullying decreased significantly between 2009 (74%) and 2016 (43.6%) ($p < 10^{-3}$). It was related to the professional status, gender, seniority, deliberate choice of medicine, satisfaction, serious family problems and hobbies in 2009 while it was related to professional status, nature of specialty, deliberate choice of medical studies and the satisfaction of the practice of Medicine in 2016. Median mental and physical quality of life scores were below the mean baseline scores in both cohorts with no significant difference; and were both significantly influenced by workplace bullying in the two cohorts.

Conclusion Despite the decrease of workplace bullying among young doctors after the Tunisian revolution, its deleterious impact remains troublesome. The promulgation of incriminating legislation and raising awareness about MHW are urgent preventive measures.

P-129 PREVALENCE OF POST-TRAUMATIC STRESS DISORDER IN HEALTH CARE WORKERS FOLLOWING COVID-19: PRELIMINARY RESULTS OF A TWO-GROUP CROSS-SECTIONAL STUDY.

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Introduction The COVID-19 pandemic has attracted worldwide attention for its rapid and exponential diffusion. The history of past human coronavirus outbreaks resulting in similar health emergencies suggests there will be post-traumatic stress disorders (PTSD) among COVID-19 survivors. This might add to the increasing stress that health care professionals are enduring.

Objectives The purpose of this study was to assess the prevalence and the determinant factors of post-traumatic stress disorder (PTSD) among health care workers with COVID-19.

Methods A two-group cross-sectional study among health care workers (150 cases of COVID-19 and 150 randomly sampled matched controls) was conducted. We present the preliminary results of 91 cases of COVID-19. Demographic data, occupational information and some psychological dimensions were collected using a self-administered questionnaire. Post-traumatic stress disorder was evaluated using the Post-traumatic Stress Disorder Checklist based on the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders.

Results The average age of the population was 36.5 ± 9.35 years, with a female predominance and a sex ratio of 0.21. The most represented professional categories were nurses and medical residents. The acute clinical manifestations lasted between 10 to 20 days in 41% of the patients. Moderate to severe levels of anxiety and depression were noted among respectively 27.5% and 14% of the population. PTSD was found among 8.8% of the study population. Significant correlations were found between COVID-19-PTSD scores and caring for children or parents (p=10⁻³), anxiety level (p=10⁻³), being admitted to the hospital (p=0.008) and the symptoms presented (p=0.003).

Conclusion These preliminary results are relevant from a clinical point of view because they suggest that the COVID-19 pandemic could be considered as a traumatic event among health care workers. Psychological and organizational interventions to counteract short- and long-term psychopathological effects, consequent to the COVID-19 pandemic, appear to be necessary.

P-131 COVID-19 IN ESSENTIAL ACTIVITIES: REPORT ON SUCCESSFUL MEASURES IN OCCUPATIONAL HEALTH FOR 7,000 WORKERS IN AN ENVIRONMENTAL SANITATION COMPANY IN BRAZIL

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Introduction According to a WHO note, since March 11, 2020, the planet has been living with an important pandemic. Human behavior and the environment are different at this point. There are countless deaths. Workers in environmental sanitation services such as water and sewage are considered

essential and need a special approach to COVID-19. Until May 9, 2021, there were in Brazil 15,000,000 infected people. This work describes the safety measures of a group of 7,000 workers of the largest environmental sanitation company in Latin America.

Objective To describe measures adopted to deal with COVID-19 through the safety and health protocol.

Methodology We describe the participation of the occupational medical service in the construction and institution of an appropriate protocol from April 2020 to April 2021 considering a bibliographic survey, management discussions, discussions with workers and measures implemented on the site, monitoring of positive cases, guidelines and preventive health care.

Results Approximately 1,000 telephone surveys were carried out for everyone suspected and/or diagnosed COVID-19. The implementation of a health protocol and daily dissemination of guidance via videos/reports. 60% of workers were allocated to teleworking. 770 cases and 12 deaths were identified. 12% of cases occurred in workers of essential activities. Such data in this Unit corresponded to 45% of the cases of the entire company and 30% of deaths.

Conclusion The adoption of specific measures and protocols, increased the participation of workers with the impact of COVID-19 on workers in environmental sanitation. The adoption of preventive measures and protocols before COVID-19 can contribute to the reduction of cases in essential work activities.

P-132 A PROFILE OF OCCUPATIONAL ACCIDENTS IN BRAZIL ACCORDING OF NOTIFICATION, IN THE PERIOD 2012 TO 2020

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Introduction Occupational Accidents (OA) in Brazil are mandatory to report, but they are very underreported. In 2020, Brazil had a population of 212 million inhabitants. According to the International Labor Organization, Brazil occupies the fourth position in the world ranking of occupational accidents, behind China, India and Indonesia. There are various notification systems and an important underreporting. In 2012, according to a survey by the IBGE, 5 million suffered OA. Officially registered data for 2019 were 700,000 cases. Analyzing existing data considering notification systems can contribute to the identification of profiles and the adoption of specific measures that involve communities beyond specific ones.

Objective To analyze OA in Brazil in the period 2012 to 2020.

Methodology Descriptive study based on the analysis of data from the Health and Safety Observatory at Work, from 2012 to 2020. Data: by state, economic sectors, most frequent injuries, most frequently affected body parts, groups of causative agents, occupations, social security absences, gender.

Results In 2020 there were 400 thousand OA. 2013 was the year with the highest number of deaths 2,841. The state of SP was the most prevalent (35%) of OA, the Hospital economic sector represented 10% of all accidents, 72 thousand received social security benefits. It is estimated that 25% of OA in 2018 were underreported. The most frequent injuries (21%) being cuts, lacerations. The most affected part was the

finger (24%). The most frequent user group was machinery (15%), followed by chemical agents (14%). 35 thousand victims were nursing technicians (6%). 18.8 thousand occurred in adolescents. Men were 60% and in the age group 18-24 years were 672 thousand. In women, the most frequent age group was 30-34 years.

Conclusion Analyzing periodic data and from different sources can contribute to a profile of work accidents with the implementation of public policies in Brazil.

P-134 COVID-19: ANALYSIS OF NOTIFICATIONS ACCORDING TO SOCIAL SECURITY BENEFITS AND ACCIDENTS AT WORK IN BRAZIL IN 2020

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10.1136/OEM-2021-EPI.210

Introduction On March 11, 2020, the World Health Organization declared the existence of a pandemic by SARS-CoV-2. On May 10, 2021, Brazil had reached the 410,000 mark, becoming the second country in number of deaths from COVID-19 and more than 15 million infected. COVID-19 generates withdrawal from work activities and consequent social security benefits. Knowing the profile of employees and benefits can contribute to a better overview of occupational approaches to COVID-19.

Objective To analyze social security benefits generated by COVID-19 leave in Brazil.

Methodology Descriptive analysis of data from the Observatory of Safety and Health at Work, in the period 2020, referring to social security benefits by COVID-19, with a comparative analysis of the year 2019. All social security gaps were considered. Used ICD - 10 = U07 and B34. Data analyzed: state of Brazil, occupation, economic activity, notification with 'report of work accident - CAT', age, gender, economic sector.

Results 50 thousands were dismissed from social security benefits in 2020 according to CID U07 and B34. The state of Sao Paulo had the highest frequency with 36%. Men were 68%. The most prevalent economic sector was hospital (15%) and the occupation was nursing technicians (38%) The most frequent age group in men was 18–24 years and in women, it was 35 to 39 years.

Conclusion Occupational epidemiology acting in the analysis of secondary, social security data on COVID-19 can contribute to the definition of public policies, expanding health promotion and prevention.

P-139 COMPARATIVE ANALYSIS OF THE FRENCH OCCUPATIONAL EXPOSURE DATABASES COLCHIC AND SCOLA

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Objectives In France, two occupational exposure databases with different goals co-exist. Colchic was built to store measurements from prevention activities since 1987, while Scola contains measurements from compliance monitoring since 2007. We aimed to compare exposure levels between these databases targeting the same population of workers.

Methods Despite their different objectives, both databases share the same structure. We selected personal measurements with a sampling duration ≤ 12 hours of airborne chemical substances with $\geq 1,000$ results in each database between 2007 and 2015 and combined into a single dataset. We used Tobit models to measure associations between log-transformed concentrations and six predictors (sampling year and duration, global ventilation, number of workers, personal protective equipment (PPE) and region) for each agent. We combined agent-specific models using meta-analytic approaches. We assessed average differences between Colchic and Scola for four prediction scenarios based on sampling year and duration.

Results We selected 239,968 measurements (25% from Colchic and 75% from Scola) across fifteen substances (66% organic solvents, 27% dusts, and 7% metals). The most prevalent agents were wood dust (n=42,193), respirable dust (n=25,299) and quartz (n=23,774). Non-detects represented 45% of all measurements. PPE, sampling year and duration were the main predictors of exposure levels. For 2007, predicted exposure levels in Scola were 2.3 times lower than in Colchic, regardless of sampling duration. This difference decreased in recent years: predicted exposure levels for 2015 were 1.25 times higher in Scola than Colchic for a sampling duration of 30 minutes, and 1.18 times lower in Scola than Colchic for a duration of 240 minutes.

Conclusions Colchic and Scola both represent important sources of information on historical and current occupational exposures in France. Despite a notable early difference in average exposure levels between Colchic and Scola, our results suggest that the contrasts in exposure are getting smaller over time.

P-150 PESTICIDE EXPOSURE OF OPERATORS DURING TREATMENT TASKS IN APPLE GROWING: RESULTS FROM THE CANEPA STUDY IN FRANCE

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Introduction Although apple trees are heavily sprayed, few studies are available on pesticide exposures of workers in apple orchard. However, these data are crucial for assessing the health impact of such exposures.

Objectives The CANEPA study was performed to measure pesticide exposures during treatment tasks in apple orchard and to identify their determinants.

Methods A non-controlled field study was conducted in apple orchards in four regions of France in 2016–2017. We measured operators' external contamination to captan and dithianon, two fungicides representative of pesticide use in apple growing. Measurements of contamination were performed during mixing/loading, spraying and equipment cleaning tasks, following the OECD guidelines with cotton pads placed onto 11 body areas, cotton gloves or hand rinsing and personal air sampling pump equipped with XAD-2 filters. In parallel, we performed detailed observations of work characteristics on the whole day and measured residues on various surfaces.

Results We observed 30 treatment days corresponding to 52 mixing/loading, 52 spraying and 12 equipment cleaning tasks. The median daily dermal contamination was 5.5 mg for captan and 3.3 mg for dithianon. The average contribution of each phase to the daily dermal contamination was 41.5% for mixing/loading, 29.6% for spraying and 33.0% for cleaning. During mixing/loading, the major determinants of the contamination were related to the use of gloves, the product handling and the characteristics of the spraying equipment. During spraying, dermal contamination was strongly correlated to the spraying equipment (e.g. type and age of the sprayer) and the characteristics of the orchard (height of trees, distance between rows). The daily contamination was also correlated to these parameters.

Conclusion Key determinants of exposure will be used to build prevention messages to improve the safety of operators during treatment operations, especially during mixing and cleaning, the most contaminant tasks. They will also be relevant to build questionnaires for epidemiological studies.

P-155 OCCUPATIONAL EXPOSURE TO ORGANOCHLORINE INSECTICIDES AND PROSTATE CANCER RISK IN THE AGRICULTURE AND CANCER (AGRICAN) COHORT

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Introduction Prostate cancer incidence ranks 2nd among men worldwide. Farming and pesticide use have been repeatedly and consistently associated with prostate cancer risk, with suggestion of the role of organochlorine pesticides, but results on individual pesticides remain controversial.

Objectives We assessed associations between prostate cancer and agricultural exposure to organochlorine insecticides (as a group and considering individual pesticides: aldrin, chlordane, HCH, dieldrin, lindane, heptachlore, DDT, DDD, endosulfan, metoxychlore, SPC, toxaphen, chlorfenethol, chlorobenzilate, dicofol, bromopropylate).

Methods Data on pesticide use on 10 crops, including years of beginning and ending, were collected for 81,960 men from the enrolment questionnaire of AGRICAN. Incident prostate cancer cases were identified through linkage with cancer registries. Exposure to organochlorine insecticides was assessed using the crop-exposure matrix PESTIMAT. Hazard Ratios (HR and 95%CI) were estimated using Cox models with attained age as time scale.

Results Until 2015, 3,535 prostate cancers were diagnosed. We found a slight increase in the risk of prostate cancer in men diagnosed until 2009 exposed to organochlorines (HR=1.11 [0.96-1.30]), but the trend disappeared with 6 additional years of follow-up (HR=0.95[0.87-1.05]). This result was also globally found when considering individual pesticides. But for substances still in use after 1980 (lindane, dicofol, endosulfan, toxaphen), some increases were still observed with longer

follow-up: for lindane used on wheat/barley for \geq 40 years (HR=1.27[1.01-1.58]), on rape for \geq 30 years (HR=1.52 [0.86-2.70]), on sunflower for \geq 10 years (HR=1.14[0.87-1.51]) and on vineyard for \geq 30 years (HR=1.09[0.90-1.32]), for dicofol used \geq 40 years on vineyards (HR=1.17[0.89-1.53]), and for endosulfan used on fruit-growing (HR=1.16 [0.95-1.41]).

Conclusions The increased risk of prostate cancer associated with organochlorines initially observed tended to disappear with follow-up duration, except for some substances still in use in the 1980s and 1990s. Explanations could be i) the distance between last exposure for some organochlorines and cancer diagnosis, ii) changes in the exposure intensity due to evolution of practices.

P-164 WORK-RELATED MUSCULOSKELETAL DISORDERS OF THE UPPER LIMB IN PRACTIONERS IN THE DENTAL TEACHING CLINIC OF TUNISIA.

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10.1136/OEM-2021-EPI.214

Introduction Musculoskeletal disorders represent an important occupational health issue in Dentistry. Awkward postures as well as repetitive motion and the lack of ergonomic tools and workstation expose to a variety of musculoskeletal disorders affecting dentists' quality of life. Therefore, ergonomic recommendations should be applied since the beginning of the university teaching and training.

Objectives The aims of our study were to assess the prevalence of upper limb MSDs among dental practitioners in the dental teaching clinic of Monastir and to identify the social, occupational, ergonomic, and psychosocial risk factors of their occurrence.

Methods It is a cross-sectional study, that interested 260 dental practitioners working in the hospital academic center of dentistry. It was based on a self-administered questionnaire exploring the socio-demographic, occupational and ergonomic data. It was completed by the standardized Nordic Questionnaire and Karasek one.

Results Ninety six percent (96.4%) of the participants reported upper limb MSDs including 95.2% with multifocal locations. The most common painful site was the elbow. The presence of upper limb MSDs was significantly correlated with a high number of patients under care (p=10-3), better social support (p=0.04), single status (p=0.03) and the position as a dental trainee (p=0.006). There is no significant difference in terms of upper limb MSD between subjects in a Job Strain situation and those who were not. Furthermore, no ergonomic determinants were found with the advent of upper limb MSDs.

Conclusion Upper limb MSDs risk among dental practitioners at the dental academic center of dentistry of Monastir is real and frequent. Prevention of this occupational issue should include ergonomic workshops in dental university course and awareness risk sessions. Prevention is obviously based on tools, movement, and space Ergonomics.

P-165 NATIONAL EPIDEMIOLOGIC PROFILE OF UPPER LIMB MUSCULOSKELETAL DISORDERS IN THE TUNISIAN WORKFORCE AND PREDICTIONS FOR 2026.

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10.1136/OEM-2021-EPI.215

Introduction Upper limb Musculoskeletal disorders (UL-MSDs) in occupationally active populations represent an important health issue that affect millions of people worldwide. They lead to high healthcare costs and represent a significant burden to the national economy.

Objectives To assess the incidence of UL- MSDs in the industrial private sector since 2000 and to determine projection for 2026.

Methods Using a national retrospective study that concerned all the Occupational MSDs reported to the Tunisian National Health Insurance Fund, in all industrial private sectors from January 2000 to May 2018, we gathered all the medical and administrative data available.

Results Six thousand and forty-two cases of UL-MSDs were totaled. Most of the declared occupational UL-MSDs were those of female workers (sex ratio=0.15). Moreover, the present study showed a young age of declaration of MSDs (44 \pm 7.5 years). The most common industrial sector affected was in textile manufacturing (63.9%). Mono-site MSDs were significantly more prevalent in almost all the industrial sectors. Central district had a significantly higher yearly number of cases than the two others (p < 10 - 3). The study showed that approximately 71% of all initial medical certificates were reported by occupational health physicians graduated in Occupational Medicine. Seventy-two percent of these declarations were accepted by the recognition committee (p=0.007). In 2026, it is expected to count 2,626 new occupational declared UL-MSDs, with a crude prevalence in female workers 27 times as high as in male workers. The textile and clothing manufacture will remain the main affected sector by the UL-MSDs till 2026.

Conclusion The risk of UL-MSDs in the Tunisian private sector workforce is considerable; it requires the implementation of rapid ergonomic preventive measures in the next decade. Further biomechanical and psycho-organizational studies of the most at-risk workstations in the Tunisian clothing industry are key to preventing these occupational disorders.

P-166 WORKPLACE STUDY OF A LOADING AND UNLOADING AUTOCLAVE WORKSTATION IN THE STERILIZATION UNIT OF THE UNIVERSITY HOSPITAL OF MONASTIR-TUNISIA.

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10.1136/OEM-2021-EPI.216

Introduction In sterilization units, autoclaves are commonly used to guarantee equipment asepsis in sensitive environment. They should be loaded many times a day to guarantee the continuity of medical activity.

Objectives At the behest of the hygiene department boss, following autoclave health workers complaints about low back

and upper limb pain, we carried out an analysis of the activity in order to identify the main occupational risk factors and propose consequent ergonomic recommendations.

Methods We proceeded to activity analysis based on observation method and operators' interviews. We finally assessed the autoclave loading and unloading lumbar and musculoskeletal disorders (MSD) risks respectively through NIOSH and Ergorom analyses.

Results For the autoclave loading station, carrying of weight loads ranged from 5 to 40 kg. The NIOSH recommended load limit ranged from 2.0 to 11.8 kg in the autoclave loading station, and from 1.4 to 11.4 kg in the unloading station with a risk of low back pain of 4% for men and 15% for women. As for upper limb MSD, Ergorom analyses proved a high risk of tendonitis of the rotator cuff (dominant shoulder in flexion or abduction> 60 ° in isometry or with heavy load bearing) and of elbow due to a 60 to 100° flexion/contraction over 73% of the working time. For the unloading station, there was an overall risk related to the hand grip. The risk of tendonitis of both elbows was related to a 60 to 100° prolonged flexion over 85% of the working time.

Conclusion In the light of the obtained results, in order to avoid MSDs and low back pain in healthcare technicians of the autoclave in the sterilization unit, we recommended the handling load of material to sterilize should be limited to 11 kg and the use of the trolleys preferably with adjustable height and with dynamic racks.

P-169 INFLUENCE OF ORGANIZATIONAL JOB CHARACTERISTICS ON NURSES' OCCUPATIONAL WELLBEING.

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10.1136/OEM-2021-EPI.217

Introduction Nurses' well-being has become a point of interest due to their stressful environment and consequent possible burnout.

Objectives to assess the influence of Tunisian nurses' job perception on their occupational well-being and to identify its main determinants.

Methods Our exploratory survey of job perception included an ergonomic chronological observation of 55 workstations in Monastir and Mahdia university hospitals in order to evaluate workload factors. The choice of the observed positions was based on the type of care department, nurse age and gender. Nurses' occupational well-being determinants were identified through a questionnaire driven by the Karasek and satisfaction scales.

Results The analysis of nurse job strain has shown that direct care requiring higher cognitive demands represents 27.26% of the total working time while administrative activities represent a higher proportion of nursing work. Furthermore, painful postures and movements were observed during about 20% of working time. Standing posture was adopted during 58.22% of the total working time, while sitting position was adopted only for a quarter (26.6%) of it.

Subjective perceived workload of occupational well-being was found to be higherthan on the day of activity observation. However, 69.1% of nurses felt stressed at work with a lack of autonomy and a lot of routine. They also reported to be under estimated by their supervisor while they are supported by their colleagues. In addition, most of them felt unsatisfied with their salary and were not confident in their career evolution.

Conclusion The discrepancy raised by our study between the real workload and the perceived well-being seems to be conditioned by organizational dysfunction and dissatisfaction with conditions of work performance. New organizational possibilities with brainstorming approaches of the nurses' work environment are recommended and are being built through interdisciplinary research-action studies.

P-171 AIR RECIRCULATION IN VENTILATION SYSTEM AND ITS IMPACT ON TRICHLORAMINE EXPOSURES IN A SWIMMING POOL HALL: A NUMERICAL INVESTIGATION

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Introduction Trichloramine (NCl3) is an irritant gas commonly found in the air of indoor swimming pool, causing health problems to swimmers and workers who are often exposed to this contaminant. ASHRAE recommends a supply air delivery rate of 4 to 8 air changes per hour to remove trichloramine in aquatic centers. However, the fraction of recirculated air can have a significant impact on the exposure level.

Objective The main objective of this study is to investigate the impact of air recirculation by mechanical ventilation systems on NCl3 exposures for five user groups: i) swimmers in the basin, ii) people sitting or iii) standing on the deck, iv) life-guards in surveillance chairs and v) spectators in mezzanine area.

Methods Exposure to NCl3 levels in a 9300 m3 swimming pool hall located in Montreal (Canada) is evaluated with a computational fluid dynamic software (Fire Dynamic Simulator). Simulations are performed for five recirculation ratios starting from the reference case at 77% down to 0% (100% fresh air). Emission rate of NCl3 is based on equations found in literature for a fully occupied pool. The numerical model was experimentally validated with tracer gas injection in situ.

Results The tracer gas simulation results show good agreement with the experimental results. Compared to the reference case (77% recirculation condition), a 100% fresh air ventilation strategy decreases the NCl3 levels of the five groups from: i) 19%, ii) 31%, iii) 62%, iv) 61% and v) 77%, respectively.

Conclusion Reducing the recirculation rate reduces the NCl3 concentrations. However, recirculation of air has less impact on the concentrations in the breathing zones located near the water surface compared to the other zones. The best air quality improvement with the 100% fresh air strategy is for spectators. Other ventilation strategies have to be investigated to improve air quality in the lower breathing zones as well.

P-175 UNDERSTANDING THE ASSOCIATION BETWEEN TREATMENT MODALITY VERSUS EMPLOYMENT STATUS AMONG PATIENTS WITH ORGAN FAILURE

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Objectives In advanced organ failure patients: (1) To study the association between treatment modality versus employment status, (2) To analyze socio-demographic profiles and deprivation status, and (3) To explore Return to Work (RTW) by analysis of self-reported employment status.

Methods This ongoing hospital based cross-sectional study used a convenience sample: 1070 patients with advanced organ failure requiring solid organ transplant (SOT) or dialysis pooled from the Comprehensive Psychosocial Research Data System at UHN, Toronto. Patient reported outcome measures, clinical and socio-demographic variables were collected from stable outpatients on iPads using electronic data capture (DAta Driven Outcomes System-DADOS, Techna Institute, UHN, Toronto). The Ontario Marginalization Index characterized material deprivation. Data was analyzed using STATA v16, logistic regression used multiple imputation by chained equations.

Results Of 1070 SOT recipients, 646 (60%) were males with 424 (40%) females. Almost half (49%) were of White ethnicity, Black (23%) followed by South Asians and East Asians. 63% (646) had >12 years education, the kidney-pancreas sub-group were highest 88% (30) then kidney, liver and dialysis with 65%, 62% and 59%, respectively. 51% of dialysis patients had a yearly income of \$70,000. These results reflect the higher employment status of kidney (60%), liver (55%) and kidney-pancreas (51%) transplants compared to dialysis patients (28%). 59% of dialysis patients had high deprivation. The association between treatment modality vs employment status and employment status vs deprivation remained statistically significant after adjusting for age, sex, ethnicity and comorbidities in logistic regression models.

Conclusion SOT was associated with significantly higher odds of employment and lower material deprivation. Dialysis, transplant and occupational health professionals should support SOT and dialysis patients overcoming barriers to maintain and RTW. RTW post-SOT is complex and likely associated with personal, professional, societal and medical factors.

P-177 TEMPORARY AND PERMANENT AUDITORY EFFECTS ASSOCIATED WITH OCCUPATIONAL CO-EXPOSURE TO LOW LEVELS OF SOLVENTS AND NOISE

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Introduction The effect of combined exposures to noise and solvents on hearing has been studied for decades, but the characterization of the risk is incomplete.

Objective To assess the temporary and permanent auditory effects associated with occupational co-exposures to low levels of solvents and noise.

Method Cross-sectional study with 25 printing industry workers (mean age 36.2 years) simultaneously exposed to low levels of solvents and noise (< 8 0 dBA TWA). The control group composed of 29 industry workers (mean age 36.7 years) without exposure to noise and/or solvents. Participants answered a questionnaire and underwent pure-tone audiometry (PTA), acoustic immittance tests, auditory brainstem response

(ABR), dichotic digit test (DD). We examined auditory fatigue through the EchoScan test.

Results Exposed workers had worse thresholds bilaterally at 4 kHz (p=0.0253 in right ear - RE; p=0.0436 in left ear - LE). Ipsilateral acoustic reflex levels were different between groups at the frequencies of 500 Hz (p=0.02 in RE; p=0.04 in LE) and 1 kHz (p=0.04 in LE). The only differences detected by the ABR was for the interpeak interval III-V (p=0.03 in RE; p=0.02 in LE). DD means (exposed= 89.5 ± 13.33 ; control= 96.40 ± 4.46), were only different in the LE (p=0.05). Echoscan detected a difference (p=0.0317) between the means of the exposed (4.58 ± 6.8) and control (0 ± 4.62) groups, indicating possible hearing fatigue in the exposed group.

Conclusion Each of the hearing tests indicated differences between the groups, suggesting that occupational co-exposure to low noise and low concentrations of solvents can be harmful to hearing functions. The temporary effect of the exposure was detected by the EchoScan and the acoustic reflex of the stapedius muscle. The permanent effects were identified mainly at the level of the high brainstem and in the auditory ability of binaural integration. The EchoScan, can facilitate the early identification of auditory effects, while these are still temporary.

P-178 EXPOSURE-RESPONSE RELATIONSHIPS FOR WOOD DUST EXPOSURE AND WORK-RELATED ASTHMA IN MOZAMBIQUAN WOOD PROCESSING WORKERS

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Introduction While exposure-response relationships for work-related asthma have been studied in wood processing workers, few studies have used multiple exposure indices to evaluate various clinical endpoints.

Objectives To investigate exposure-response relationships for work-related respiratory symptoms, airway obstruction, bronchial hyperresponsiveness, and exhaled nitric oxide (FeNO) among Mozambiquan wood processing workers.

Methods A cross-sectional study of 450 workers using inhalable wood dust particulate concentrations assigned to workers based on personal environmental exposure samples (n=124) collected for different jobs. Exposure metrics of current and cumulative dust exposure were modeled using multivariate linear and logistic regression for the clinical endpoints, adjusted for confounders (age, gender, atopy, smoking).

Results The mean inhalable dust concentrations modelled were 3.29 mg/m3 (GSD: 3.04), cumulative exposure in current job was 26.23 mg/m3-yr (GSD: 2.94) and cumulative exposure over all jobs was 24.07 mg/m3-yr (GSD: 2.94). The mean age of predominately male workers was 38 years, among whom 76% were non-smokers and 50% atopic. Work-related ocular-nasal symptoms were associated, in a dose-dependent manner, with exposure groups (EGs) categorized according to current dust particulate levels (medium, 4.68–4.71 mg/m3: OR = 3.45, 95% CI: 1.21 – 10.63; high, >4.71 mg/m3: OR = 3.66, 95% CI: 1.19 – 11.26) versus low EG (< 4 .68 mg/m3) in adjusted models. Work-related asthma symptoms were

associated with mean cumulative exposure (OR = 1.01, 95% CI: 1.00 - 1.02) in adjusted models. FeNO was associated with cumulative exposure in current job (quartile 2, OR= 1.23, 95% CI: 1.02 - 1.51; quartile 4, OR= 1.23, 95% CI: 1.02 - 1.49) as well cumulative exposure across all jobs in the factory (quartile 4, OR= 1.22, 95% CI: 1.01 - 1.48) versus quartile 1 in adjusted models.

Conclusion This study demonstrated positive exposure-response relationships between wood dust particulate for both workrelated ocular-nasal symptoms as well as asthma, suggestive of an acute irritant.

P-180 COHORT PROFILE: THE DANISH OCCUPATIONAL MEDICINE COHORT – LONG-TERM PROGNOSIS FOR PATIENTS WITH WORK-RELATED DISORDERS

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Objective Danish departments of occupational medicine currently receive about 9,000 patients each year referred due to suspected work-related disorders. In Denmark and internationally there is a lack of follow-up studies investigating the longterm prognosis of employees with work-related disorders. The purpose of this cohort is to facilitate long-term prognostic studies.

Methods The cohort was created through The Danish National Patient Register and comprises all patients seen in Danish Departments/units of Occupational Medicine from 2000–2018 (N= 145,390). Numerous register data are included in the database from five years prior to time of inclusion until 2018. Examples of register data are; information on work, sickness absence and disability as well as number and type of contacts to health services, hospital admissions, income, education, type of occupation, social status, death and cause of death. Job Exposure Matrices (JEMs) on physical and psychosocial work exposure, life styles and other matrices are also available. The cohort will be updated with new patients regularly.

Results Currently the cohort comprises seven major groups: musculoskeletal (n=51.056), mental health (n=28.212), lung (N=12.274), skin (N=6.544), nervous system (N=5.513), cancer (N=1.566), and others (n=40.225). Preliminary analyses across groups suggest that the labor market attachment has been high among the majority (about 75%) of patients during the years prior to the year of inclusion. However, results indicate that the main diagnostic groups, with the exception of skin patients, do not return to comparable levels of labor market attachment during the years following referral and diagnosis.

Conclusions The Danish Occupational Medicine Cohort is an open source dataset available to researchers interested in longterm follow-up on patients with work-related disorders. Preliminary analyses indicate most diagnostic groups do not return to prior levels of labor market attachment during the years following referral and diagnosis from a department of occupational medicine.

P-181 THE PREVENTION OF OCCUPATIONAL HEAT STRESS IN SUGARCANE WORKERS IN NICARAGUA: AN INTERPRETATIVE PHENOMENOLOGICAL ANALYSIS

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Introduction Chronic kidney disease of non-traditional origin (CKDnt) is an ongoing epidemic that has taken the lives of tens of thousands of people in Mesoamerica, also affecting other tropical geographies. Occupational heat stress, which will increase worldwide as climate change persists, has been identified as a primary trigger of inflammation and subsequent kidney injury and reduced renal function. At Nicaragua's largest sugarcane mill, the water, rest, shade (WRS) intervention has proven to reduce the risk of heat stress and kidney injury effectively as assessed by the research and policy NGO La Isla Network and their academic partners. However, discrepancies between intervention design and implementation have been found.

Objective This study explores the perceptions of the WRS intervention in the company from the perspective of positions responsible for the workers' environment and heat stress prevention implementation.

Method A qualitative design was used in the study. Twentyone key informants of low and middle management, field assistants, and two members from La Isla Network took part in the study. Semi-structured interviews were used to collect the data. Interviews' transcriptions were analyzed using interpretative phenomenological analysis.

Results Four main themes were developed in the analysis of the data: 'A worthwhile struggle,' 'Culture of care,' 'Traditional production culture versus Culture of care,' and 'The importance of the formalization of care.' Each theme contained sub-themes, all of which were further discussed in the light of organizational psychology.

Conclusion Discretionary differences resulting in low and middle management prioritizing production over health protection appeared to relate to a fair part of the implementation challenges and indicate that more efforts are needed to align operations' production and health goals. Education enhancement might be necessary, while further focus on health metrics for performance assessment might offer an opportunity to level perceived incentives and value of health and production.

P-183 THE COSTS IMPUTABLE TO WORK STRESS IN EUROPEAN COUNTRIES: HOW MUCH DOES IT COST FROM A SOCIETAL PERSPECTIVE? A STUDY PROTOCOL

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Introduction Work-related psychosocial exposures are highly prevalent in European countries and are associated with various health outcomes, especially mental disorders and cardiovascular diseases (CVD). Evaluations of the economic burden of psychosocial work exposures are however very seldom in the literature.

Objective To estimate the annual costs of depression and CVD attributable to work-related psychosocial exposures in 28 European Union countries (EU28).

Methods This study will follow the top-down cost-of-illness (COI) approach, which estimates the economic burden of health conditions in a population from a societal perspective, starting from the total costs of diseases. We will estimate the fractions of these costs that are attributable to work-related psychosocial exposures (attributable fractions, AFs). AF estimates require data on the prevalence of exposure in the whole population, and on the relative risk of developing the disease when exposed to the risk factor. Relative risk estimates will come from a systematic literature review. Prevalence of exposure estimates will derive from an analysis of the 2015 European Working Conditions Survey data. Work-related psychosocial exposures will include the factors from the job strain model, effort-reward imbalance model, and other models/concepts depending on the availability of data.

Results Our evaluation of costs will include: (1) direct healthcare costs as reimbursed by public healthcare systems: outpatient visit fees to physicians and other health professionals, hospitalisations, emergency room visits and medication, (2) direct healthcare costs as out-of-pocket payments paid by patients, depending on the extent of the public healthcare system in each country, (3) indirect costs due to sickness absences at work, to disability leave, early retirement and premature death, and the cost of presenteeism when available.

Conclusion This study will provide original and relevant insights on a macro-level for policy-makers and stakeholders when defining public health priorities and preventive strategies in European countries regarding work stress prevention.

P-191 JOB SATISFACTION AMONG HEALTH CARE PROFESSIONALS WORKING AT THE SURGERY DEPARTMENTS IN NIŠ, SERBIA

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Introduction Job satisfaction in health care is an important factor determining quality and performance of a health care system.

Objectives The objectives of this study are to assess job satisfaction among Serbian health care professionals of the surgery clinics and to evaluate factors that could influence the job satisfaction rating.

Methods A cross-sectional study using anonymous self-report questionnaire (Spector, 1994) was performed between June 2016 and March 2017. The study included 158 health care professionals, 33 males (20.9%) and 125 females (79.1%), from the surgery departments of Niš, Serbia. The questionnaire with 36 item has nine facet scale (Pay, Promotion, Supervision, Fringe Benefits, Contingent Rewards, Operating Procedures (required rules and procedures), Coworkers, Nature of Work, and Communication) and each facet is assessed with four items, and a total score is computed from all items. Data were analyzed using SPSS version 20.

Results Highest-rated factors of job satisfaction were nature of work (the average score was 15.78 ± 5.38 , maximum 24) and supervision (14.90 \pm 5.79). Highest-rated stressors were fringe benefits (10.90 \pm 4.36), and promotion (11.26 \pm 4.33). Compared to nurses, a higher total job satisfaction was found among doctors (p = 0.020). There was a statistically

significant correlation between overall job satisfaction and managerial roles leader (r = 0.272, p = 0.002), decision maker (r = 0.196, p = 0.022), innovator (r = 0.206, p = 0.014) and negotiator (r = 0.237, p = 0.005). There was no correlation between total job satisfaction and motivation of health care professionals (r = -0.033; p = 0.713).

Conclusion The finding suggests that the nature of work, supervision and coworkers had a modest effect on job satisfaction of healthcare workers at surgery departments. Strengthening of managerial skills would lead to increased job satisfaction of health workers.

P-193 ASSOCIATION BETWEEN SLEEP-WAKE ACTIVITY CIRCADIAN RHYTHM AND MILD COGNITIVE IMPAIRMENT AMONG WORKERS WITH PNEUMOCONIOSIS IN HONG KONG

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Introduction Weakened circadian activity rhythm was found to increase dementia and mild cognitive impairment (MCI) among female aged general population, but little is known among pneumoconiosis workers with male predominating.

Objectives This study aims to investigate sleep-wake activity circadian rhythm of patients with pneumoconiosis and test the hypothesis that weakened circadian rhythm is associated with MCI.

Methods We randomly enrolled patients with pneumoconiosis who participated in the annual interview activity. Community controls frequency-matched by age and sex were recruited as the reference. Participants wore wrist actigraphs continuously for 7 days (168 h) after completion of a standardized epidemiological questionnaire. Mesor, doubled amplitude acrophase and percent rhythm are the main circadian parameters and a higher value indicates a more robustness of circadian rhythm. MCI status was assessed using validated Chinese version of Montreal Cognitive Assessment (HK-MoCA) and Mini-mental state examination (MMSE) with a cutoff of 21/22 and 26/27, respectively. Co-variance analysis and multivariate logistic regression were performed to obtain adjusted mean of cognitive score and adjusted odds ratio (AOR).

Results Workers with pneumoconiosis had significantly lower MoCA score than the community controls $(20.5\pm0.4 \text{ vs. } 22.0\pm0.5, \text{ p}=0.03)$ after age and education were adjusted, while the difference in MMSE score was borderline $(25.6\pm0.3 \text{ vs.} 26.4\pm0.4, \text{ p}=0.08)$. Mesor and Double amplitude were the circadian parameters that were notably lower among pneumoconiosis workers than the community controls. Compared with community controls with higher Mesor values, pneumoconiosis workers with lower Mesor levels had an AOR of 2.89 (95%CI: 1.20–6.95) for MCI measured by MoCA, which was relatively higher than that of the community controls (AOR=2.73, 95%CI: 0.94–7.93). Similar but attenuated results were observed for double amplitude.

Conclusion This study provides the first epidemiological evidence that increased risks of mild cognitive impairment is associated with weakened circadian rhythm among pneumoconiosis workers.

P-194 SEX DIFFERENCE OF NEGATIVE EMOTION AND CONTRIBUTING FACTORS AMONG CHINESE NIGHTSHIFT WORKERS

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10.1136/OEM-2021-EPI.227

Introduction Nightshift work is prevalent in developed and developing countries in which female nightshift workers are more vulnerable, particularly for mental health.

Objective This study aims to investigate if the prevalence of negative emotion differ among male and female nightshift workers and explore the contributing factors using the baseline information of a prospective nightshift worker cohort in Shenzhen, China.

Methods We recruited 5329 workers and collected their blood/urine samples from 5 industries at the baseline, but only included 834 workers from 2 companies into this report because other 3 companies mainly composed of male workers. We adopted a standardized questionnaire to collect information on lifetime nightshift work, lifestyle factors, housework demands and socio-demographic data.

Results Overall, 510 workers were males (61.2%) and 324 were females (38.8%). More female than male workers were nightshift workers (90.1% vs. 82.7%), aged>40 years (20.4%) vs. 12.9%) and married (74.4% vs. 58.2%) but less females attained college or above (8.6% vs. 23.5%) and leisure-time exercises (32.7% vs. 50.0%). Significantly more female workers did different housework including cooking (12.7% vs. 9.6%), washing (50.6% vs. 31.4%) and taking care of children/elderly (20.4% vs. 12.2%), and the sex difference in housework demands was particularly prominent among nightshift workers. Female nightshift workers were more prone to negative emotion because of 'feel exhaust or insufficient energy (40.1% vs. 32.2%)', 'worry of significant change of body weight (18.5% vs. 12.6%)', 'insomnia/poor sleep (31.5% vs. 21.3%)', and 'hard to concentration or forgetful (30.1%) vs. 20.4%)'; however, there was no significant sex difference of negative emotion among daytime workers.

Conclusion This study reveals that female nightshift workers were more vulnerable to negative emotion, and nightshift work schedule and high housework burden are the contributing factors.

P-195 EFFECTIVENESS OF COVID-19 VACCINE IN HEALTH CARE WORKERS, MILAN, ITALY

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Introduction Randomized controlled trials showed efficacy of vaccines against coronavirus disease 19 (COVID-19). There is the need to quantify vaccine effectiveness in real-word contexts, including people at high risk of infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), such as health care workers (HCWs).

Objectives To evaluate vaccine effectiveness among hospital HCWs.

Methods We performed a cohort study among HCWs of a large University hospital in Milan, Lombardy, Italy by merging routinely collected data on demographics, COVID-19 vaccination, and polymerase chain-reaction (PCR) tests performed on nasopharyngeal swabs. Follow-up started on December 27, 2020 (start of vaccination campaign). We included HCWs never PCR-positive before the start date and with at least a PCR test afterwards. Vaccination was treated as a timedependent variable by calculating person-years (PY) at risk before and after vaccine doses. Subjects contributed PY until first positive PCR test (cases) or last test for never positive HCWs (to avoid immortal time bias). We calculated infection rates (cases per 1000 PY), rate ratios (RR, with a Poisson regression model adjusted for gender, age, occupation and 30day periods), vaccine effectiveness (VE = (1 - RR)x100) and 95% confidence intervals (CI) taking never vaccinated HCWs as reference.

Results As of May 10, there were 3,152 vaccinated (97% with BNT162b2, 140 with one dose, 2,679 with two doses) and 333 non-vaccinated. We counted 29 infected cases (rate 385) among non-vaccinated, 6 (rate 65) from day 14 after the first dose (VE 79%, CI 49–92%), and 24 (rate 65) from day 7 after the second dose (VE 89%, CI 80–94%). Most cases after vaccination were asymptomatic or mildly symptomatic.

Conclusion In these preliminary analysis we found high effectiveness of COVID-19 vaccine in HCWs in our hospital. Further work is needed to assess long-term effectiveness and to better plan future preventive strategies among this high-risk occupational group.

P-196 PREVALENCE OF NIGHT/SHIFT WORK AND ITS ASSOCIATION WITH EXITING THE WORKFORCE AMONGST OLDER UK WORKERS FROM THE HEAF STUDY

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Introduction Night/shift work is increasing but there are few data about the prevalence amongst older workers. Night/shift work has been associated with a number of adverse physical and mental health outcomes, including cardiovascular disease, cancer, anxiety, and depression. With governments encouraging people to work to older ages, it is important to know how feasible night/shift work is for older workers and whether it is associated with prematurely exiting the workforce.

Objectives Amongst current older workers (aged 50–64 years), to explore the prevalence of night/shift working and evaluate its associations with early exit from the workforce over 4 years of follow-up.

Methods Data from the Health and Employment After Fifty (HEAF) cohort were used to describe the demographic, job and health characteristics of men and women undertaking night/shift work. Longitudinal data from annual follow-ups were used to examine the number and nature of exits annually thereafter.

Results Amongst the 5409 working at baseline, 32% reported night/shift work but the sectors differed by sex. Night/shift workers were more likely to be: current smokers; doing physically-demanding work; struggling to cope at work physically and mentally; dissatisfied with their hours; depressed; sleeping poorly; and/or rating their health poorly. Men (OR 1.4, 95%CI 1.1–1.8) and women (OR 1.3, 95%CI 1.0–1.6) working nights/shifts were slightly more likely to exit the workforce over 4 years. A greater proportion of those exiting the workforce who were night/shift workers attributed their exit to ill-health compared with those working conventional hours.

Conclusion In our study, almost one in three workers reported night/shift work. We found some evidence of adverse impact on health, sleep and wellbeing and higher rates of job exit in shift/night workers. More research is needed, but night/shift work may be challenging to sustain for older workers and could be detrimental to health.

P-199 LONG TERM EXPOSURE TO AIR POLLUTION AND COVID-19 INCIDENCE IN THE CITY OF VARESE, NORTHERN ITALY: A COMPLETE-YEAR, INDIVIDUAL-LEVEL ANALYSIS

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Introduction Studies on air pollution and COVID-19 are limited to the first pandemic wave (April/June 2020) and by their ecological design.

Objectives To investigate the association between airborne pollutants and SARS-CoV-2 incidence up to March 2021 in the Varese city (Lombardy region), with individual-level data on exposures, disease and confounders.

Methods Varese citizens aged 18+ years as of Dec31st,2019 were linked by residential address to 2018 average annual exposure to outdoor concentrations of PM2.5, PM10, NO2, NO and O3 modelled using FARM chemical-transport model (linkage coverage: 97.4%). Citizens were linked to Regional datasets for COVID-19 case ascertainment (positive nasopharyngeal swab specimens) and to define age, sex, residential care home living, population density and comorbidities. We estimated rate ratios and additional number of COVID-19 cases for 1 μ g/m3 increase in air pollutants, from single- and bi-pollutant Poisson regression models.

Results Among the 62.848 residents, we observed 4408 COVID-19 cases. Yearly average PM2.5 exposure was 12.5 µg/m3. Cumulative incidence curves suggest an increased risk for PM2.5>13.5 µg/m3 in correspondence of downtrend periods in the pandemic curve. Age, residential care home living, history of stroke, medications for diabetes, hypertension and obstructive airway disease were independently associated with COVID-19 rate. In single-pollutant multivariate model, 1 µg/ m3 increase in PM2.5 was associated with 5.1% increase in COVID-19 rate (95%CI: 2.7%-7.5%), corresponding to 294 additional cases per 100.000 person-years. These figures were confirmed in bi-pollutant models and after excluding subjects in residential care homes. Similar findings were observed for PM10, NO2 and NO. O3 was associated with a 2% decrease in disease rate, the association being reversed in bi-pollutant models.

Conclusions In our study, long term exposure to low-levels of air pollutants, especially PM2.5, positively affected COVID-19 incidence. Causality warrants confirmation in future studies;

meanwhile, governmental efforts to further reduce air pollution should continue.

P-200 'IMPAIRED KIDNEY FUNCTION DUE TO LEAD EXPOSURE AMONG MEXICAN CRAFTWORKERS'

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Objective Approximately 12.4% of the Mexican population is affected by chronic kidney disease (CKD). Leading risk factors for CKD are diabetes, hypertension, obesity and hypercholesterolemia. Other factors, including heavy metals and pesticides, are associated with decreased kidney function even at low exposure levels. Lead exposure in Mexico remains a public health problem and its effects on renal function remains unclear. The aim of the study was to determine the role of lead exposure on kidney function among Mexican craftworkers.

Methods A cross-sectional study was performed on 399 craftworkers and/or users of lead-glazed pottery. We obtained socio-occupational data and calculated creatinine clearance and glomerular filtration rate (GFR). A complete blood count, blood lead (BPb) and biochemical profile tests were performed. A multiple linear regression model was constructed to analyze GFR determinants.

Results 48.37% (193) of the participants were men. The mean age was 44.34 \pm 14.54 [17–84] years old. GFR: 104.07 mL/min/1.73 m2 \pm 14.42 [61.9, 144.2], BPb: 17.57 [g/dl \pm 14.68 [-2, 109], cholesterol: 181.38 mg/dL \pm 38.05 [87, 411], systolic blood pressure (SBP): 122.42 mmHg \pm 14.75 [89, 189]. CKD was present in 6.03% (24) of the population. The model explained 56.17% of GFR variability. The main determinants were: BPb β = 0.125 [0.055, 0.196]; age β = -0.675 [-0.751, -0.598]; males β = -3.393 [-5.458, -1.328]; CKD β = -4.825 [-9.165, -0.486]; cholesterol β = -0.033 [-0.060, -0.006] and SBP β = -0.069 [-0.147, -0.007].

Conclusions The Mexican population is exposed to multiple nephrotoxic risk factors, including pesticides and heavy metals. The results suggest that the increase in GFR is probably an early sign of kidney dysfunction due to lead exposure.

P-201 'OCCUPATIONAL NOISE, ORGANIC SOLVENTS AND LEAD EXPOSURE, AND ITS ASSOCIATION WITH HEARING LOSS AMONG PRINTING WORKERS IN MEXICO'

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Objective Noise has been considered as the main risk factor for occupational hearing loss. In addition, ototoxic substances, such as organic solvents and heavy metals, contribute to this disease. However, conjoint exposures of these risk factors need further attention. Therefore, the aim of the study was to determine if there is an association between hearing thresholds and exposure to organic solvents and lead, alone or in combination with noise, in Mexican workers.

Methods A cross-sectional study was conducted including workers at a printing press in Mexico City exposed to noise and organic solvents (n=279); and workers from Tlaxcala in central Mexico exposed to lead who produce glazed clay pottery at small workshops (n=188). Organic solvents exposure was assessed by questionnaire; noise was measured with a sound level meter. Moreover, lead exposure was defined according to blood lead levels. Individuals were categorized as exposed or non-exposed in both samples. Hearing thresholds were compared across exposure categories. Multiple linear regression models were built to explain changes in hearing thresholds.

Results Exposure to organic solvents >10 years and blood lead levels >30 micrograms per deciliter were associated with worse hearing thresholds. Compared to the non-exposed group, mean hearing thresholds in exposed workers increased as years of exposure to organic solvents increased (≤ 5 years: 2.7 dB [0.46, 5.01]; >5–10 years: 6.3 dB [3.87, 8.77]; >10 years: 8.2 dB [6.00, 10.4]). The same behavior was observed with increasing blood lead levels, compared to workers with >30 micrograms per deciliter: 3.26 dB [0.09, 6.42]). When analyzed altogether, there was no evidence of interaction between noise, organic solvents and lead on hearing thresholds.

Conclusion Occupational exposure to organic solvents and lead was associated with worse hearing thresholds among workers from different job settings.

P-205 'WHAT ARE THE EFFECT OF WORK-RELATED FACTORS ON THE DECISION TO RETIRE? A SYSTEMATIC REVIEW OF PUBLISHED STUDIES 2000–2017.'

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Introduction Ageing populations in high income countries, have the potential to greatly increase the proportion of retired people in relation to workers. Recent policy changes to extend working lives have focused on increases in state pensions ages. However, work-related factors may also present an opportunity for employers to design effective interventions to delay retirement.

Objectives We conducted a systematic review of published studies that investigated the relationship between work-related factors and the decision to retire.

Methods Studies that investigated retirement after 1st January 2000 at ages 50+ were included, whilst studies investigating intention to retire or transitions to unemployment and/or disability retirement were excluded. Six online databases were searched and results were independently screened against the inclusion criteria by two researchers. Data extraction and risk of bias checked were carried out independently by two researchers. Reference lists of eligible studies were screened for further studies.

Results Searches returned 4,995 references. Results were screened and 30 studies were identified that met inclusion criteria. 28 studies were assessed as low/medium risk of bias, however 19 of the studies had limited generalisability to

cohorts of contemporary workers. 169 work-related exposures had been investigated in relation to retirement outcomes. The exposures were grouped into 19 categories to enable comparison and synthesis. The included studies were heterogenous in terms of outcome definitions and measurement of exposures. However, appreciation at work and higher job control consistently associated with a decreased risk of retirement. The review also highlighted limited evidence that: age discrimination: having a positive culture of working beyond SPA: flexible working hours: and job prospects may influence retirement.

Conclusion Increasing worker's job control and perception of appreciation at work have may delay retirement decisions. Further research is required to explore the effect of work-related factors on retirement in cohorts of contemporary workers.

P-206 'ASSESSING THE IMPACT OF EXPOSURE CONTROL ON FUTURE CANCER BURDEN AMONG CONSTRUCTION WORKERS'

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Objectives Construction workers are exposed to several carcinogens at work. Implementing intervention methods may reduce workers' exposure, which should subsequently reduce the number of cancer cases attributable to the exposure. The current study estimates the future cancer burden due to several common carcinogens among Ontario construction workers, and assesses the impact of implementing interventions on this burden. This presentation focuses on solar ultraviolet radiation and asbestos.

Methods The annual number of new cancer cases attributable to each carcinogen was estimated from 2030 to 2060 using Levin's equation based on the prevalence of exposure (PrE) and the risk of cancer (RR) associated with exposure. The RR was selected from a review of the epidemiologic literature. The PrE was estimated using CAREX Canada's estimates of prevalence and level of exposure, combined with historical and projected employment data, labour force characteristics, and survival probabilities. The intervention methods specific to each carcinogen were assumed to be fully implemented from 2020, and incorporated into the model by adjusting prevalence and level of exposure downwards.

Results We estimated that without intervention, 27645 nonmelanoma skin cancers would be attributable to sun exposure in Ontario construction workers from 2030 to 2060. Using portable shade structure and hat/long sleeve clothes, a total of 1957 and 2503 of these cases would be prevented, respectively. For asbestos, the two interventions, asbestos ban and building registry, would prevent 56 and 439 lung cancers out of the 6022 attributable cases from 2030 to 2060 if no intervention was applied.

Conclusions Future work-related cancers can be prevented by reducing workers' exposure. Combining the economic assessment of both the cancer burden and the costs of implementing exposure controls will help to assess the cost-benefit of different intervention methods, which can be used to direct intervention strategies in construction workplace.

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Introduction Changes in the workplace environment, precarization and flexibilization of employment, loss of labor rights, and the big economy have had an impact, increasing work accidents, harms, and occupational diseases as well sick leaves. In Brazil, Vocational Rehabilitation (VR) is provided by the National Institute of Social Security system and includes educational, adjustment, and re-adjustment support to facilitate return to work among workers who receive benefits due disease or accidents. However, its scope is quite limited and does not offer a follow-up to workers after discharge.

Objective To understand the return to work after discharge of the VR.

Methods Qualitative study developed in a VR program from Sao Paulo state and carried out in two phases: (i) documental analysis to identify potential participants who were assisted by VR; (ii) individual interviews by telephone following an open questions script and analyzed through Thematic Content Analysis. This research was approved by the Ethical Committee of Federal University of Sao Carlos; all ethical concerns were addressed.

Results From 2009 to 2020, 263 workers returned to work after discharge of VR: 84 (32%) women and 179 (68%) men received support predominantly due to musculoskeletal disorders (35%) and external causes of injuries (33%). Of these, 71 (27%) returned to the same task and 192 (73%) to different ones. 33 workers discharged from VR during 2019–2020 were invited to participate in the interviews and 11 workers were interviewed. Three categories emerged from interviews: difficulties in the return to work process; limits of VR to return to work; necessary advances to VR regard to return to work.

Conclusion Results showed the need for reorganization of VR including review of criteria of inclusion, interprofessional team analysis of potential participants, discharge mechanisms, follow-up of the worker after discharge, and negotiating with employers accommodation to the rehabilitated worker.

P-213 'USING PARITY MONITOR AND RANDOM FOREST MODELS TO EXPLORE INDICATORS OF INDOOR AIR QUALITY FOR INDEPENDENT WORKERS IN COFFEE SHOPS'

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Introduction Independent workers often work in Taiwan's coffee shops. However, there is not enough information for workers to notice poor indoor air quality (IAQ), such as high concentration of particulate matters (PMs) and carbon dioxide (CO2).

Objectives This study aims to explore indicators of IAQ for independent workers in the coffee shop industry.

Methods Investigators as mystery shoppers went to several coffee shops in metropolitan area of Taipei and New Taipei City to measure indoor conditions and IAQ. Every selected shop was surveyed twice; each measurement lasted 3 hours. Sizefractionated PMs including PM10, PM2.5, and PM1 as well as CO2 were measured by miniature parity monitoring instrument (AS-LUNG) every 15 seconds. Indoor conditions including temperature, and relative humidity (RH) were also measured by AS-LUNG every 15 seconds. Moreover, investigators recorded the weather, condition of indoor ventilation, occupant density, presence of tobacco odors, and customers activities as indoor conditions every 10 minutes. Random forest models R(4.0.3) were used to explore the impact of indoor conditions on concentrations of indoor size-fractionated PMs and CO2.

Preliminary Results The average indoor concentrations of PM10, PM2.5, and PM1 and CO2 in selected coffee shops were 9.75 [g/m3, 8.49 [g/m3, 6.18 [g/m3 and 1079.46 ppm, respectively. Indoor air flow and temperature conditions were two major indicators of IAQ. When opening the window or when the temperature is higher than 20.5°C, concentration of PMs and CO2 increased.

Conclusion Independent workers could use the shop's indoor air flow and temperature as simple indicators for workplace IAQ. Using the results of this study, workers will be able to select working place with suitable IAQ.

P-216 DEVELOPMENT AND CHALLENGES OF A NATIONAL OCCUPATIONAL HEALTH SURVEILLANCE SYSTEM FOR COVID-19 IN THE WORKPLACE.

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Introduction South Africa does not have a comprehensive occupational health surveillance system for COVID-19. The data collection processes were fragmented and did not provide a comprehensive view of the workforce affected by the pandemic. The National Department of Health initiated the Occupational Health Surveillance System (OHSS).

Objectives To develop a COVID-19 surveillance platform to collect and report on data on workforce vulnerability, COVID-19 positive rates, severe disease outcomes and return to work status of workers.

Methods The OHSS commenced data collection on the 1st October 2020 following the promulgation of the Department Employment and Labour Directive to legally require employers to submit the data on a regular basis. Awareness campaigns were conducted to obtain the compliance of employers to report.

Results After a period from 1 October 2020 to 31 March 2021, which coincided with the second wave, a total of 3111 businesses had registered covering a total 1,829,897 employees. During this period 3,704 positive cases were reported, with the majority from Gauteng province (48,2%), the economic hub of the country and from the banking and insurance (57,0%) followed by the health and social sector (27,3%). A workplace contact was reported in 33% of positive cases. Eighty-nine percent (89%) were symptomatic at the time of diagnosis. Among those with COVID-19, 2,617 (70.6%) had returned to work. There were only 38 (1.5%) deaths reported and 195 (7.5%) employees had been hospitalised.

Conclusion Only 1% of all businesses had registered during this period and only 12.2% of the formal sector employees were represented. Major challenges included missing information, failure of businesses to register and report data. Measures to improve this are currently being undertaken. The enforcement of legislation and ongoing training and awareness of employers is essential to provide the necessary information required so as to plan targeted interventions for COVID-19.

P-220 ASSESSING PROSTATE CANCER RISK AMONG PROTECTIVE SERVICE WORKERS AND HEALTH PROFESSIONALS

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Introduction Fire-fighting occupations and nightshift work are possibly/probably carcinogenic to humans (Groups 2A/2B), according to IARC. Some recent studies also found a higher risk for prostate cancer (PCa) for these occupational categories. However, results are inconsistent and most did not consider the aggressiveness of the tumour.

Objectives To study the risk of PCa among protective service workers and medical professionals, occupations frequently entailing night-shift work, with a particular interest for aggressive cancers.

Methods EPICAP, PROtEuS and MCC-SPAIN are three population-based case-control studies conducted respectively in France, Canada and Spain that included overall 3,859 PCa cases newly diagnosed between 2005 and 2014 in men \leq 85 years old and 4,359 population-based controls frequency-matched on age. Participants have been interviewed face-to-face on their socio-demographic characteristics, life-style, leisure activities and complete occupational history for each job held. Occupations were coded using the International Standard Classification of Occupations 1988. Unconditional logistic regressions were performed to assess the association between selected occupations and PCa risk, using the Gleason score at diagnosis, after adjusting for potential confounders.

Results Regarding protective service occupations, we observed positive associations with PCa among participants who has ever worked as police officers (odds ratio (OR)=1.49 [95% confidence interval 1.03 ; 2.17]), as police inspectors and detectives (OR=1.90 [1.06 ; 3.40]), and as fire-fighters (OR=1.62 [0.92 ; 2.86]). We found a negative association for those who ever worked in the armed forces (OR=0.67 [0.53 ; 0.86]). Positive associations with PCa were observed for health professionals (except nursing) who had worked \geq 10 years (OR=1.54 [0.99 ; 2.39]). Analyses taking into account PCa aggressiveness, screening and nightshift work are in progress.

Conclusion Excess PCa risks were observed for occupations that involve a high frequency of nightshift work.

P-224 OCCUPATIONAL RADIATION EXPOSURE AND INFLAMMATORY BIOMARKERS RELATED TO CIRCULATORY DISEASES AMONG MALE INTERVENTIONAL MEDICAL WORKERS

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Introduction A few epidemiologic studies have reported increased risk of circulatory disease among population exposed to ionizing radiation although the mechanism has not been established.

Objectives We investigated the association between occupational radiation exposure and inflammatory biomarkers in medical workers at interventional radiology departments.

Methods We conducted a field survey for interventional medical workers in 2017. Individual radiation dose was linked to the National Dose Registry in 1996–2017. Twenty-three inflammatory biomarkers related to circulatory diseases were measured using by multiplex immunoassays in blood plasma. Multiple linear regression analysis was used to analyze the associations between radiation exposure and inflammatory biomarkers adjusted for potential confounders.

Results A total of 73 male medical workers (52 radiologists, 21 radiologic technologists) were included in this study and they have been worked for a mean of 11.1 years at the department of interventional radiology. The mean cumulative badge dose was 22.5 mSv, which ranged from the 0.01 to 109.3 mSv. The pro-inflammatory cytokines IFN-B, IFNγ, and anti-inflammatory cytokines IL-1ra, IL-4 were significantly decreased with cumulative occupational radiation dose (coefficient = -0.388 per 10 mSv, -0.080 per 10 mSv, -0.564 per 10 mSv, -0.068 per 10 mSv, respectively), whereas endothelial cell adhesion molecules E-selecand pro-inflammatory cytokines MIF showed tin significantly increased association (coefficient = 0.058 per 10 mSv, 0.189 per 10 mSv, respectively). The association between radiation dose and the level of biomarkers were similar by job titles.

Conclusion This study suggests that low-dose occupational radiation exposure was associated with a few inflammatory biomarkers related with circulatory diseases among interventional medical workers. However, given some limitations, further investigation with larger population are warranted.

P-227 CANCER OUTCOMES OF EPIDEMIOLOGICAL STUDIES AMONG PETROLEUM WORKERS AND RESIDENTS LIVING IN OIL PRODUCING COMMUNITIES: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction Petroleum extraction and refining are major sources of various occupational carcinogens and of air pollution and may therefore contribute to the global cancer burden.

Objective The objective of this systematic review was to evaluate the cancer risk in workers employed in petroleum industries and residents living in oil producing communities.

Methods Relevant studies were identified and retrieved through PubMed and Web of Science databases. Summary

Results Overall, petroleum industry work was associated with an increased risk of mesothelioma (ES = 2.09, CI: 1.58–2.76), skin melanoma (ES = 1.34, CI: 1.06–1.70 multiple myeloma (ES = 1.81, CI: 1.28–2.55), and cancers of the prostate (ES = 1.13, CI: 1.05–1.22) and urinary bladder (ES = 1.25, CI: 1.09–1.43) and a decreased risk of cancers of the esophagus, stomach, colon, rectum, and pancreas. Offshore petroleum work was associated with an increased risk of lung cancer (ES = 1.20; 95% CI: 1.03–1.39) and leukemia (ES = 1.47; 95% CI: 1.12–1.92) in stratified analysis. Residential proximity to petroleum facilities was associated with childhood leukemia (ES = 1.90, CI: 1.34–2.70).

Conclusion Many of the associations however appear to be due to factors other than those directly emerging from the petroleum production, including the inverse associations. Improved exposure assessment is needed in further studies to identify the drivers of the observed cancer risks. In particular, there is a need for targeted studies in under-researched areas of high petroleum production with presumably higher exposures. An international consortium guiding new generation studies in Africa, the Middle East and Asia, to harmonize study protocols and exposure assessments, may be the most promising way forward.

P-228 OCCUPATIONAL EXPOSURE TO RADIOFREQUENCY ELECTROMAGNETIC FIELDS AND RISK OF CANCER: PRELIMINARY DATA FROM THE ITALIAN RESEARCH PROJECT BRIC 2018 – ID 06

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Introduction The possible role of Radiofrequency electromagnetic fields (RF-EMF) exposure as potential human carcinogen has been extensively studied considering mobile phones use, while until now less effort was devoted to an evaluation of the risk related to other occupational exposures.

Objectives The aim of the research is to evaluate the evidence on the possible association between RF-EMF exposure in various occupational activities and carcinogenic effects in published epidemiologic studies.

Methods A systematic review of human epidemiologic studies investigating carcinogenic effects in workers occupationally exposed to RF-EMF is ongoing within the Italian research project BRIC 2018 – ID 06, supported by the Italian Workers' Compensation Authority (INAIL). The protocol of the study has been registered in the PROSPERO database (CRD42020200202).

Results The preliminary results of the review indicate that, even if various types of cancers as blood and lymphatic neoplasms, uveal melanoma, testicular, breast, lung and skin cancers were also evaluated, the majority of the studies focus on the possible association between occupational RF-EMF exposure and brain tumors. One of the major problems of research, observed in most of the studies, is the evaluation of exposure: the methods applyed for RF-EMF exposure classification and assessment have several limits, possibly jeopardizing aggregate quantitative analyses (as, e.g., pooling Odds Ratios

or Relative Risks). Another relevant problem is the presence of various confounding factors, e.g. occupational exposure to physical or chemical carcinogens possibly occurring in several workplaces, and others, potentially affecting the overall results. **Conclusions** The completion of studies collection, and data extraction and quality assessment of the papers including Risk of Bias analysis according to the protocol registered in PROS-PERO, are currently ongoing.

P-230 THE MENTAL HEALTH OF CHILEAN TEACHERS IN TIMES OF FORCED TELEWORK: HOW MANY, WHO AND WHY ARE THEY IN WORSE HEALTH?

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Introduction The impact of the COVID-19 pandemic on education resulted in school closures and the forced implementation of virtual teaching and teleworking. This situation together with the diversity of social and economic contexts in schools, has emphasized inequality in access to quality education and increased stress and anxiety among teachers.

Objectives This study aims to explore the mental health of teachers forced to telework because of COVID-19 and analyze its relationship with sociodemographic, teacher-related and working conditions.

Methods The sample was 278 Chilean classroom teachers who teleworked more than 50% during the 2020 academic year. The dependent variable was mental health measured through the General Health Questionnaire (GHQ-12). The independent variables were sociodemographic, teacher-related and work conditions. The internal structure of the mental health construct was evaluated using the Rasch model. Crude (cOR) and adjusted odds ratios (aOR) were estimated using logistic regression models. The analyzes were stratified by years of teaching experience and sex.

Results A high prevalence of poor mental health was found in teachers (58%). Working in a private-subsidized school (aOR = 2.89; 95% CI: 1.16 - 7.22), working two or more unpaid overtime hours (aOR = 2.25; 95% CI: 1.11 - 4.59) and having sickness absence (aOR = 3.82; 95% CI: 1.53 - 9.58) were associated with poor mental health. Working 35 hours or more weekly among less experienced teachers (6–10 years: aOR = 0.07; 95% CI: 0.01 - 0.51) and being a tutor teacher among women (aOR = 0.48; 95% CI: 0.23 - 1.0) had a protective effect on mental health.

Conclusion This study contributes to the recognition of a high prevalence of poor mental health among Chilean teachers and its associated contextual and labour factors. Need for actions to improve the working conditions of teachers who telework are guaranteed to improve their mental health.

P-235 A DESCRIPTIVE ANALYSIS OF WORKSITE WELLNESS PROGRAM PARTICIPANTS IN A US DEPARTMENT OF ENERGY NATIONAL LABORATORY, 2013 TO 2019

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Introduction Since most working Americans spend one third of their day at a worksite, worksite wellness programs (WWP) provide an avenue for promotion of healthy lifestyles and may reduce health risks.

Objective The purpose of this study is to describe the health trends in the WWP and identify differences between WWP participants and non-WWP workers.

Methods Health data collected from WWP participants at a US Department of Energy National Laboratory was compared to other site personnel who visited Occupational Health services during program years 2013 to 2019. Data were analyzed continuously and categorically, and analyses were conducted in SAS and R.

Results The number of participants in the WWP varied each year (range: 1,463-2,556), with participation slightly declining in later years. Overall, the percentage of those with normal blood pressure declined from 44.7% in 2013 to 29.9% in 2019, while those with a normal total cholesterol increased from 58% in 2013 to 67.2% in 2019. Both males and females in WWP saw changes in waist circumference, blood pressure, and pulse across the program years. Trends in blood pressure showed a decline in normal readings, but both waist circumference and pulse increased the percentage of normal readings. When comparing WWP participants to non-participants, WWP generally had better health values than non-participants in heart rate and blood pressure. In most years, BMI remained the similar between the two groups; however, WWP participants had significantly lower BMIs in 2013 and 2015.

Conclusion The results of the study show that biometric values change over time for WWP participants. Overall, the WWP participants had better biometric values than non-participants. However, more research is needed to determine if this difference is the result of the WWP, or if the volunteerism of WWP participants represents a behavioral difference that may influence their willingness to improve their health.

P-239 DETERMINANTS OF MUSCULOSKELETAL DISORDERS OF THE UPPER LIMBS AMONG MILITARY PERSONNEL IN TUNISIA.

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Introduction Musculoskeletal disorders (MSDs) are the first medical reason for work stoppage among military personnel and are one of the main reasons for dismissal from army service. Prevalence of MSDs, in particular those of the upper limbs (UL-MSDs), among military officers, is insufficiently known, as well as their risk factors, given the complexity of the military service.

Objective To assess the prevalence and the determinants of UL-MSDs in Tunisian army officers.

Methods This is a cross-sectional study among army officers, based on a questionnaire with several items: socio-demographic, occupational characteristics, and psycho-social constraints at work through the Karasek standardized questionnaire. The Nordic questionnaire was adapted to assess musculoskeletal health. **Results** Five hundred and twenty-seven participants were enrolled in the study with a mean age of 28.86 years and extremes ranging from 19 to 55 years. Prevalence of UL-MSDs in the study population was 10.6%. The univariate analysis showed that UL-MSDs in army officers were significantly associated with : age ($p < 10^{-3}$), job seniority (p=0.009), weekly worked hours (p=0.007), wearing a helmet (p=0.039) and job strain ($p < 10^{-3}$). According to the multivariate analysis, determinants of the risk of UL-MSDs in the study population were: history of upper limbs trauma (p=0.002, OR=3.1; CI 95\% = [1.49; 6.44]), age (p= 0.001; OR=1.89; CI 95\% = [1.30; 2.73]), occupational category (p=0.047; OR= 0.78; CI 95\% = [0.62; 0.99]) and irregular working hours (p=0.008; OR=2.99; CI 95\% = [1.32; 6.75]).

Conclusion Prevention of UL-MSDs in army officers represents major challenges for military health professionals. Keeping a good operational capacity of military personnel is dependent on the establishment of an effective global preventive approach that covers the various aspects of the work in this environment, while respecting its particularities.

P-244 FROM COMMERCIAL FISHERMEN TO RECREATIONAL BOATERS: FATALITIES AND LIFEJACKET USE INFORM THE NEED TO PROMOTE USE.

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Objective Vessel disasters and falls overboard result in fatalities in the commercial fishing industry and recreational boating. We reviewed available fatality surveillance data to identify opportunities to promote lifejacket use in the US Pacific Northwest.

Methods Commercial fishing fatality information for 2000–2018 was obtained for all fatalities in Oregon and Washington waters from the Commercial Fishing Incident Database (CFID). Recreational boater fatality information was obtained from the Oregon and Washington State Marine Boards' publicly available information. Summary statistics were compiled and lifejacket policies reviewed for both occupational and recreational uses.

Results In Between 2000–2018 In Washington and Oregon there were 90 commercial fishing fatalities; only 5 (6%) victims were wearing a lifejacket, with 3 of those not properly worn. From 2000–2018 in Oregon there were 263 recreational boating fatalities with 76 (29%) victims wearing a lifejacket. In Washington, available data was limited from 2011– 2017, there were 52 recreational boating fatalities with no lifejacket information. Commercial fishermen and recreational boaters over the age of 12 years are not required to wear lifejackets while boating, although Coast Guard-approved devices must be provided for each person onboard. Lifejacket use marketing promotions exist such as the 'Live to be Salty' campaign for commercial fishermen and 'Life Jackets and Seat Belts-It's Your Choice' for recreational boaters.

Conclusion The percent difference in lifejacket use between commercial fishermen and recreational boaters who suffered a fatality likely represents differences in the precipitating factors in the incidents, and the ease of wear for tasks. Primary prevention of vessel disasters and falls overboard is critical; as lifejackets are essential in the event of an emergency. A regional intervention based on a successful program for lobstermen is proposed to bring lifejacket education, try-beforeyou-buy and discounts to commercial fishermen and recreational boaters that will be evaluated for impact and change of culture.

P-245 IMPACT OF FOOD ON DIVE'S SAFETY

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Introduction Professional diving is an activity that exposes the diver's body to numerous environmental and physiological challenges. These require adequate physical and mental health conditions as a prerequisite for the task's safe performance. The diver's diet is an underestimated risk factor that has not been properly studied so far. Thus, due to lack of dietary recommendations, many times divers make basic dietary mistakes that can lead to undesirable outcomes, from abdominal discomfort to death by drowning.

Objective To determine how food and physiological changes due to immersion and hyperbaric exposure can interfere with diving safety.

Methods

Literature review

Results Food-related factors can lead to life-threatening risk conditions, since situations that would normally be considered just inconvenient and uncomfortable can be potentially fatal when they occur underwater, such as vomiting, for example. Especially considering the diet specific factors: volume of the food, nutritional composition of the diet, and the time interval between the last meal and the dive, the food can be a hazard associated with risks that can compromise the safety in the dive. These risks can be divided into direct - such as hypoglycemia, dehydration, gastrointestinal barotraumas (mainly resulting from aerophagia and gastrointestinal producing conditions), and regurgitation with vomiting or bronchoaspiration - and indirect - such as increased cardiac risk and increased decompression stress (which could lead to decompression sickness despite the correct application of the decompression tables).

Conclusion Healthy eating is a fundamental part of ensuring a healthy lifestyle. Given the particularities imposed by immersion and hyperbaric exposure, the diver's diet should be considered an important aspect in promoting health and diving safety. Awareness of the risks and knowledge of measures to increase the safety of diving can lead to beneficial changes in habits and, consequently, in the safety of diving operations.

P-246 'HEALTH AND WORKING CONDITIONS OF WASTE PICKERS: SCOPING REVIEW.'

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10.1136/OEM-2021-EPI.247

Introduction It is estimated that between 15 to 20 million people in the world recover materials from waste in an informal condition. Many living in poverty, become involved in the activity because they do not have an accessible job opportunity. This need leads them to be exposed to unhealthy, dangerous environments, with a high risk of injury due to the lack of control measures in risk factors.

Objective To describe the health and working conditions of waste pickers worldwide, through a review of scientific articles published between the years 1999 to 2019.

Methods A scoping review was carried out, where scientific articles were identified by manual bibliographic search in PubMed, Taylor and Francis, ScienceDirect and SAGE. The Mendeley bibliographic manager was used to refine the articles. The review of the records was based on: type of document, reading of titles, abstracts, methodology and results. Inclusion and exclusion criteria were taken into account for the selection of articles.

Results Eight-eight studies were included that met the inclusion criteria. Most of the studies analyzed used a qualitative approach, where questionnaires, interviews and focus groups were applied. Waste pickers' working conditions were mainly associated with situations present in the work environment, non-working conditions are largely associated with their economic, family and interpersonal relationships. The individual conditions with the highest incidence are associated with gender, age and education. The health conditions are related to the physical capacity of the waste picker to carry out the work, the consumption of tobacco and other substances and the prevalence of some diseases such as tuberculosis and skin rashes.

Conclusion It is important to expose to the academic and governmental community the problems that waste pickers face in the development of their work in order to establish tools to improve the health and working conditions of this vulnerable population.

P-247 WORK-RELATED DISEASES AND INJURIES AMONG CULTIVATED AGRICULTURISTS IN THAILAND

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Objective This cross-sectional analytic study aimed to investigate the situation of work-related diseases and injuries among cultivated agriculturists in the upper northeast of Thailand. The case study of Udon-Thani and Roi-Et provinces is representative of the upper Northeast region of Thailand.

Methods Cases of work-related diseases reported from the health database (HDC) in 2014–2016 among farmers by occupation code were used for analysis. The number of registered farmers from the agricultural office of Thailand and the secondary data in 43 files of occupational diseases from the provincial public health office were collected from 2014 to 2016. The annual morbidity rate of occupational diseases was analyzed and presented in the rate per 100,000 registered farmers.

Results Chronic lung diseases were the first ranking of disease recorded in HDC among visited farmers for health care in the northeast of Thailand. The following rate of diseases in orders were work-related musculoskeletal disorders (WMSDs), noise and heat-related diseases, and pesticide toxicity, respectively. Occupational injuries were as high as the WMSDs. The morbidity rate of Udon-Thani was higher compared to Roi-Et province, and closer to the national rate. The morbidity rates were increasing every year during 2014–2016 which, in 2016, were 479.1, 207.7, and 26.5 per 100,000 farmers for WMSDs, noise and heat-related diseases, and pesticide toxicity for Udon-Thani database. Those rates were higher than a report in HDC at least 2 times.

Conclusions Situations of work-related diseases among cultivated agriculturists in Thailand were not reflected in reality at the present as underestimation. Two main causes that made the underestimation rate; firstly, the number of cases were rarely reported of ICD-10 as occupational diseases, and the second was an inaccuracy of the number of registered farmers in the population. In the future, all agriculturists should be registered in the agricultural and health database.

P-248 STRESS STATUS OF HEALTHCARE DRIVERS DURING THE COVID-19 PANDEMIC IN MALAYSIA

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Introduction The pandemic of COVID-19 has brought a disastrous impact on every single aspect of human life and activities. The economic and health sectors are most affected by restriction on public movement, daily activities, and burden of coronavirus infection through increased infection and hospitalisation rate. Most research focused on front liners but they overlooked ambulance and healthcare drivers.

Objectives To determine the stress status of healthcare drivers in Malaysia and its associated factors during the COVID-19 pandemic.

Methods This cross-sectional study was conducted among randomly selected 163 healthcare drivers in Negeri Sembilan State Health Department, Malaysia, using self-reported validated questionnaires.

Results A majority of healthcare drivers were male (100%), married (90.1%) with their highest education consisting of a high school certificate (90.1%). Ethnically, they consisted of Malay (95.7%), Indian (3.7%) and Chinese (0.6%). Three out of ten healthcare drivers were ambulance drivers, while the rest were non ambulance drivers. The prevalence of stress among healthcare drivers was 7.4% (95% CI: 3.7, 11.7). Higher prevalence was found among ambulance drivers compared to non ambulance drivers; 10.6% and 6.0% respectively. There was a significant association between stress and smoking status, performing on-call and duration of working hours in a similar unit.

Conclusion The study revealed that there was a low prevalence of stress among healthcare drivers in Malaysia during the pandemic. The reduced life threatening tasks, fewer emergency incidents and lesser assigned tasks throughout the movement control order during the COVID-19 pandemic could have contributed to the low prevalence statistics among the healthcare drivers in Malaysia. In addition, the effort by the Occupational and Environmental Health Unit, Negeri Sembilan State Health Department in providing consistent safety and health training including stress management might have assisted healthcare drivers to cope with the stressed situation both mentally and physically.

P-249 IMPACT OF SOCIO-PROFESSIONAL FACTORS ON MAMMOGRAPHIC DENSITY IN TUNISIAN WOMEN.

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Introduction Mammographic density (MD) which refers to the percentage of the radiologically dense fibroglandular tissue in the breast, is one of the most important risk factors for breast cancer. Although highly hereditary, MD is also influenced by other factors.

Objectives To study the influence of socio-demographic characteristics, lifestyle, gyneco-obstetrical conditions and occupational factors on the degree of MD among Tunisian women.

Methods A 04-months cross-sectional study was carried out on women aged between 25 and 68 years presenting to the Department of Radiology in the Centre of Maternity and Neonatology of Monastir, for the practice of mammography. Data collection was carried out through a survey on sociodemographic, medical and occupational characteristics of the participants. The study population was divided into two groups: professionally 'active' women and 'inactive' women. Density assessment was based on the BIRADS 2013 classification.

Results A total of 220 women were included in this study, with an average age of 45.2 ± 9.7 years. At the moment of the study, 63% of participants had a paid job. Mammographic density was significantly associated with level of education (p=0.009), type of diet (p=0.032), BMI (p=0.003), the period of the menstrual cycle when the mammography was realized (p=0.008). According to the multivariate analysis, determinants of MD were: level of education (p=0.011; OR=1.9 ; 95% CI = [1,15–3,12]), BMI (p=0,001; OR=2,67; 95% CI = [1,46–4,88]), occupational status (p=0.002; OR= 0.26; 95% CI = [0.11–0.62]) and number of weekly working hours (p=0.002; OR=4.4; 95% CI = [1.76–11.16]).

Conclusion Mammographic density is an established risk factor for breast cancer. It is dependent on several individual, hormonal and occupational factors. Its modifiable character justifies the information and sensibilization of concerned women, as well as the implementation of adequate preventive measures in workplaces.

P-251 RELATIONSHIP BETWEEN WORK SHIFT AND SLEEP DISTURBANCE IN BRAZILIAN WORKING WOMEN

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Introduction Shift work, especially night work, can have some consequences. Among the investigated changes is sleep disturbance, which in turn is associated with several health problems. Objective This study aimed investigate the relationship between work shift and sleep disturbance in a sample of female shift workers.

Methods A cross-sectional analysis was conducted with 444 female shift workers aged 18-61 years in Southern Brazil. The self-reported sleep quality was measured using the Pittsburgh

Sleep Quality Index (PSQI) scale (BUYSSE et al, 1989) with total score of 21. This score was categorized in good (0-4), bad (5-10) or sleep disturbance (> 10). Shift work was defined based on the schedule that was provided by the company and confirmed by the workers during interviews. Multivariate-adjusted associations between work shift and sleep disturbance were assessed by Poisson regression with robust variance.

Results The prevalence of sleep disturbance was 9.7% (CI 95% 6.9; 12.4). Adjusted models suggest that sleep disturbance was associated with women aged from 31 to 40 years (RP: 2.63, CI 95% 1.08; 6.39), night shift work (RP: 7.13, CI 95% 2.81; 18.12), former smoker status (RP: 3.08, CI 95% 1.21; 7.87), having less than 3 meals per day (RP: 3.85, CI 95% 1.98; 8.82), and strongly associated with positive screening for Common Mental Disorders (CMD) (RP: 19.68, CI 95% 7.17; 54.03), and worse self-perceived health category (RP: 8.38, CI 95% 2.00; 35.05).

Conclusions Night shift work was associated with a higher prevalence of sleep disturbance. We also found a strong association between CMD and regular or bad self-reported health perception with sleep disturbance. These results indicate the importance of monitoring women shift workers to promote actions on mental health care.

P-253 RELATIONSHIP BETWEEN WORK SHIFT AND ABDOMINAL OBESITY IN FEMALE SHIFT WORKERS

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Introduction Abdominal obesity has a high prevalence in the population, which is a risk factor for several health problems. Shift work, especially at night, seems to be associated with this condition.

Objectives This study aimed investigate the relationship between work shift and abdominal obesity in a sample of female shift workers.

Methods A cross-sectional analysis was conducted with 446 female shift workers aged 18–61 years in southern Brazil. Abdominal obesity was identify by measuring waist circumference. The measurements were perform in duplicate and the average of the collected values was consider. A waist circumference equal to or greater than 88 cm was consider abdominal obesity. Multivariate-adjusted associations between work shift and abdominal obesity were assessed by Poisson regression with robust variance.

Results The overall prevalence of abdominal obesity was 44.6% (95% Confidential Interval [95% CI]: 40 to 49.2) and 23.9% (95% CI: 19.9 to 27.8) of the sample were night shift workers. After adjusting for potential confounding factors, night shift women were 38 percent more likely to have abdominal obesity than working women on the day (Prevalence Ratio [PR] = 1.38; 95% CI: 1.12 to 1.70; P = <0.001).

Conclusions This study revealed that work at night has an independent association with abdominal obesity in female shift workers. This finding demonstrates the importance of educational and preventive health actions in the context of public health and occupational health.

P-256 RETURN TO WORK AFTER BREAST CANCER: AN OPPORTUNITY OF TUNISIAN WOMEN EMPOWERMENT

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Introduction Returning to work after breast cancer, is associated with different benefits such financial independence and engaging in a meaningful occupation, but often limited by several difficulties.

Objectives To assess the return to work among active Tunisian women after breast cancer and to identify its determinants and barriers.

Methods Women treated for breast cancer, in one of the biggest Tunisian gynecology centers, at least two years and at most five years before the cross-sectional survey onset, and under a regular employment contract at diagnosis time, were included (n=112). Socio-demographic and medical characteristics were collected from medical files. Return to work and its circumstances were investigated during a face-to-face interview.

Results At diagnosis, 26% of patients were under 41 years old (mean age= 48 ± 11 years). Patients worked in the public sector in 87% of cases, in a middle or senior management position in 35% and in a limited-term employment contract by 4% of cases. After cancer, 97% of women needed a sick leave (mean duration=9.5 \pm 2.5 months). Sick leave was significantly prolonged among patients working in the public sector (p = 0.01), blue collar officiers (p=0.01), unlimited employment contract (p=0.02) and surgical treatment (p=0.01). At investigation time, return to work was noted among 72% of patients, with regain of initial occupied workstation only in 5% of cases. After returning to work, 76% of patients reported incomes decrease and 49% of them co-workers discrimination. Hostility at work motivated 3% of patient to ask for early retirement. Return to work was significantly higher among married women (p=0.02), blue-collar officers category (p=0.01), in case of early diagnosis cancer stage and better health auto assessment (p=0.01).

Conclusion Return to work, an important step in the recovery of a normal life, should be better prepared through a reinforced collaboration between occupational and attending physicians.

P-257 WORK-FAMILY CONFLICT AS A RISK FACTOR OF BACK PAIN AMONG NURSES.

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Introduction Work Family Conflict (WFC) is one of the most specific sources of stress in the nursing profession. Although the impact of this phenomenon on both family life and mental health of nurses has been well documented, its role as a risk factor for musculoskeletal disorders (MSDs) has only recently been the subject of scientific research.

Aim To examine the impact of WFC on the occurrence of back pain among nursing staff in a public district hospital in Tunisia.

Methods This cross-sectional study was conducted on nurses assigned to a District Hospital in Tunisia, whose job seniority was at least one-year. Data collection was based on an administered questionnaire on the socio-demographic and occupational characteristics of the participants. Psychosocial factors at work and work-family interface were evaluated using the Organizational Psychological Constraints questionnaire and Carlson's work-family conflict scale. Screening of musculoskeletal disorders of the spine was conducted through a Nordicstyle questionnaire.

Results 72 nurses were included in this study with a mean age of 42.3 ± 10.8 years. Over the past 12 months, the prevalence of back pain has been 77.8%. It was associated with gender (p=0.009), age (p=0.021), marital status (p < 10^{-3}), BMI (p=0.009), history of chronic disease (p=0.009), job seniority (p=0.008), the duration of home-hospital journey (p=0.024), work-family conflict (p < 10^{-3}) and family-work conflict (p=0.005). Multivariate analysis showed that the significant predictors of back pain were personal history of chronic diseases (p=0.009; OR = 6.5; CI95% = [1.6-26.7]) and Work-Family Conflict (p < 10^{-3} ; OR = 11.8; CI95% = [2.9-47.3]).

Conclusion Work-family conflict is one of the most important stress factors that cause back pain among nurses. The extent of this phenomenon in this professional category justifies its consideration in any precautionary approach to prevent musculoskeletal disorders in healthcare settings.

P-259 WORK-RELATED BIOMECHANICAL EXPOSURE AMONG NURSES: SEMI-QUANTITATIVE ERGONOMIC RISK ASSESSMENT

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Introduction Care activities associated biomechanical constraints induce musculoskeletal disorders with heavy consequences, notably for exposed nurses.

Objectives This study aimed to assess biomechanical exposure among nurses in 28 patient hospitalization services.

Methods Concerned services were classified according to the nurses' usual physical workload in 'light', 'moderate', 'important' and 'high' physical demanding group. A specific software was used to encode nurse activity observations. Indeed, at regular intervals of 15 seconds, each relevant biomechanical parameter of work situation is observed and instantly associated to a physical load score. The 'patient handling score' integrates both the adopted posture and the patient caracteristics . In order to estimate the overall physical arduousness, the software calculates a global score and distributes it according to the Chamoux scale.

Results Most constraining postures were adopted during significantly longer periods in 'heavy' services. 'Standing with leaning or twisted back' was observed during 22.99% of working time in 'high physical demanding service', during 19.23% in 'important physical demanding services', during 15.60% and 15.33% in 'moderate' and 'light' demanding ones. The fraction of time spent with 'Arms raised over the shoulders' decreased from 2.14% in heavy demanding services to 1.44 in moderate ones. In total, patient handling activity took 0.71%

of working time. Moreover, 'High physical demanding service' were significantly concerned by largest fraction of handling time (1.77%), by lower degree of autonomy of handled patients (1.51% of total working time), and by handling patients having weight exceeding 65 kg (1.57% of total working time). According to the Chamoux scale, global physical activity was classified rather heavy in all services groups, with an average score significantly increasing from 7.25 to 7.76 light' 'high' physical demanding from' to services (Anova=0.039) .

Conclusion Our investigation objectified variable levels of biomechanical constraints in hospital services. Ergonomic and organizational preventing measures should be set up to prevent serious consequences among caregivers, in particular those affected to heavy services.

P-260 FATAL WORK-RELATED INJURIES INVOLVING MOTORCYCLE BY SEX, AGE AND OCCUPATIONAL SECTORS IN BRAZIL, 2007 TO 2018

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Introduction Brazilian records show a high rate of traffic accidents involving motorcycles (30% of deaths, 55% of hospitalizations). The number of Brazilian workers who use motorcycles is increasing and it is necessary to understand the context of these accidents in order to develop public policies and promote education.

Objectives To describe the proportion of mortality by work-related injuries (PM_WRI) involving motorcycle in Brazil, 2007–2018.

Methods The study was conducted with data from the Brazilian Mortality Information System for those aged 18–65 years, in 2007–2018. Motorcycle-related deaths correspond codes V20 to V29 (ICD-10). PM_WRI are presented by calendar year, sex, age and occupational groups.

Results There were 121,124 records of fatal injuries involving motorcycles, with a increasing linear trend from 7,502 in 2007 to 9,725 in 2018. Work-related data (WRD) were registered for only 48,716 (40.2%) cases, from which 3,692 were classified as occupational. From 2007 to 2010, the PM_WRI went from 7.6% to 8.9% (maximum) when it started to fall until 2015 (6.4% minimum). The average for the last three years was 7.4%. No significant difference of PM_WRI by sex was found. PM_WRI increased with age but declined in the oldest age group (50–65 age years). Occupation was registered for 33,784 cases (69% of the WRD). The highest PM_WRI was estimated among workers from service industry (14.3%) followed by administrative services (13.6%). Agriculture had the largest number of motorcycle-related deaths (35%) but only 3.1% was recognized as work-related.

Conclusion The work-related data in death certificates were poorly recorded, limiting conclusions on the contribution of labor on motorcycle associated deaths. PM_WRI estimates were presumably underestimated and findings could be biased. Motorcycle-related deaths doubled over the study time and the role of labor for this need to be better understood. Improvements in the quality and completion of WRD are urgently needed and prevention programs implemented.

P-261 SEMI-QUANTITATIVE ERGONOMIC ASSESSMENT OF BIOMECHANICAL RISK FACTORS OF THE UPPER LIMBS' MUSCULOSKELETAL DISORDERS AMONG TUNISIAN JEWELRY CRAFTSMEN

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Introduction Jewelry handcrafting activity is strongly associated with biomechanical constraints and high risk of upper limb musculoskeletal disorders (UL-MSDs).

Objective This study aims to assess biomechanical constraints and specific tasks and subtasks at risk of UL-MSDs among jewelry craftsmen.

Methods Open observations were conducted in several jewelry workshops during whole working days. These observations allowed us to identify representative work periods, tasks and subtasks and to set the number of recordings at fourteen according to 'homogeneous exposure group' (HEG) sampling recommendations. For each video recording (duration=30 to 40 minutes), 100 images were extracted through regular stops on fixed time intervals. In each image, postures were encoded and analyzed by ERGOROM software. Gestural Variability Score (GSV) was calculated based on variability of posture from one image to the next.

Results Six main tasks composed handcrafting jewelry activity (mold making; fusion and gluing metal; demoulding; sanding; crimping and polishing). These tasks were associated to eleven subtasks (the creation of impression in the mold, the heating of the metal, the welding during assembly of the piece.). Objective analysis revealed that jewelers spent 38% of their working time with the neck in flexion exceeding 40° or extension, and the shoulders in adduction, extension or visible rotation during 60.8% of the time. The elbow articulation was maintained in extreme pronation in 40.4% of the working time and flexion between 60° and 100° during 78.1% this time. The ulnar deviation of the wrist was observed during 40.9% of work time and the pinch grip for over 79.5% of it. In addition, the high variability score was noted especially for elbow joint and shoulder, reflecting a rapid postural change and high repetitiveness.

Conclusion Our results, suggest the necessity of preventive actions among jewelers craftsmen, with mainly the introduction of ergonomic design of hand tools .

P-268 METAL EXPOSURE AND RISK OF PARKINSON'S DISEASE: SYSTEMATIC REVIEW AND META-ANALYSES

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Introduction Parkinson's disease (PD) is the second most common neurodegenerative disorder. Metal exposure has been suggested as a possible environmental risk factor by many epidemiological studies, but results have been inconsistent. Additionally, existing reviews on metal exposure and PD risk lack careful screening for study design and quality, especially on the exposure assessment.

Objectives We aimed to synthesize the literature on metal exposure and PD risk by examining the quality of the overall study and exposure assessment method.

Methods We conducted a systematic review on observational studies of metal levels from biological matrices, and dietary and occupational/environmental sources among PD patients and controls. We searched the PubMed/MEDLINE, EMBASE and Cochrane databases up to July 2020. Metal species included manganese, iron, copper, lead, mercury, aluminum, calcium, selenium, zinc, magnesium, cadmium, chromium and nickel, and the outcome was idiopathic PD. We applied an adapted Newcastle-Ottawa Scale (NOS) and a previously established exposure assessment rating to evaluate each individual study. We then performed meta-analyses with random-effects model.

Results 80 case-control studies were included, of which 69 were graded as low or moderate quality. The majority of casecontrol studies were hospital-based and applied biomonitoring approaches to quantify metal levels after disease diagnosis. Studies on copper, iron, manganese and zinc were most prevalent. Meta-analyses showed no significant PD risk for these metals and heterogeneity among studies was substantial. Furthermore, 5 cohort studies were retained, but the population source, metal exposure and follow-up period were heterogeneous.

Conclusion The level of evidence on metal exposure and PD risk is limited and no consensus can be drawn from the literature. Reverse causality cannot be ruled out by existing biomonitoring studies. Studies assessing metal levels before disease onset are needed to improve our understanding of the role of metals in the etiology of PD.

P-279 RETURN TO WORK AFTER PARENTAL LEAVE: PERSPECTIVE OF BRAZILIAN WOMEN

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Introduction maternity leave is a constitutional right in Brazil, but the payment/benefits is restricted to women who contribute to the social security system. Although women represent half of the labor workforce around the world, they are still mostly responsible for family and child-rearing which compromises the process of return to work after birth.

Objective to understand the return to work after maternity leave from the perspectives of Brazilian working women.

Methods qualitative study with mothers that gave birth and return to work regardless of kind of job. Until now, four women have participated in online interviews following a validated script of open questions. Data analysis has been done simultaneously of data collected through thematic approach and the sample will be delimited by saturation. This research was approved by the Research Ethics Committee of the Federal University of Sao Carlos, Brazil (all ethical concerns have been respected).

Results return to work influenced the continuation of breastfeeding, including home office: 'I was in front of the computer and breastfeeding'. There is a duality when women talk about job and the care with the babies: 'the good thing is that I manage to stay with him all the time [...] and at the same time it also becomes exhausting to stay at home for a long time'. Women report that the work was invaded by the needs of their children causing dissatisfaction and frustration with performance after returning: 'I feel more encouraged to work [...] but my career is over, at least in the pandemic there is no way', especially during pandemic with all day care centers closed.

Conclusion the burden of responsibility in caring for children falls on women impacting performance at work and also breastfeeding.

P-280 METALWORKING FLUIDS AND CANCER INCIDENCE IN THE UAW-GM AUTOWORKERS COHORT

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Introduction Metalworking fluids (MWF) are complex mixtures of oils and chemical additives used to cool and lubricate metal machining operations. Previous studies have reported increased risk of specific cancers associated with MWF exposure.

Objectives This report broadly examines cancer incidence in the United Auto Workers-General Motors (UAW-GM) cohort exposed to MWFs with extended follow-up (through 2015). The outcomes of interest were melanoma, leukemia, non-Hodgkin lymphoma and cancers of the colon, rectum, pancreas, esophagus, stomach, larynx, lung and bronchus, breast, prostate, kidney and renal pelvis, and bladder.

Methods The cohort includes 39,132 workers followed for cancer incidence in Detroit area Surveillance, Epidemiology, and End Results Program (SEER) and Michigan cancer registries, from 1973–2015. Cox models yielded estimates of adjusted hazard ratios (HR) with categorical variables for lagged cumulative exposure to each MWF (straight, soluble, and synthetic).

Results There were 7,809 cancer cases of interest. Over 43 years of follow-up, the incidence of several types of cancers was significantly elevated in relation to at least one type of MWF; exposure–response patterns were consistent with prior reports from this cohort. We found significantly increased incidence of stomach and kidney cancer associated with higher levels of straight fluid exposure and increased rectal and pancreatic cancer with increasing synthetic fluid exposure. Only Non-Hodgkin lymphoma was associated with soluble MWF, with HRs significantly elevated in the highest exposure category at 1.70 (95% Confidence Interval (CI): 1.13–2.54).

Conclusions Our results provide further evidence of associations between MWF exposure and several types of cancer. This study summarizes information on the incidence of the fourteen cancer types with reduced bias from both the healthy worker hire effect and left truncation. However, the HRs presented do not address potential downward bias from the healthy worker survivor effect which may be necessary to correct in future targeted analyses.

P-281 IDENTIFYING RETURN-TO-WORK TRAJECTORIES AMONG BREAST CANCER SURVIVORS USING SEQUENCE ANALYSIS

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Introduction The return-to-work (RTW) process after breast cancer (BC) can be complex. Simple static measures used to assess RTW may ignore this dynamic multi-stage process that are yet important for targeting interventions aimed at reducing poor RTW outcomes.

Objectives Our aim was to identify RTW trajectories after BC using the sequence analysis method and describe their underpinning personal, medical, psychological and occupational factors.

Methods This study is based on the ELCCA II cohort (Angers, France) that recruited 128 women diagnosed with BC between February 2015 and April 2016. Among them, 96 were still participating at the four-year follow-up. An occupational calendar was used to assess their situation every 6 months from their diagnostic up to 4 years later. Women that did not complete their occupational calendar, that were inactive (retired, disability pension) at the time of their diagnosisic were excluded leading to a final sample of 52 breast cancer survivors (BCS). Sequence analysis was used to identify RTW trajectories among BCS. Patterns of RTW trajectories were described by socio-demographic, medical, occupational and the functional scales of the EORTC-QLQ-C30.

Results Three types of RTW trajectories were identified among BCS by sequence analysis: long sickness absence with progressive RTW (n=18), short sickness absence and full time RTW (≤ 6 months) (n=27), short sickness absence with part-time RTW (n=7). Socio-demographic, medical and trend in functional scales during the first year after diagnosis were shown to vary according RTW trajectories.

Conclusion The application of sequence analysis highlights the dynamic process of RTW among BCS. It captures trajectories of multiple states and transitions that provided a holistic and diachronic approach of RTW. Three different patterns of RTW trajectories after breast cancer were identified. However, these results have to be confirmed by using a larger sample of BCS.

P-286 AN INVENTORY OF OCCUPATIONAL CANCER STUDIES AND THEIR EXPOSURE ASSESSMENT METHODS IN IRAN

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Introduction The presence of occupational carcinogens in workplaces in Iran are not well characterized, and little is known about the burden of occupational cancer in Iran and other Middle East countries.

Objectives This study aimed to provide a comprehensive overview of occupational cancer studies in Iran and describe how exposures were assessed and assigned in those studies.

Methods Studies addressing exposure to and health effects from carcinogens in Iran until the end of 2020 were identified through three databases (PubMed, Web of Science, and Google Scholar). Two reviewers independently screened the articles according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guideline. Data extracted from each eligible paper included geographical region, study design, occupation, industry, exposure agents, population size/sample size, exposure assessment methods, and cancer sites. **Results** Forty-nine publications from inception to 2020 (1 cohort, 11 case-control, 34 exposure monitoring studies, and 3 other) were included. The case-control studies used self-reported job titles and/or self-reported exposures to estimate the associated risk of cancer, while exposure monitoring studies applied exposure measurements (including personal and stationary air sampling).

Conclusion Occupational cancer epidemiology in Iran is at an early stage, as evidenced by relatively small number of published articles on this topic. A coherent strategy to assess occupational exposures and cancer burden in Iran should include systematic inventory and monitoring of exposure to carcinogens for use in hazard control and research, as well as targeted tools and studies to assess unique occupational environments and their potential associated cancer hazards.

P-290 NUMBER OF JOBS, JOBS DURATION AND RISK OF PROSTATE CANCER: A CASE-CONTROL STUDY IN MONTREAL, CANADA

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Introduction Successive job changes may reflect precarious employment, job dissatisfaction or promotions, all of which can result in accrued stress, disrupted social connections and health-altering circumstances and behaviours. Evidence is lacking on the potential role of job stability in cancer development.

Objectives We investigated the association between the number of jobs held and jobs duration over the career, and the risk of prostate cancer, overall and by cancer aggressiveness.

Methods Data from the Prostate Cancer & Environment Study, a population-based case-control study conducted in 2005–2012 in Montreal, Canada were used. Incident cases (n=1,931), aged < 76 years, were ascertained across hospitals in the Montreal area. Population controls (n=1,994) from the same area, frequency-matched to cases by age (± 5 years), were identified from the electoral list. Information on the number of paid jobs held for ≥ 1 year throughout the career and the duration of each job was elicited during face-to-face interviews. Unconditional logistic regression was used to assess odds ratios (OR) and 95% confidence intervals (CI), adjusting for age, ancestry and education.

Results Subjects had held 5 jobs, on average (\pm 3), with a mean job duration of 11.1 years (\pm 7.9). A greater number of jobs held was associated with a higher risk of prostate cancer. The OR for men who had had > 6 jobs was 1.23 (95% CI = 1.04–1.46), compared to men who had held 1–3 jobs, with no differences according to cancer aggressiveness. Conversely, men who had held shorter jobs, on average, had a higher risk of prostate cancer, following a dose-response pattern (p-trend 0.047). The association was more pronounced for non-aggressive tumours.

Conclusion Our results suggest that job stability throughout the career may have a protective effect against prostate cancer. Further in-depth analyses are warranted. These findings are novel and require replication.

P-292 AGING, PRODUCTIVITY AND WORK ABILITY FOR WORK IN NURSING WORKERS IN BRAZIL

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Introduction The problem of aging at work has been discussed at national and international levels, given its impact on productivity and the management of public policies on worker health.

Objective To investigate the association between chronological aging, work ability and productivity in nursing workers.

Method Analytic and cross-sectional study, with a quantitative approach, developed at a Public Hospital in the state of São Paulo, with nursing team workers aged 45 and over. Data were collected through a form containing sociodemographic and professional questions, a questionnaire on Work Ability Index and a questionnaire on work productivity.

Results 211 (79.9%) nursing workers participated in the study. The mean age was 53 years (SD = 4.3 years), ranging from 45 to 71 years. The average of the Work Ability Index score was considered good, with 37.8 points, but 41.7% with a Capacity Index for inadequate work. The predominant health problems were musculoskeletal diseases. Productivity showed an average score of 24.7% for 'damage to daily activities due to health', 22.7% for 'total work injury due to health' and 21.2% for 'presentism'. There was a statistically significant association between productivity and work ability (p < 0.001), where productivity impairment was among those with inadequate capacity (moderate and low).

Conclusion It is important to identify the profile of nursing workers in the aging phase so that the institutions could promote strategies and interventions aimed at this age group in order to prevent early retirement and promote a better longevity.

P-293 A FEASIBILITY STUDY FOR DEVELOPING AN OCCUPATIONAL EXPOSURE-CONTROL INTELLIGENCE SYSTEM (OCCECIS) FOR GREAT BRITAIN

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Information on where occupational exposures to dangerous substances occur, how many workers are exposed, the levels of exposure, and the uptake of control measures and their effectiveness are crucial for the development and monitoring of effective interventions and exposure prevention in the workplace. The feasibility of establishing an Occupational Exposure-Control Intelligence System (OccECIS) for use in Great Britain was assessed. A scoping exercise mapped existing information of exposure tools and databases. The information sources were expanded further by input from an International Expert Advisory Committee (EAC) established to support the project in all aspects and analysed for their basic characteristics and relevance to the system. The outputs of the analysis were used together with inputs from the EAC to establish the basic conceptual framework underlying the system. This framework was converted to a set of

theoretical questions relevant for the systems outputs which formed the basis for separate stakeholder and gap analyses. The outputs of these analyses were then used to develop technical solutions. The feasibility of the approach was tested on a small scale using National GB data for the construction and brick manufacturing industries. Data on exposure intensity were extracted from the National Exposure DataBase (NEDB). Prevalence of exposure was estimated by combining data from the UK census 2011, the Labour Force Survey and a previously established quantitative job exposure matrix. The results were used to illustrate examples of relevant outputs for the system. Overall, these preliminary findings suggest that it is feasible to establish such an intelligence system. This system once developed can provide leading indicators to relevant stakeholders to inform health burden and impact assessments, intervention strategies, and policy actions. A prototype of the system that will be next developed will most likely be based on the example of respirable crystalline silica.

P-295 PERCEPTION OF OCCUPATIONAL EXPOSURE OF NOISE AND ITS IMPACTS ON FISH HARVESTERS' HEALTH IN NEWFOUNDLAND AND LABRADOR: A MIXED-METHOD STUDY

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Introduction Noise exposure is a significant concern for fish harvesters, as it can cause serious health problems. Occupational noise exposure can result in hearing loss and non-auditory health issues such as annoyance, asthma, insomnia, cognitive disability, and diminished quality of life and wellbeing.

Objectives The aim of this study is to determine how fish harvesters in Newfoundland and Labrador perceive noise risk and to examine their experiences with noise exposure, noise-related health problems, and barriers and challenges associated with preventing hearing loss.

Methods A mixed-methods study was conducted among NL fish harvesters. The study comprises an online questionnaire and telephone interviews. Survey tool consist of a 37-item questionnaire included noise risk perception and self-reported hearing loss questions. A semi-structured interview guide was developed to elicit information about fish harvesters' experiences with noise exposure and related health issues, as well as the obstacles and challenges associated with noise reduction and hearing loss prevention.

Results The survey results represents that an average noise risk awareness score of 2.3 to 2.9 out of 5 based on perceived benefits, barriers, and self-efficacy reflects that NL fish harvesters have a relatively positive attitude toward noise reduction and hearing loss prevention. Similarly, the noise-related perceived attitude and susceptibility score (3.9 to 4.5) shows that harvesters disliked the high level of noise and indicated a high risk of hearing loss. Around 62% of participants reported having hearing problems. Most participants acknowledged their workplace is noisy. There was a conflict between onboard safety and wellbeing.

Conclusions Harvesters stop wearing hearing protectors on a daily basis for safety reasons. Participants emphasized the

importance of increasing education and awareness, training, and the use of specialized equipment in order to minimize noise exposure. Regulating onboard noise levels is necessary to avoid noise-related health problems.

P-305 A MEDIA SURVEILLANCE ANALYSIS OF COVID-19 WORKPLACE OUTBREAKS IN CANADA AND THE UNITED STATES

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Introduction The news media is one of the most accessible sources of information regarding COVID-19 transmission in the workplace in the absence of other occupational data. Only a few public health agencies in Canada and the United States have publically reported detailed occupation information for non-health care worker COVID-19 cases.

Objective We conducted a media surveillance analysis to identify new or emerging occupational groups at risk of exposure to the SARS-CoV-2 virus ('COVID-19 exposure').

Methods We searched the Factiva database for media articles reporting COVID-19 workplace outbreaks (February 1 -December 22, 2020). Job titles were coded to the 2016 National Occupational Classification (V1.3) and industries to the 2017 North American Industry Classification System (V3.0). Occupations with COVID-19 workplace transmission identified in media articles were compared and contrasted with the same occupation in the Vancouver School of Economics (VSE) COVID Risk Tool by risk rating (seven categories between very high to very low).

Results We identified 1,111 unique COVID-19 workplace outbreaks in the media. After nurse aides, orderlies and patient service associates, industrial butchers and meat cutters, poultry preparers and related workers had the most workplace outbreaks reported in the media (n=79) but were rated as medium risk occupations for COVID-19 transmission in the VSE COVID Risk Tool. Outbreaks were also reported in the media among material handlers (n=61) and general farm workers (n=28) but were rated medium-low risk and low risk, respectively. Outbreaks reported in the media among food and beverage services (n=72) and cashiers (n=60) were identified as high risk occupations in the VSE COVID Risk Tool.

Conclusion Media surveillance can identify COVID-19 workplace outbreaks and indicate transmission risk. Our results point to key determinants of health that compound the risk of COVID-19 exposure in the workplace, and highlight the importance of collecting occupation data during a pandemic.

P-309 INVESTIGATING HEALTH AND OTHER CHARACTERISTICS OF MILITARY VETERANS AUTHORIZED TO RECEIVE MEDICINAL CANNABIS IN CANADA

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Introduction Veterans Affairs Canada (VAC) has reimbursed cannabis for medical purposes (CMP) since 2008. However, to date little is known about the characteristics of Veterans authorized for CMP, and whether these differ by authorization amount.

Objectives To descriptively summarize social, health, and other characteristics of Canadian Regular Force Veterans authorized to receive CMP from Veterans Affairs Canada.

Methods A linked database of CMP authorizations was developed using VAC reimbursement files, VAC client records, and military personnel data. Analyses were limited to 13,173 Regular Force Veterans residing in Canada with an active authorization as of December 31, 2020. CMP authorization amounts (mean and categorical) were summarized by sociodemographic factors, pensionable conditions and benefits, and military service characteristics.

Results Overall, the average amount of a CMP authorization among Canadian Veterans was 3.6 grams/day. For sociodemographic characteristics, the highest average amounts were observed among Veterans who were aged 30 to 39 years (4.2g/day), male (3.7g/day), separated/divorced/widowed (3.8g/ day), and residing in the provinces of New Brunswick (4.7g/ day), Newfoundland and Labrador (4.1g/day) and Manitoba (4.1g/day). For conditions documented as part of the VAC benefit process, the highest average amounts were observed among Veterans with mental health (3.9g/day) and hearing loss conditions (3.7g/day). For military service characteristics (sub-sample of 9,200 Veterans) the highest average amounts were observed among Veterans with a more recent release year, peaking in 2016 (4.2g/day); and among those who were Junior Non-Commissioned Members (4.0g/day), had served in the army (4.0g/day), and released from the military involuntarily (4.8g/day).

Conclusion This descriptive epidemiology provides new insights on the characteristics of a large population of veterans with medical cannabis authorizations in Canada. This will be used to inform further research on associations between CMP authorizations and wellness outcomes among military veterans.

P-314 ESTABLISHING A EUROPEAN-AMERICAN POOLED COHORT OF STYRENE EXPOSED REINFORCED PLASTICS WORKERS

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Introduction Styrene is genotoxic, an animal carcinogen, associated with lymphohematopoietic malignancies in humans, and classified as a group 2A carcinogen by the IARC.

Objective To combine and harmonize existing cohorts of reinforced plastics industry workers with the aim to study exposure-response relations for styrene and subtypes of lymphohematopoietic and other malignancies as well as nonmalignant diseases.

Methods Six European cohorts included in an earlier IARC coordinated cohort and one US cohort participated. They all have been previously used in investigation of the health risks of styrene exposure. They will be updated with extended follow-up until 2019–2020 in national registries for mortality

and cancer incidence. Personal air styrene measurements and biological markers of styrene exposure from the 1960s up to the present day will be used to update the exposure assessment. Linear mixed-effects models will be applied to develop a quantitative, historical, industry-specific job-exposure matrix. Predictors available in the individual cohorts include country, occupation, employment year, product, process, and task. Some cohorts will be pooled together prior to analysis, others analyzed separately following a common protocol that will focus on different exposure metrics (cumulative, duration, mean, highest attained, peaks) and exposure time windows. The aggregated data will be synthesized by a meta-analysis. Results A total of 96,000 workers employed between 1947-2007 in 762 companies in Finland, Italy, UK, US, and Denmark, and over 2.8 million person years will be included, and 40,000 air samples and 13,000 urinary samples are identified. Conclusion Pooling and meta-analysis of existing cohorts are powerful tools in the search for more definite answers to the

P-323 THE EFFECT OF THE ONSET OF A DISEASE ON EXIT FROM PAID EMPLOYMENT AMONG WORKERS IN THE NETHERLANDS: A LONGITUDINAL REGISTER-BASED STUDY WITH 11 YEARS FOLLOW-UP

carcinogenicity of this important chemical.

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Introduction With increasing retirement age, employed persons are more likely to suffer from chronic diseases, such as cardiovascular diseases, diabetes, inflammatory diseases, respiratory diseases, and psychological disorders, at later stage during their working career.

Objectives This study investigates the influence of the onset of a disease on the likelihood of exit from paid employment through different pathways (unemployment, disability benefits, economic inactivity, early retirement).

Methods For this longitudinal study with 11 years of followup (2009–2019), 4,276,770 persons were selected, who were employed between 2009 and 2010, and used no medication for the selected diseases in 2009. Register data from Statistics Netherlands on medication use, employment status, and sociodemographic factors were used. Exit from paid employment pathways were defined as: unemployment, disability benefits, economic inactivity, and early retirement. The following six disease categories were identified based on medication: cardiovascular diseases, diabetes mellitus, respiratory illness, psychological disorders, inflammatory disorders and psychotic disorders. Descriptive statistics and Cox Proportional Hazards analyses with competing risks were performed.

Results The onset of any disease increased the likelihood of exit from paid employment, with strongest effect observed for psychological disorders (Hazard Ratio [HR]=1.37, 95% confidence interval [CI] 1.34-1.40) and psychotic disorders (HR=1.49, 95% CI 1.41-1.58). Of all pathways out of paid employment, onset of a disease had the strongest effect on disability benefits, with HRs ranging from 1.75 (inflammatory diseases) to 9.30 (psychotic disorders).

Conclusion For the working age population, the onset of common disorders, especially psychological and psychotic disorders, is a risk for maintaining paid employment. Interventions are needed to prevent persons with these diseases from involuntary loss of paid employment.

P-328 AGE DIFFERENCES IN WORK-DISABILITY DURATION ACROSS CANADA: EXAMINING VARIATIONS BY FOLLOW-UP TIME AND CONTEXT

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Introduction Research has examined age-related patterns in return to work and wage-replacement duration following a workplace injury. The various clinical, functional or physiological factors studied do not fully account for age differences in wage-replacement duration. One contextual factor that has been largely overlooked in research studies is the potential impact of the phase of recovery.

Objectives This study aimed to understand age differences in wage-replacement duration by focusing on variations in the relationship across different periods of follow-up time.

Methods We used administrative claims data provided by six workers' compensation systems in Canada, focusing on timeloss claims for workers aged 15–80 years with a work-related injury/illness during the 2011 to 2015 period. Survival analysis examined age-related differences in the hazard of transitioning off (versus remaining on) disability benefits, allowing for relaxed proportionality constraints on the hazard rates over time. Differences were examined on the absolute (hazard difference) and relative (hazard ratios [HR]) scales.

Results Older age groups had a lower likelihood of transitioning off wage-replacement benefits compared to younger age groups in the overall models (e.g., 55–64 vs. 15–24 years: HR 0.62). However, absolute and relative differences in agespecific hazard rates varied as a function of follow-up time. The greatest age-related differences were observed at earlier event times and were attenuated towards a null difference across later follow-up times.

Conclusion Our study provides insight into the workplace injury/illness claim and recovery processes and suggests that older age is not always strongly associated with worse disability duration outcomes at longer disability durations. The use of data from multiple jurisdictions lends external validity to our findings and demonstrates the utility of using cross-jurisdictional data extracts. Future work should examine the social and contextual determinants that operate during various recovery phases, and how these factors interact with age.

P-330 AGE DIFFERENCES IN RETURN-TO-WORK FOLLOWING INJURY: UNDERSTANDING THE ROLE OF AGE ACROSS LONGITUDINAL FOLLOW-UP

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Introduction Older age tends to be associated with longer time to return-to-work (RTW) following a workplace injury and multiple recurrences of work absence following an initial RTW attempt. However, few studies have examined the underlying factors that are responsible for these differences. **Objectives** To examine the overall association between age and return-to-work (RTW), understand the extent to which functional, psychosocial, organizational, life-stage related factors indirectly explain these associations, and examine whether there is a remaining direct proportion not mediated by these factors.

Methods We used survey data from a prospective cohort of injured workers in Victoria, Australia. Participants were recruited during the 2014 to 2015 period from monthly samples of claimants identified by the compensation system. Path models examined the relationship between age and RTW, and the proportion mediated via functional, psychosocial, organizational, life-stage related factors.

Results Older age was associated with non-RTW, although the pattern was not observed consistently across follow-up surveys. A proportion of the overall relationship between age and non-RTW was explained by functional and life-stage factors and RTW status at previous time points.

Conclusion Findings underscore the importance of moving beyond age measured only in chronological years, towards more complex conceptual and analytical models that recognize age as a multidimensional construct.

P-333 USING CANJEM TO EXAMINE THE ASSOCIATION BETWEEN OCCUPATIONAL EXPOSURE TO SELECTED METALS, METALLOIDS, AND WELDING FUMES AND BRAIN CANCER IN THE INTEROCC POOLED INTERNATIONAL CASE-CONTROL STUDY

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Introduction Exposure to metallic compounds may contribute to the etiology of brain cancer; however, few epidemiologic studies have examined this potential association.

Objective To examine occupational exposure to 21 metallic compounds in relation to the risk of glioma and meningioma. Methods INTEROCC is an international consortium of seven brain cancer case-control studies using a common protocol. Among 1,917 glioma cases, 1,827 meningioma cases, and 5,475 controls in the pooled INTEROCC population, job histories were collected and transformed into histories of exposure to 21 metallic compounds by linkage to the Canadian job-exposure-matrix. Three metrics of exposure were calculated for each agent: ever exposed, duration of exposure, and cumulative exposure. Conditional logistic regression was used to estimate the odds ratios (ORs) and their 95% confidence intervals (95%CIs) for the association between the three metrics of exposure and both glioma and meningioma.

Results There was no evidence of associations between our selected agents and glioma. There were positive associations, with ORs ranging from 1.20 to 2.40, between meningioma and several of the metallic compounds, most notably zinc compounds, lead fumes, chromium VI compounds, soldering fumes, metal oxide fumes, and soldering fumes. Overall, our results were similar to two previous studies based on INTER-OCC that examined five of the metallic compounds included in this study, using a modified version of the Finish job-exposure-matrix.

Conclusion Our results are suggestive of positive associations between exposure to metallic compounds, particularly metallic fumes, and meningioma, but not glioma.

P-334 OCCUPATIONAL EXPOSURES EXPERIENCED BY MONTRÉAL WOMEN PARTICIPATING IN TWO CASE-CONTROL STUDIES

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Introduction Women constitute nearly half of the workforce. However, most of our knowledge about occupational diseases come from studies conducted on men.

Objective To describe occupational exposures experienced by women.

Methods Two case-control studies of postmenopausal breast cancer were conducted in Montreal in 1996 and in 2011. Questionnaires on lifetime occupational history were administered during in-person or telephone interviews. Experts reviewed subjects' work history, assessing exposure to a list of 258 chemicals. Chemicals that were deemed to be present were categorized by concentration ('low', 'medium', 'high'), where low represented a background occupational level and high was the highest level experienced in that work environment. We pooled exposure information from both studies by time period and by age of exposure.

Results In both studies combined, the three most prevalent exposures were cleaning agents, ozone, and organic solvents; the jobs in which these top 3 agents were present included nurses and waitresses (cleaning agents), secretaries and clerks (ozone), and housekeepers and elementary school teachers (organic solvents). For cleaning agents and ozone, most exposures occurred at a low concentration (>98%) while slightly higher exposures to organic solvents were found (14% medium and 2% high). The top 3 agents by time period were: <1950, fabric dust, aliphatic aldehydes, and cotton dust; 1950-1969, cleaning agents, aliphatic aldehydes, and organic solvents; 1970-1989, cleaning agents, ozone, and aliphatic alcohols; and ≥1990, ozone, cleaning agents and aliphatic alcohols. The prevalence of exposures differed for women exposed earlier versus later in their working life (predominant agents ≤35 years of age: cleaning agents, aliphatic aldehydes, aliphatic alcohols; >35 years of age were ozone, cleaning agents, organic solvents).

Conclusion Occupational exposures of women remain understudied; bringing out inconspicuous exposures can help better assess women's occupational risks.

P-336 GENDER DIFFERENCES IN OCCUPATIONAL EXPOSURE IN THE CANADIAN JOB-EXPOSURE-MATRIX (CANJEM)

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Introduction One of the principal challenges in communitybased occupational studies is retrospective assessment of exposure. Job-exposure-matrices (JEMs) have been proposed as a cost-effective tool. However, most JEMs are built from the assessment of jobs held by men, with few studies assessing the applicability of those JEMs to the same jobs when held by women.

Objective To compare within-occupation exposure assessments for jobs held by men versus women in a Canadian JEM (CANJEM).

Method Two sex-specific JEMs were created using data from CANJEM, a JEM based on the expert assessment of exposure to 258 chemicals in >30,000 jobs held during 1933–2005, by participants in five Montreal-based case-control studies. Each cell in the JEMs provided the probability, intensity, frequency, and frequency-weighted intensity (FWI) of exposure to a selected occupational agent, for a specific combination of a 4-digit Canadian Classification and Dictionary of Occupations code and one of four time periods. We used intra-class correlation coefficients (ICC) to compare the probability, frequency and FWI between cells considered exposed in the two JEMs; 'exposed' cells were defined by probability \geq 5%. Given the semi-quantitative nature of intensity, Kendall's Tau (τ) was used. We further compared differences between the JEMs using empirical cumulative distribution functions (ECDF).

Results In total, 1,488 cells considered exposed in both JEMs were included in the analysis. ICC (95% confidence interval) of 0.58 (0.55–0.61), 0.55 (0.52–0.58) and 0.12 (0.07–0.17) were found for probability, frequency and FWI of exposure, respectively. For intensity, a τ of 0.24 (0.20–0.29) was found. The ECDFs showed a tendency for frequency to be higher in the female-JEM, but for intensity and FWI to be higher in the male-JEM. No clear trend was observed for probability of exposure.

Conclusion Our results suggest that CANJEM assessment of jobs held by men was inadequate to estimate exposure in women's.

P-338 PROBLEMS OF THE SANITARY AND EPIDEMIOLOGICAL SERVICE IN THE FIGHT AGAINST COVID-19

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Introduction The State Sanitary and Epidemiological Surveillance in the Republic of Kazakhstan is carried out by the Committee for Sanitary and Epidemiological Control, which is a unified centralized system for the prevention, detection, suppression of violations in the field of ensuring the sanitary and epidemiological well-being of the population in order to protect the health of the population and the human environment. The pandemic of a novel Coronavirus Disease 2019 (COVID-19) caused by the severe acute respiratory syndrome SARS-CoV2 has posed a severe global crisis. During the COVID-19 pandemic, this service took full control, monitoring and analysis of work to combat coronavirus infection. The purpose of infection control is to prevent and combat the emergence of acute infectious diseases among the population. The activities of the committee are aimed at: 1. Protection of public health. 2. Sanitary and epidemiological welfare of the population. 3. Anti-corruption activities. 4. Control and supervision over compliance with the requirements established by technical regulations in the country.

Methods An analysis was made of the structure of this state body, its activities, the number of employees and the results of their work.

Results and Conclusion There was a high shortage of specialist epidemiologists in this industry during the pandemic. After analyzing the activities of the sanitary and epidemiological service, we came to the conclusion that these problems arose in connection with the constant reorganization of this service. Over the period of 10 years (2010–2020), there have been transformations and changes in the committee for sanitary and epidemiological control more than 6 times, which significantly influenced the work of the sanitary and epidemiological service and its weakening. It should be noted that over the years of its existence, the service has been one of the main ones in protecting the health of the population of Kazakhstan.

P-339 THE IMPORTANCE OF TRAINING DOCTORS EPIDEMIOLOGISTS IN THE REPUBLIC OF KAZAKHSTAN

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Introduction In the history of development, humanity has tried to avoid the spread of diseases. It is known from historical sources that humanity has suffered about 50 pandemics. The main specialist in solving problems of infection control is the 'Epidemiologist'; his task is to prevent diseases and take appropriate preventive measures to prevent and spread diseases.

Objectives The purpose of this work is to analyze the training of doctors of the sanitary and epidemiological profile.

Methods An analysis of the training system for specialists in the sanitary and epidemiological profile was carried out, taking into account the study of specialized subjects, as well as an analysis of the lack of specialists in this industry.

Results and Conclusion Earlier in the Republic of Kazakhstan, there were 5 medical universities in which doctors-epidemiologists-hygienists were trained for the sanitary-epidemiological service. At the moment, there are 7 medical universities, which train specialists in the new specialty 'Public health'. After analyzing the training system for specialists in the sanitary and epidemiological profile, we discovered in 2020 during the COVID-19 pandemic in the Ministry of Health of the Republic of Kazakhstan, there was a shortage of more than 800 epidemiologists and specialists of the sanitary and epidemiological service, which significantly influenced the fight against coronavirus infection. From this it can be concluded that medical universities need to: 1. Open new faculties to train doctors-epidemiologists-hygienists; 2. to intensify the recruitment of new applicants for this specialty of a sanatorium-epidemiological profile; also, government agencies need to allocate additional grants for such applicants. The Sanitary and Epidemiological Service has played an important role in the history of the well-being of the population of the Republic of Kazakhstan. Over the years of its existence, the service has been one of the main ones in protecting the health of the population of Kazakhstan.

P-341 SUN EXPOSURE IN OUTDOOR WORKERS: KEY CONSIDERATIONS FOR AN OCCUPATIONAL SURVEILLANCE SYSTEM

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Introduction Outdoor workers are exposed to a variety of hazards, including solar ultraviolet radiation (UVR). Identifying, reporting, analyzing, and tracking the exposures or health outcomes of outdoor workers specifically have not generally been considered in a formalized way.

Objectives Our objective was to identify the key characteristics and the barriers and facilitators of occupational surveillance systems in order to make recommendations for a system for outdoor workers that includes consideration of sun exposure and skin cancer.

Methods A traditional literature review (peer-reviewed and grey literature) was performed using search terms relevant for surveillance, outdoor workers, and best practices. Additionally, 22 qualitative key informant interviews were conducted with a variety of experts. The audio recorded interviews were transcribed verbatim and coded for broad themes and specific barriers and facilitators using NVivo 12.

Results The literature review found no occupational surveillance programs focused solely on outdoor workers. Five occupational surveillance strategies were summarized to obtain a better understanding of occupational surveillance systems and how they might be applied to keratinocyte carcinoma (KC) or solar UVR exposure in outdoor workers. The key informant interviews revealed ten key considerations for the design of a surveillance system, including identifying a clear goal, a defined target population and stakeholder involvement. Additionally, five critical barriers including underreporting and funding, and five vital facilitators including communication/collaboration and a simple reporting process were identified.

Conclusion Our study demonstrated that barriers and facilitators to an occupational surveillance system for outdoor workers exist and thoughtful design and implementation are key. Some specific suggestions for a successful occupational surveillance program for outdoor workers include the recognition of KC as an occupational disease, designing and implementing a notification/data collection mechanism for KC, continuing to build primary prevention initiatives, educating workers/employers on the risks of skin cancer and other outdoor hazards, and investing long-term into surveillance.

P-342 COMPENSATION OF OCCUPATIONAL DISEASES: A RETROSPECTIVE STUDY DURING FIFTEEN YEARS IN A UNIVERSITY OCCUPATIONAL MEDICINE DEPARTMENT IN TUNISIA

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Introduction Human heavy costs of Occupational Diseases (OD) are associated with significant economic ones estimated, in some countries at 2 or even 3% of the gross domestic product.

Objective This study aims to identify epidemiological profile of Tunisian patients concerned by OD and their associated professional factors.

Methodology A retrospective study was carried out in one of the seven Tunisian occupational medicine university departments, with data collected between 2005 and 2017, based on the medical files and declaration forms.

Results In total, 351 patients had been declared victims of at least one OD. The sex ratio was 0.21 and the average age was 40.51 ± 8.36 years. The average professional seniority was 18.2 ± 7.8 years. Among concerned workers, 69.23%were actives in clothes-textile sector; 7.97% in hotel-catering sector and 6.84% of them in the health sector. Machine operator (63.53%), followed by cleaning worker (6.55%), were most concerned work situations. Musculoskeletal disorders (MSDs) represented 86.61% of declared OD, followed by respiratory pathologies, and occupational dermatitis in 7.41% and 2.56% of cases respectively. The average files' processing time by compensation commission was 15.15 ± 8.8 months (3 - 36 months). Demands of compensation were refused in 6.3% of cases. The average permanent partial disability (PPD) rate was 22.54 ± 10.13% (6 to 50%). Statistical analysis concluded that MSDs, the most reported OD, were more common among female patients ($p = 10^{-3}$); those active in the clothing-textile sector (p = 0.005); machine operators (p =0.003) and those who received a compensation pension (PPD > 5%) (p = 0.02).

Conclusion Occupational diseases are a real issue of health and safety at work, particularly in some sectors characterized by multiple risks exposition and needs specific preventive actions.

P-343 RELATIONSHIP BETWEEN LABOR PRECARIOUSNESS AND HEALTH IN A SAMPLE OF UNIONIZED FEMALE DOMESTIC WORKERS IN URUGUAY

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Introduction A little more than a decade after regulating paid domestic work in Uruguay, a mixed study was carried out to know about workers' employment and health conditions in this sector. This study offers unprecedented evidence on these aspects of domestic work in Uruguay.

Objectives The study aims to find out the relationship between labor precariousness and the health of domestic workers, incorporating the analysis of some characteristic and frequent variables of work in this sector.

Methods A non-probabilistic sample of unionized female domestic workers from different departments of Uruguay was considered for this research. In the quantitative study, a selfadministered standardized questionnaire was applied, which included questions about their employment and health conditions, among other characteristics of work in the home. The qualitative approach contributes to the interpretation and contextualization of the results presented below, based on the fieldwork carried out through interviews and discussion groups with these workers.

Results The results obtained reflect a relationship between a higher level of labor precariousness and worse level of health of domestic workers, and being exposed to putting their time

at the disposal of employers, even outside working hours. This relationship is reversed when the worker has more seniority in the labor relationship.

Conclusions The results presented here are the outcome of a study in which unionized workers, presumably organized and with access to information, participated. Despite this, results reveal that the law and the policies developed for the sector do not protect domestic workers' health, as they do not consider the particularities of the sector. These results reflect the need to continue investigating the particularities of their working conditions to prevent their negative impact on health.

P-348 THE ROLE OF AN OCCUPATIONAL HEALTH SERVICE IN THE RETURN TO WORK FROM WORKERS DISCOURSE ANALYSIS

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Introduction The Brazilian Public Healthcare System offers an occupational health service (OHS) regulated from the Primary Health Care to assist work injuries and diseases and collaborate to return-to-work (RTW), to ensure workplace accommodations for the rehabilitated worker.

Objective To understand the role of the OHS in the RTW process from the perspective of workers assisted by this service.

Methods

Qualitative research We interview eight workers assisted by OHS in 2017–2018 after discharge and RTW. We analyzed the speeches based on Discourse Analysis and interpreted them based on RTW and Psychodynamics of Work theoretical approaches. **Results** OHS was considered helpful in the RTW mainly in the physical and psychological health recovery. Besides, it helped to guarantee workers' rights regarding to the social security benefits and the employer's responsibilities. However, workers highlighted the need for improvement inside OHS team communication and between them and workers, as well negotiations with the employer to workplace accommodations and better security conditions of work.

Conclusion OHS was considered helpful for individual recovery, but limited for RTW. Even so, workers recognize the relevance of this service in difficult and complex moments such as RTW, and also the protagonism of it when compared to other stakeholders. Considering the potential for articulations of the OHS we suggest it mediates actions together with workers and stakeholders to improve the RTW process.

P-349 CHALLENGES OF RETURN-TO-WORK AFTER WORK-RELATED SICK LEAVE: FROM WORKERS PERSPECTIVES

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Introduction Return-to-work (RTW) is a complex process that involves many sectors and stakeholders including worker participation. RTW should consider biopsychosocial aspects of workers and workplace changes with stakeholders' participation to ensure adaptation and sustainability of the job. Objective to identify RTW challenges from workers' perspectives after work-related sick leave.

Methods Qualitative research. We interview workers who were victims of occupational diseases or accidents and were treated by a Brazilian public occupational health. We analyzed the speeches considering theoretical and methodological approaches of RTW, Psychodynamics of Work, and Discourse Analysis.

Results RTW is a difficult experience for workers, mainly caused for miscommunication and non-articulation of stakeholders and sectors involved. RTW triggers negative feelings and distress in the workers such as humiliation, revolt, and even feeling of guilt due to sick leave. Besides, workers experience fear of retaliation and stigmatization of their employer or co-workers for their new condition and receive rare or no support in this sense. Discourse analysis shows lacking support from stakeholders and the invisibility of workers during return to work that walks alone in this path. Government sectors (as insurance and healthcare systems) do not mediate RTW and workplace accommodations rely on workers' demand in an unfair and unbalanced negotiation with the employer.

Conclusion There is an urgent need to review the RTW process in Brazil focusing on a collaborative model between sectors, stakeholders, and the worker looking to a more comprehensive perspective and more effective results.

P-350 SOCIO-OCCUPATIONAL INEQUALITIES IN POTENTIAL WORK-RELATED EXPOSURE TO SARS-COV-2

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Introduction The risk of contracting COVID-19 is not uniform across occupations. Certain workers, exposed to diseases/infections, interfacing with the public/colleagues, unable to work from home, and without appropriate personal protective equipment are likely to experience higher workplace exposure to SARS-CoV-2.

Objective To describe the proportion of workers potentially exposed to coronavirus in each occupation under 'routine' working conditions, as well as a baseline socio-demographic profile of these workers in France.

Methods We combined two French cross-sectional populationbased surveys: 'Working Conditions' (CT-2013) and 'Medical Surveillance of Occupational Risk Exposure' (Sumer-2017) to quantify 'exposure to infectious agents', 'face-to-face contact with the public' and 'working with colleagues'. We then identified the most exposed occupations before the first lockdown and built an exposure matrix. Finally, we described other socio-demographic characteristics (age, sex, occupational group, educational level, income level, origin) of the workers with the highest potential exposure to COVID-19.

Results Before the first lockdown, 42% (11 million) of French workers were exposed to at least two COVID-19 occupational exposure factors. While most exposed workers are in the health care sector, other occupations such as social workers, hotel/restaurant employees, army/police officers, firefighters, hairdressers, and teachers also have a high proportion of exposed workers. Middle age participants, females, unskilled employees, those with post-secondary non-tertiary education,

those with lower income level, French-born in overseas departments, and descendants of non-European immigrants faced a greater risk of occupational exposure to coronavirus before the first lockdown.

Conclusions Our exposure matrix can now be used as an input in ongoing French cohorts to attribute a baseline level of work-related exposure and adjust it based on actual working arrangements during the epidemic. Surveillance of occupational exposure to coronavirus and the socio-demographic characteristics of the workers vulnerable to this virus is key to the implementation of occupation-specific public health response to Covid-19.

P-351 ANALYTICAL PLATFORM FOR EMPLOYEE HEALTH MANAGEMENT

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Objective High quality and effective occupational health service (OHS) is heavily dependent on smart use and analysis of data. To provide OHS in an innovative and economically efficient way using real world data and machine learning (ML/AI) we have developed a proof-of-concept (PoC) of an analytical platform HeBA (Health for Business Analytics) to support everyday clinical practice of employee health management.

Methods The innovative approach of HeBA is that it uses naturally collected data of OHS provision and offers analyses based decision support for OHS physicians and for employers. It has modules for physicians (seamlessly integrated with electronic health record system), for individual employees and employer OH administrators. For managing employees' health in companies HeBA analyses indicators of quality of working life - presentism, stress-level, motivation, sick-leave days and allows to see correlations between working-life quality indicators and health indicators by department, company, economic sector or occupation. Companies can get annually action plans for health management and make an analyses based decisions in employees' and workplace investments. OH physicians can get rule-based decision support in their everyday practice.

Results HeBA has been tested and used in our OHS clinic serving our clients - 10 000 employees. An example of possibilities: we can measure prevalence of poor self-rated health by occupations in datapool of all employees; make comparisons of poor health between departments in a company and assess association of it with workplace risk-factors and health indicators. Qualitative feedback to the PoC from 3 major user groups - physicians, employer administrators and individual employees - has shown very high satisfaction rate and given guidance for further development potential of HeBA.

Conclusion The proof-of-concept has proven its value in improving the OHS quality and efficiency in Estonia. Further research and development is planned for international validation and introducing ML/AI in decision support solutions.

P-353 CHRONIC FATIGUE IN NURSING STAFF WORKING SHIFTS

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Introduction The aim of the present study was to determine the association between shift work and chronic fatigue among Educational Hospital nurses.

Methods This cross-sectional study was carried out in an Educational Hospital in Yazd. Using stratified sampling technique, 200 Nurses were selected. The data was collected by using questionnaires about demographics and chronic fatigue. The data was analyzed using SPSS20 software and applying chisquare and Pearson correlation coefficients.

Results 57 male nurses and 143 female nurses participated in this study. There was no significant relation between the gender, marital status, work experience and education level with chronic fatigue. Between age groups with chronic fatigue there was a significant difference. Results from this study showed a significant relation between shift work and chronic fatigue. Chronic fatigue was less frequent among subjects with constant shifts than among those with nonconstant shifts.

Conclusion The relation between shift work and chronic fatigue appears to differ according to constant and non-constant shifts.

P-356 INEQUALITIES IN PESTICIDE POISONING IN BRAZILIAN STATES BY ETHNICITY AND RACE, 2010–2020

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Brazil is the main consumer of pesticides worldwide. As a consequence, we have observed an increase in cancer cases, high rates of suicides, congenital malformations, high prevalence of mental disorders, high incidence of poisoning in the population in regions with greater use and exposure to pesticides.

Objective To analyze the cases of poisoning notifications by pesticides of use: agricultural, domestic, public health and rodenticides among the Brazilian population, by ethnicity and race.

Methods Descriptive cross-sectional study based on the cases of notifications of pesticide poisoning recorded by DataSUS/ SINAN/MS and SINITOX/Fiocruz, in the Brazilian population, in the period from 2010 to 2020.

Results Data indicate higher rates of pesticide poisoning in the Black, urban, and young people aged between 20 and 39 years. 116,981 cases of poisoning by pesticides for agricultural use, domestic, public health and rodenticides were reported.

Conclusion Victims of pesticide poisoning do not necessarily need to be economically active, nor do they need to live in the countryside, in a rural area. Poisoning is a problem of the urban Black population, where the largest number of cases are concentrated. Exposures and poisoning by pesticides have been part of the reality of children very early, many are still intoxicated in the wombs of their mothers, rural workers. Therefore, it is a public health problem that needs to be treated with greater attention by governments, health, education and academia professionals, in order to develop specific studies with exposed populations.

P-360 IS OCCUPATIONAL EXPOSURE TO POLYCYCLIC AROMATIC HYDROCARBONS ASSOCIATED WITH PROSTATE CANCER RISK? RESULTS FROM PROTEUS, MONTREAL, CANADA

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Introduction Polycyclic aromatic hydrocarbons (PAHs) have been shown to have endocrine-disrupting effects. Exposure could be carcinogenic to the prostate, a hormone-dependent organ.

Objective To examine the association between lifetime occupational exposure to PAHs and prostate cancer risk.

Methods Face-to-face interviews elicited detailed work histories for 1,937 histologically confirmed prostate cancer cases (524 aggressive) and 1,994 controls from Montreal, Canada. Industrial hygienists applied the hybrid expert assessment approach to assign concentration, frequency and certainty of exposure to benzo(a)pyrene, PAHs from different sources (wood, coal, petroleum, other sources) and PAHs from any source. Odds ratios (ORs) adjusted for age, ancestry, education, lifestyle and occupational factors, and their 95% confidence intervals (CI), were estimated using unconditional logistic regression.

Results After restriction to probable and definite exposure, and application of a 5-year lag, no clear association was observed between exposure to PAHs and overall prostate cancer risk, although a weak positive dose-response pattern emerged for total duration of exposure to PAHs from wood (OR=1.06; 95%CI 0.95 to 1.18, per 5-year increment). Men in the upper tertile of cumulative exposure to these PAHs showed an elevated OR of 1.54 (95%CI 0.60 to 3.92), predominantly reflecting the non-aggressive form of the tumour (OR=1.74; OR=0.67 to 4.56). Nevertheless, exposure to PAHs from wood occurring at least 10 years before the index date was associated with some elevated risks of high-grade tumours (OR=1.54, 95%CI 0.70-3.39). Similar results were found in sensitivity analyses, including those restricted to controls recently screened for prostate cancer or in those prioritizing the Gleason score ascertained from prostatectomy over that from biopsy.

Conclusion Only a handful of small studies have used detailed exposure assessment protocols to study the role of PAHs in prostate cancer risk. Our findings provide some limited evidence that exposure to PAHs from wood increases the risk of prostate cancer.

P-361 OCCUPATIONAL EXPOSURE TO ENGINE EXHAUST AND PROSTATE CANCER RISK

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Introduction Some engine exhaust components are carcinogenic or have hormone-disrupting properties.

Objective To investigate the association between lifetime occupational exposure to various engine exhausts (EE) and prostate cancer risk.

Methods In the context of a case-control study conducted in Montreal, Canada, 1,924 histologically-confirmed prostate cancer cases (436 aggressive) and 1,989 population controls were recruited. Complete occupational history, socio-demographic and lifestyle factors were collected during in-person interviews. Industrial hygienists conducted semi-quantitative evaluations of intensity, frequency and reliability of exposure to leaded and unleaded gasoline EE, any diesel EE, heavy diesel EE, light diesel EE, jet fuel EE, and propane EE in each job held ≥ 2 years. Odds ratios (ORs) adjusted for age, ancestry and education, and 95% confidence intervals (CI), were estimated with unconditional logistic regression, modelling the association between each EE and prostate cancer risk.

Results Ever exposure to leaded gasoline EE was associated with a slight increase in risk of overall prostate cancer (OR=1.13, 95%CI 0.98 to 1.31), after restricting to probable and definite exposures, and applying a 5-year lag. Although no formal statistical heterogeneity in risks appeared, the association was slightly stronger for non-aggressive cancers than aggressive ones. No dose-response relationships emerged for total duration or cumulative exposure. Men who had ever been exposed to jet fuel EE showed a decreased odds of the tumor (OR=0.34 95%CI 0.19 to 0.61). No association was found with exposure to any other EE. Mutual adjustments for other EE and sensitivity analyses restricting controls to men recently screened for prostate cancer yielded results consistent with the main findings.

Conclusion We found limited evidence for a deleterious role of occupational exposure to leaded gasoline EE in the development of prostate cancer. This is the first study to examine the distinct role of leaded and unleaded gasoline EE in the etiology of this cancer.

P-362 GENDER DIFFERENCES IN SKIN RELATED QUALITY OF LIFE

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Background Quality of life (QL) is an important component of individuals' general well-being, particularly in active adults. However, factors influencing skin related QL have not been fully examined. Furthermore, the role of gender differences in relation to QL in occuptaional dermatitis (OD) has also not been examined in detail. This study aimed to assess determinants of skin-related QL of healthcare workers and examine the role of gender differences.

Methods A cross-sectional and exhaustive study was conducted among healthcare workers of four public hospitals in the central region of Tunisia. All cases of dermatitis recognized as occupational disease were included. Skin-related QoL was assessed using the validated Tunisian version of the 'Dermatology Life Quality Index' (DLQI).

Results A total of 37 cases of OD were collected with an annual incidence of 4.2 cases per 10,000 workers. The population was predominantly female (73%) and mean aged 44.7 \pm 9.4 years. Nurses were the most represented occupational category (38%). Allergic contact dermatitis was the most frequent diagnosis (96%). The median score of DLQI was 5. Twelve patients (32%) had a DLQI score > 10, meaning a significant impairment in skin related QoL. Among them, 11 (92%) were female (p = 0.11). Multivariate analysis showed an association between the impairment of skin-related QoL and female gender (p = 0.04; OR = 19.384), exposure to

disinfecting chemicals in the workplace (p = 0.01; OR = 17.306) and the absence of occupational reclassification (p = 0.01; OR = 21.567).

Conclusion This study has revealed skin-related QoL is significantly more impaired in women. Several studies have reported a similar result. This could be explained by the fact that traditionally, in Tunisia, women have been predominantly responsible for household chores, and therefore more exposed to substances that can trigger dermatological conditions. In addition, the aesthetic consequences of skin pathology do not have the same impact on men and women.

P-363 SEX DIFFERENCES IN MANAGING ACCIDENTAL BLOOD EXPOSURE IN A TUNISIAN PUBLIC HOSPITAL

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Accidental blood exposure (ABE) is major problem of occupational safety among health care workers. This work aimed to assess the gender differences among health care workers of a public hospital in the central region of Tunisia.

Methods An exhaustive retrospective study was conducted over a period of fourteen years, concerning ABE reported in the Department of Occupational Medicine of a public hospital in the central region of Tunisia (Mahdia). The data collected were related to socio-professional characteristics of victims, circumstances of the accident and immediate and follow-up care. Gender groups were compared.

Results A total of 650 ABE were reported during the study period. Victims were predominately female (sex ratio=0.47), mean aged 32.1±9.4 years and having a mean job tenure of 5.5±7.7 years. Paramedics represented 28.3%. AEB were caused by a needle stick in 82.6% of cases. Needle recapping was the direct cause in 10.6% of cases. Only 47.1% of caregivers were wearing gloves at the time of ABE. Women were more exposed to ABE with a higher risk of contamination, but with no statistically significant difference (p=0.33). Immediate care was in accordance with universal recommendations in 34.1% of cases and less adequate among women (p=0.05). The initial serology was prescribed in 82.6% of cases, that of the 3rd month in 5% of cases and that of the 6th month in 1.2% of cases. Women were less adherent to follow-up with a statistically significant difference at six months (p=0.016). Hepatitis B vaccination schedule was correctly followed in 79% of cases. Women were more adherent than men (p=0.029). Logistic regression analysis did not reveal gender as a predictor of vaccination status (p=0.211).

Conclusion The current study has revealed a high prevalence of ABE mainly among female health care workers with unsatisfactory management, including inadequate immediate care and incomplete post-accident follow-up.

P-364 INTERACTIONS AMONG SHIFT WORK DOMAINS AND EMPTY CALORIE FOOD/BEVERAGE CONSUMPTION

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Introduction Shift work has been linked to increased consumption of empty calorie food/beverages. However, the majority of studies investigating associations between shift work and empty calorie food/beverage consumption has been focusing on the impacts of shift timing. Little is known about how other domains of shift work contribute to empty calorie food/ beverage consumption.

Objectives The purpose of this study was to examine associations between shift work and empty calorie food/beverage consumption, focusing on other domains of shift work and their interactions.

Methods This was a 14-day intensive longitudinal study with ecological momentary assessment. A convenience sample of 80 Taiwanese hospital registered nurses were recruited. During the study period, employing a 21-item food checklist, participants were prompted four times daily to report their empty calorie food/beverage consumption on a smartphone. Three domains of shift work: shift timing, intensity, and speed were derived from the registry-based work schedules. Three-level mixed-effects regression models were used to test hypotheses.

Results A total of 2,444 momentary observations from 77 participants were included in the final analysis. Findings suggested that high night shift intensity was associated with an increased likelihood of sugar-sweetened beverage intake (AOR=1.64, 95% CI [1.01, 2.68]). Shift speed moderated associations between sugar-sweetened beverage consumption and work shift intensity or shift timing. However, associations between night shift intensity and empty calorie food/beverage consumption did not vary by shift speed.

Conclusions This study suggested how shift assignments might contribute to workers' empty calorie food/beverage consumption. Therefore, it would be beneficial to rotating shift workers' eating behaviors and overall health if the identified hazardous shift schedule can be avoided.

P-365 PROMOTING SENTINEL SURVEILLANCE PROGRAMS FOR ANTIMICROBIAL RESISTANCE IN CANADIAN SALMON AQUACULTURE, A POSSIBLE AND UNDERSTATED OCCUPATIONAL HEALTH HAZARD

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Introduction Canadian salmon aquaculture is a high-risk industry with injury rates that surpass provincial averages in Atlantic Canada, yet few publications address occupational health hazards. Antimicrobial resistance (AMR) emergence is a growing public health concern, and the marine aquatic environment with its rich microbiota is particularly vulnerable to selection of AMR. Antibiotic use in the industry and other anthropogenic activities that result in the deposit of pollutants contaminated with antibiotics into the marine environment can together amplify selective pressure propagating AMR. Similar to terrestrial animal production facilities, there is concern for the development of hotspots for occupational exposures to AMR among aquaculture workers. As the fastest growing food production network globally, the aquaculture industry has been appealed by the Food and Agriculture Organization, among others, to standardize monitoring and to generate an evidence base to better understand the aetiology of AMR emergence in aquaculture settings.

Objectives This case study will identify Canadian policies and practices that promote antimicrobial stewardship and surveillance in the aquaculture industry.

Methods i) Compare antibiotic use by Canadian salmon aquaculture to other global industry leaders. ii) Compare regulatory regimes and surveillance strategies across industry leaders.

Results Prescribed antibiotic use in Canadian salmon aquaculture exceeds that of Norway, the industry leader, which has implemented an array of strategies to drastically reduce antibiotic use since the 1990s. Unlike Norway, Canadian aquaculture lacks monitoring programmes for AMR and, furthermore, has yet to document possible occupational exposure pathways to this hazard. Current data repositories do not elucidate health risks associated with AMR emergence in aquaculture settings.

Conclusion Canadian salmon aquaculture has an opportunity to lead the country's animal production industries in the development of a standardized sentinel surveillance network to accommodate formal risk analyses and early warning systems. Continuous AMR surveillance coordinated with current public health monitoring would promote health protective strategy development and antimicrobial stewardship within the country.

P-368 OCCUPATIONAL BIOLOGICAL LIMIT DERIVATION PROCESS AND BIOLOGICAL LIMIT VALUES FOR SEVERAL PRIORITY SUBSTANCES

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Introduction Biomonitoring and atmospheric metrology are complementary approaches to assess occupational exposure to chemicals. The ANSES working group on biomarkers of exposure (WGBME) has developed an approach to derive Biological Limit Value (BLV) for occupational priority substances.

Objectives The aim of this commuication is to present the approach as we as the derived BLV for the priotity substances.

Methods Based on available data and using a decision tree, 4 types of BLV may be derived: a BLV based on a health effect for substances with threshold effects, a BLV based on an Occupational Exposure Limit (OEL), a BLV based on a cancer risk level (10–4, 10–5 or 10–6) or a theoretical value called 'pragmatic BLV'. When knowledge on the relationship biomarker-health effects or biomarker-exposure is lacking, no BLV is derived. Whenever possible, a Biological Reference Value (BRV) based on the 95th percentile of a non-occupationally exposed population is also proposed. BRVs are not risk-based but are part of the preventer's toolbox.

Results Since 2011, 16 substances were assessed by the ANSES WGBME. Detailed information has been published in scientific reports which are publicly available on the ANSES website. Lead and Cadmium were the only chemicals for which BLVs based on relationship between health effect and biological levels were derived: lead BLV of 180 μ g.L-1 based on neurological effects and urinary cadmium (5 μ g.g-1 creatinine) and blood cadmium (4 μ g.L-1) based on nephrotoxicity. BLVs (urinary concentrations) based on OELs were derived for cobalt (5 μ g.g-1 creatinine), dichloromethane (0.2 mg.L-1) and styrene (40 μ g.L-1). A pragmatic BLV based on OEL was

calculated for chromium VI (2.5 μ g.L-1). No BLV was based on cancer risk level. In addition, no BLVs but BRVs were proposed for substances such as acrylamide, beryllium, butadiene and some phtalates.

Conclusion This expertise from the ANSES WGBME has led to derive several BLV to prevent health effects in workers or to control exposure to contaminants. BLV and BRV help occupational physician to unfold prevention program and surveillance in occupational settings.

P-372 SAFETY DATA SHEETS AS A HAZARD COMMUNICATION TOOL: AN ASSESSMENT OF SUITABILITY AND READABILITY

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Introduction Safety data sheets (SDSs) are printed materials designed to communicate the hazards associated with using chemicals/hazardous products in the workplace. SDSs are highly technical in nature, often containing dense, ambiguous text, which places considerable comprehension demands on workers, especially those with lower literacy skills.

Objective To assess the suitability and readability of SDSs as a hazard communication tool for workers.

Methods A random sample of 50 SDSs compliant with WHMIS 2015 were extracted from the CCOHS m(SDS) database. The Suitability of Materials (SAM) tool, originally designed to evaluate patient education materials, was used to assess SDSs for content, literacy demand, use of graphics, and layout/typography. To account for legislated content requirements under WHMIS 2015, an amended SAM tool was also developed for scoring. Readability software was used to determine the reading grade level required to understand SDSs based on several common formulas/indices.

Results When the original SAM tool was used, the mean total SAM score was 'not suitable' (30.22%). When the amended SAM tool was used, the mean total SAM score increased to 'adequate' (64.43%). The mean readability scores were as follows: Flesch-Kincaid Grade Level (10.2), Gunning-Fox Index (8.5), Coleman-Liau Index (12.2), and Simple Measure of Gobbledygook index (10.2).

Conclusion Even though the amended SAM tool was better able to identify content-related issues specific to SDSs, the use of SDSs as a hazard communication tool needs improvement. The SDSs analyzed required a reading grade level between the 8th and 12th grades. These levels exceed the 6th-grade reading level recommended to ensure that 75% of adult Americans can read the material without difficulty. Overall, chemical/hazardous product manufacturers should use readability assessments together with the amended SAM tool when writing SDSs to ensure that the written information is easily understandable for all audiences.

P-373 IMPACT OF MUSCULOSKELETAL DISEASES ON HEALTH-RELATED QUALITY OF LIFE AMONG OFFICE FEMALE WORKERS.

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The objective of this study is to assess the prevalence of musculoskeletal disorders (MSDs) among Medical Secretaries (MS) and their impact on their health-related quality of life (HRQL).

Methods A cross-sectional multicentric exhaustive study was conducted among medical secretaries working in three public hospitals. The survey included a self-administered questionnaire related to individual and professional characteristics, a French abbreviated version of the Karasek's Job Content Questionnaire, a French validated version of Nordic Questionnaire, a French validated version of the SF12 and NHP scores. The study also included objective validated clinical maneuvers. Determinants of MSDs and their impact on HRQoL were evaluated through univariate and multivariate analysis.

Results A total of 72 office female workers were included with a response rate of 81.8%. The mean age was 43.75 \pm 8.9 years. The body mass index (BMI) was higher among workers over the age of 45 years. According to Karasek's model, 54 subjects (75%) were in 'Job strain' situation. During the last 12 months, back complaints were reported by 69.4% and neck complains were reported by 79.2% of workers. An impaired physical HRQoL (PCS <50,11) was identified in 72.2% of subjects. An altered mental HRQoL (MCS <47.96) was identified in 76.4% of workers. In the multivariate analysis, BMI was found to be a risk factor for MSDs of the back (OR: 1.2), whereas time spent in front of the computer screen was found to be a risk factor for MSDs of the neck (OR: 2.8). MSD of the back was an independent predictive factor for a more altered physical HRQoL (OR: 7.45), whereas MSD of the knees was an independent predictive factor for more altered mental HRQoL (OR: 1.87).

Conclusion The prevalence of MSDs among female office workers is high and have a negative impact on both physical and mental HRQoL.

P-374 LIFE AND DEATH AT WORK: A TUNISIAN PROSPECTIVE STUDY

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10.1136/OEM-2021-EPI.296

Introduction Death at work remains a frequent pressing public health issue despite undeniable progress in occupational health and safety. This study aims to assess cases of deaths at the workplace reported in the Forensic Medicine Department of a public hospital in the central region of Tunisia.

Patient and Methods A prospective exhaustive study was conducted in the Forensic Medicine Department of a public hospital located in the central region of Tunisia (Mahdia). This study concerned death occurring in the workplace for which a forensic investigation was carried out during a period of four years from January 2016 to December 2019.

Results Of the 728 deaths reported to the Forensic Medicine Department during the study period, only thirty-five deaths occurred in the workplace with an incidence of 4.8%. The deceased were mostly men (sex ratio = 4) and mean aged 48 years. Victims were blue-collar workers in 97% of cases, fishermen in 34% of cases, security guards in 14% of cases, construction workers in 12% and finally agricultural labourers in 2% of cases. The mechanism of death mostly reported was drowning (34%) followed by cardiac accidents (23%) and trauma (16%). This study revealed a case of suicide in the workplace and two cases of white autopsy.

Conclusion Deaths in the workplace fall into two broad categories: deaths due to workplace injuries or fatal work-related accidents including motor vehicle accidents, machinery-related events, homicides, falls, and electrocution, and deaths due to chronic diseases such as ischemic accidents, aortic dissection. This study has highlighted the contribution of early autopsy in revealing the cause of deaths occurring in the workplace and the need to implement preventive measures to minimize workplace-related preventable deaths.

P-375 OCCUPATIONAL FUTURE OF HEALTHCARE WORKERS WITH OCCUPATIONAL DERMATITIS.

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Aim To identify factors influencing the occupational future of healthcare workers suffering from occupational dermatitis.

Patients and Methods This was a multicenter cross-sectional study of healthcare workers suffering from occupational dermatosis in the four public hospitals in the central region of Tunisian. A synoptic sheet related to socio-professional and administrative data was completed. A self-questionnaire relative to medical data and occupational future was completed during a direct interview.

Results The study involved 40 healthcare workers, only 37 workers were included in the study. They were predominantly female (73%) and mean aged 44.7±9.4 years. A request of reclassification was introduced in 19 cases (51%), workstation adaptation in 14 cases (38%) and allergen eviction in 20 cases (54%). A mutation was reported in two patients (5.4%) and three workers retired (8.1%). A statistically significant association was found between the request of reclassification, a history of allergic manifestations (p = (0.003) and the allergic agent (p = (0.014)). Workstation layout was significantly associated with a history of allergic manifestations (p = 0.039), the hand palm location (p =0.04), and eviction measures. After multiple binary logistic regression, the request of reclassification was significantly correlated with a history of allergic manifestations (p = 0.008), a sensitization to nickel sulfate (p = 0.009) and the fingers location (p = 0.038). The change of workstation was significantly correlated with a history of allergic manifestations (p = 0.026).

Conclusion The occupational future of healthcare workers suffering from occupational dermatitis depends on a history of atopy (especially allergic rhinitis) and sensitization to allergens (thiuram mix).

P-376 ORIGIN, PREVALENCE AND DETERMINANTS OF VIOLENCE IN PUBLIC HOSPITALS IN TUNISIA.

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Objective To assess the prevalence of violence in the healthcare environment and to identify its respective origin and determinants in two university hospitals in the Central -East region of Tunisia.

Methods A bi-centric and exhaustive cross-sectional study was carried out in health professionals from two public hospitals in the Center-East of Tunisia over a period of eight months. The study was based on a self-administered and structured individual questionnaire composed of two parts: a first part for the evaluation of the socio-professional characteristics of the participants and a second part for the evaluation of violence at work (VAW) and its origins (external and internal).

Results A total of 546 healthcare professionals agreed to participate in this study, giving an overall response rate of 19%. The prevalence of VAW was 95.8%. The mean age was 34.5 \pm 9.6 years with a sex ratio of 0.42. Doctors, Nurses and Senior Technicians were significantly the most exposed to VAW (p = 0.000). External violence (EV) was more frequent than internal violence (IV) (93.4% and 77.8%, respectively). EVs were moral (92.3%) and physical (73.4%) and IVs were mainly moral (76.9%). After multivariate regression, the predictive factors of VAW were the level of education (primary/ secondary, OR = 12.2) and the profession (Technician (OR =21.2), Doctor (OR = 14.5) and Nurse (OR = 12.8)). Predictors of EVs were nationality (OR = 6.2), level of education (primary/secondary, OR = 7.2) and occupation (Doctor (OR = 10.4) and Nurse (OR = 8.8)). The only predictor of IV was male gender (OR = 0.6).

Conclusion This study has identified a high prevalence of VAW among health workers dominated by external violence. Sensitization and staff training on the management and prevention of violence should be necessary to improve professional performance in public hospitals.

P-377 THERMAL CONSTRAIN IN A TUNISIAN STEEL COMPANY

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Background Historically, the arduous sectors of work have been those that are physically heavy such as work in the steel industry. In this context, this arduousness is related to significant thermal constraints caused by the production processes. In Tunisia, this sector employs more than 2498 workers. This study aims to identify the heat strain at work in the steel industry by measuring the metabolism of work.

Methods A cross-sectional and exhaustive study was conducted in a steel company located in the governorate of Monastir (Tunisia). The study was conducted in the hot season during the months of August and September 2015. The evaluation of the thermal constrain was made through the evaluation of the metabolic rate in accordance with the recommendations of the 'analysis' level of the international standard ISO 8996 'Ergonomics of the thermal environment – Determination of metabolic rate'. This analysis was based on the recording of heart rate during work.

Results A total of 80 male workers aged 37.9 ± -9.25 years and having an average job tenure of 12.5 ± 11.4 years were included. The mean absolute cardiac cost was 18.67 ± 6 beats per minutes. The average relative heart rate was $17.1\% \pm 10.1\%$

5.8%. The equivalent metabolic rate was estimated at 292.7 \pm 59.8 Watts. The interpretation of the workload based on the equivalent metabolic rate, the percentage of use of the maximum work capacity and the limit time for this metabolic load was rated as acceptable for the majority of workers (84.8%).

Discussion and Conclusion In Tunisia, the steel sector is an active sector of activity. The present study objectively quantified the physical workload in the steel sector in hot season. For most workers, the workload was light to moderate. Nevertheless, a preventive approach combining technical, organizational and medical actions should be implemented.

P-379 FATIGUE AND SLEEPINESS AT THE WHEEL: CASE OF PUBLIC BUS-DRIVERS IN THE CENTER OF TUNISIA

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Introduction The World Health Organization estimated that fatigue and sleepiness multiply the risk of road traffic accident by eight. Indeed, fatigue, related to physical, mental or emotional workload, generates disruption of physiological functions and sleep-wake rhythm. This impact drivers' cognitive performance with disruption of the decision-making process and lengthening of reaction time.

Objectives To assess the prevalence of fatigue and sleep disorders among bus drivers in a public transport company and to identify the associated socio-demographic, medical and occupational risk factors.

Materials and Methods

An exhaustive cross-sectional survey was conducted over three months, among bus drivers of a company in the center of Tunisia. Validated questionnaires of Pichot, Epworth and Pittsburgh were used for the assessment of sleep quality and drowsiness.

Results The study population was exclusively male (n=197). The mean age was equal to 40 ± 6.5 years and the bus driving seniority was higher than 10 years in 58% of cases. According to Pichot's score, 60% of bus drivers were concerned with fatigue, in high level for 6% of cases. In addition, 40% of the drivers suffered from excessive daytime sleepiness. The sleepiness was slight in 24% of cases and moderate in 16% of cases. According to statistical analysis, medical history (p=0.05), snoring (p=0.04) and the nature of the traffic circuit (p=0.04) emerged as bus drivers' fatigue risk factors. Sleepiness was associated with several individual and occupational factors including obesity (p=0.07) and daily driving time (p=0.04).

Conclusion Fatigue and sleepiness among bus drivers were statistically associated with individual characteristics and work organization specificity. Efficient global preventive strategy must promote healthy lifestyle among drivers (fight against sedentary, substance abuse, promotion of physical activity...) and take into consideration their working days duration and organization.

P-380 PERSONAL EXPOSURE TO OCCUPATIONAL RADIOFREQUENCY ELECTROMAGNETIC FIELDS: RESULTS FROM A PILOT

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Background A Job-Exposure-Matrix (JEM) for occupational exposure to radiofrequency (RF) electromagnetic field (EMF) was previously developed based on source measurements and not on personal measurement data. In the framework of an international study aimed at validating and enriching the JEM, we conducted a pilot study of personal measurements of occupational exposure to RF fields in a rehabilitation department of a Spanish hospital among various groups of workers in order to develop a protocol for the main field study in three countries.

Methods We previously identified and prioritized the types of occupations to be measured based on their presumed levels of exposure to RF fields from the RF-JEM and based on expert judgment. A screening questionnaire was used to identify potential participants, based on their job titles and reported sources of RF exposure. Consequently, personal full-shift measurements were collected. In addition, a worker's dairy collecting information on occupational-specific sources of RF used during the measurement day, the use of personal mobile phones and general occupational data was filled in by every participant at the end of the shift.

Results A total of 16 workers (cleaning staff, receptionists and physiotherapists) participated in the Spanish pilot test. Overall geometric and arithmetic personal exposure levels were low; however, peaks of exposure to electric (>125 V/m) and magnetic fields (>0,55 A/m) exceeding the ICNIRP 1998 occupational standards at the frequency of 27,12 MHz were observed for a small number of participants, though peak duration was brief and their frequency scarce.

Conclusion We performed personal measurements of RF occupational exposure in a pilot study within the framework of an international study. Measurements will be performed across a wide range of occupations in Spain, France and the Netherlands and will be used to update and enhance an existing RF-JEM to be use in occupational epidemiological research.

P-381 COMPARISON OF URINE N-METHYLFORMAMIDE AMONG THE MIGRANT AND NATIVE WORKERS AT RISK OF EXPOSURE TO N, N-DIMETHYLFORMAMIDE IN MANUFACTURING INDUSTRIES IN THE REPUBLIC OF KOREA (2012–2019)

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Introduction N-N-dimethylformamide (DMF) which could induce to liver toxicity was the most common chemicals attributing 27.3% of the intoxication accidents of which 33% involved the migrant workers at workplace. Occupational health studies of the migrant workers at risk of exposure to DMF are rare despite their social vulnerabilities due to the lack of information owing to the deficiencies in the national monitoring system.

Objectives The aim of this study is to assess the urine concentration of N-methylformamide, a biological monitoring index (BEI) of DMF, among the migrant workers at risk of exposure to DMF by comparing with the native workers in manufacturing industry.

Methods This cross-sectional study was designed to target employees aged 20 and more, who were eligible to participate in the special health examination for DMF exposure in 2014– 2019. Data were obtained from the workers' special health examination (WSHE) and Work Environment Measurement (WEM) database of 2014–2019, managed by the KOSHA. We assessed the fundamental characteristics known to affect DMF exposure and its metabolism in human body including demographics (sex, age), companies where the subjects are employed (number of workers, types of industries), and DMF exposure factor (Time weighted average(TWA), years of employment). The Mann-Whitney U test and Pearson's chisquared test were used to compare the baseline characteristics between the native and migrant workers.

Results 60.6% of the migrant workers exposed to DMF were employed in small and medium sized company, while 19.6% of the native workers were. 21.6% of the migrant workers were exposed to TWA of DMF exceeding Threshold Limit Values, which significantly high compared with the native workers (6.3%). The mean concentration of urine N-methylformamide in the migrant workers (1.37 mg/L) was significantly higher than in the native workers (0.47 mg/L, p < 0 .001).

Conclusions The migrant workers at risk of DMF exposure in manufacture industries were in highly vulnerable environment at workplace.

P-386 HEALTH SURVEILLANCE OF THE WORKPLACE MEDICAL SERVICES IN ECUADOR

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Introduction Thanks to ILO Recommendation 112, companies with more than 100 workers must carry out pre-occupational, periodic and retirement medical evaluations. A study of these services has not yet been carried out in Ecuador. There is an underreporting of occupational diseases.

Objectives 1. To know the health prevention activities of the occupational medical services 2. To know the opinion of the workers about the work of these services.

Methods A representative sample of company doctors belonging to the National Association was obtained. An anonymous questionnaire was administered to 64 doctors, with 42 questions about the characteristics of the company and the workforce, the equipment, the medical evaluations, the health promotion activities they carry out and about professional secrecy. Another survey was carried out on union organizations of 21 companies on similar aspects.

Results The incidence of occupational accidents was 14.34×1000 . The prevalence of occupational diseases was 1.01×1000

1000. 83% of the services did not have an audiometer or spirometer, 86%. Only 56% of the services met the threshold of audibility during the pre-occupational evaluation. 76.6% of workers who moved weights had a lumbar X-ray. A significant proportion could not maintain professional secrecy, due to company requirements. The opinion of the workers contrasted with the opinion of the medical services. Only 19% of the services delivered the results of the evaluations to the workers. 52.38% considered that the medical service kept professional secrecy.

Conclusions There was a low detection and notification of occupational diseases, little equipment of services for preventive activities, and it is necessary to ensure that the medical service has the power to keep medical secrecy.

P-387 SUCCESS OF REHABILITATION AMONG 185.385 EMPLOYEES UNDERGOING MEDICAL REHABILITATION FROM 2010 TO 2012 IN GERMANY.

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Introduction In Germany the statutory pension insurance fund covers the cost of rehabilitation treatment for employees whose working capacity is endangered due to health problems.

Objectives We aimed to describe success of medical rehabilitation (work ability at discharge, return to work in the year after rehabilitation, early retirement within seven years after rehabilitation) with special consideration of potential sociodemographic determinants among employed persons undergoing medical rehabilitation from 2010 to 2012 in Germany.

Methods Analysis based on Scientific Use Files of administrative pension records from the Research Data Centre of the German Federal Pension Insurance, which include 20 percent random samples of all cases of medical rehabilitation. Risk of low work ability at discharge (LWA) and failed return to work in the year after rehabilitation (FRW) was estimated using logistic regression models, risk of early retirement during seven years after rehabilitation (ER) was estimated using cox proportional hazard models. Age, sex, citizenship, school and vocational education, annual income before rehabilitation and medical diagnosis were considered as potential risk factors.

Results We included 185.385 employed persons aged 18 to 60 years undergoing medical rehabilitation from 2010 to 2012. Low work ability at the end of rehabilitation was reported among 7.9%, 26% showed unsufficient return to work one year after rehabilitation, and 9.7% received disability pension during 7-year follow-up, respectively. In fully adjusted models, non-German citizenship, older age, low educational level, as well as low annual income were risk factors for each outcome of work ability. For example, adjusted risk among persons with low annual income (1st quartile vs. 4th quartile, OR/HR [95%-CI]) was 2.3 [2.2;2.4] for FRW, 4.8 [4.5; 5.1] for LWA, and 2.5 [2.3; 2.6] for ER.

Conclusions These results continue to show that success of medical rehabilitation is lower in deprived social groups in Germany.

P-389 RETURN TO WORK AFTER ACUTE MYOCARDIAL INFARCTION: A COMPARISON BETWEEN YOUNG ACTIVE WOMEN AND MEN

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Background Return to work (RTW) after an acute myocardial infarction (AMI) is an important outcome particularly relevant to young and active patients. Women may be at a greater risk for not returning to work given evidence of their worse recovery after AMI than similarly aged men. However, sex differences in return to work after AMI has not been studied extensively in a young active population (≤ 65 years). This study aimed to assess return to work among patients after an AMI and evaluate the role of gender.

Methods We prospectively followed patients with a first time AMI, employed at the time of the index hospitalization between June 2018 and December 2019, in the Cardiology department in a Public hospital in the central region of Tunisia. Data were obtained by medical record abstraction and patient interviews. Data collected were related to socio-demographic characteristics, clinical characteristics and the validated MacNew Questionnaire.

Results Fifty patients were enrolled aged 35 to 65 years. The study group was made up of 45 (90%) male and 5 (10%) female. Patients who did and did not return to work did not differ in gender distribution (p=0.79). Women returned to work later than men (respectively after 65 and 75 days) without statistically significant difference (p=0.87). Eighty four percent of the study population returned to work within six months. Smoking, left ventricular ejection, Killip class, in-hospital complications, global physical activity and Quality of Life were found to be significantly associated with return to work in independent univariate analyzes. A stepwise multivariate regression analysis identified only the Quality of Life and the number of children in charge as predictors of RTW.

Conclusion This study revealed a higher probability of RTW in males among a young active population. This difference is explained by disparities in demographic, occupational and health characteristics.

P-390 USING A CLINICAL DATABASE TO INFORM PREVENTION OF OCCUPATIONAL SKIN DISEASE WITH A FOCUS ON THE HEALTH CARE SECTOR.

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Introduction Clinical databases provide useful information on occupational diseases including occupational skin diseases. Patch testing is an important tool in the diagnosis of occupational contact dermatitis. Patch test databases not only contain specific diagnostic information but also identify affected occupations and workplace characteristics allowing comparisons across industries and jobs. Additional workplace information can be added to gain insight into prevention activities. Objectives To examine the diagnosis, common workplace allergens and prevention practices in workers seen for patch testing in a tertiary referral centre in Toronto, Canada.

Methods Demographic, clinical, patch test and workplace information were collected for patients seen between 2012 and 2019. Basic descriptive statistics were generated to compare workers in common industries and jobs.

Results Out 3714 patients evaluated, 1261 were diagnosed with occupational skin disease. Comparison across the healthcare, services, manufacturing, automotive and construction sectors revealed differences in diagnosis and causative agents, workplace characteristics and prevention practices. 308 health care workers included 154 nurses, 34 personal support workers, 28 dental workers and 22 cleaners. 90% had a diagnosis of occupational irritant contact dermatitis and 34% had occupational allergic contact dermatitis. Dental workers had the highest percentage of allergic contact dermatitis and higher proportions of occupationally relevant rubber (carba mix and thiuram) and methacrylate/acrylate positives on patch testing. They were more likely to work in a small workplace and less likely to take time off work, file a compensation claim or have health and safety training.

Conclusion Collection of detailed work-related descriptors and clinical information in a patch test database facilitates an understanding of the causative agents and the workplace characteristics that may place workers at increased risk for occupational skin disease, providing a focus for prevention activities.

P-393 HAND AND WRIST MUSCULOSKELETAL DISORDERS ASSOCIATED WITH BIOMECHANICAL RISK FACTORS AMONG TUNISIAN WEAVERS

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Introduction The informal industry of handmade carpet is particularly developed in the Tunisian central region with use of ancestral tools. The hand and the wrist are continually solicited during the different performed tasks, which may result in musculoskeletal disorders.

Objective This study aimed to assess the biomechanical constraints of the wrist and hand among Tunisian weavers.

Methods A 6 months study was conducted among a representative sample of traditional weavers in a region of central Tunisia. The survey was based on semi-quantitative ergonomic assessment of biomechanical risk factors, with video recordings during a period of full activity (25 to 40 minutes). Each recording was stopped at fixed time intervals and converted into one hundred images. For each image, the postures of the wrists and hands were encoded and analyzed with ERGO-ROM software. The Gestural Variability Score (GVS) and the subjective BORG scale were used to estimate postural variation and the level of exerted force.

Results The average duration of the working day was 7.45 ± 2.5 min. The weavers spent 57.5% of the working time with a wrist extension >30° with a relatively high Flexion/Extension GVS of 46%. In the coronal plane, radial and ulnar deviation were found during 11.5% and 9.4% of the activity time, respectively. Pinching grip of hand tools was spread over 83.4% of the working time range with a relatively low GVS (22.2%). According to the BORG scale, 78.5% of the weavers

Conclusion During artisanal weaving, the hand and the wrist are deviated from the neutral position adopting awkward postures. Moreover, they are exposed to forceful gripping and repetitive movement, which may lead to musculoskeletal injuries. The prevention of these damages should focus on rethinking poorly designed hand tools.

P-394 MUSCULOSKELETAL DISORDERS AMONG MILITARY DENTISTS: SEMI-QUANTITATIVE ERGONOMIC RISK ASSESSMENT

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Introduction The activity of the dentist, notably in the military force, is faced like many others the scourge of musculoskeletal disorder (MSD).

Objectives This study aimed to identify the MSD hazards among dentists and identify work situations that can contribute to their appearance and offer appropriate ergonomic remedial measures for their prevention.

Methods This is a semi-quantitative study conducted in a military dental surgery service in Tunis by observing biomechanical constraints during three different dental acts. These observations were then analysed using ERGOROM software.

Results The MSD hazards identified in this study as common to all dentists were strained postures, repetition, static shoulder postures and bad working position. The neck was in more than 40 degrees flexion or extended over 63% to 95% of the working time. The shoulders were in sustained contraction over 40 to 72% of the working time with a low variation suggesting an isometric shoulder contraction. The elbows were in flexion over 56 to 91% of the working time with low variation flexion/extension. The preferred wrist position was hyper-extension or hyper-flexion over 20 to 64% of working time and ulnar or radial deviation over 14 to 35% of working time. Isometric dental instruments grasp spread over almost the whole working time for the three observed dental acts.

Conclusion Our study confirmed biomechanical constraints and MSD hazards to which dentists are exposed and guided us in our preventive approach in order to propose the most adequate and appropriate solutions to the military command.

P-395 WORKPLACE BULLYING AMONG HEALTHCARE WORKERS: PREVALENCE AND IMPACT ON MENTAL HEALTH

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Introduction Workplace bullying (WPB) is a peculiar form of workplace violence. This behavior affects the healthcare sector in general and particularly intensive care units such as anaesthesiology. **Objectives** The purpose of this study was to assess the prevalence of WPB among anaesthesiology caregivers and to identify its impact on their mental health.

Methods A cross-sectional study was conducted over three months among the anaesthesiology caregivers of the three university hospitals of Mahdia and Monastir in Tunisia (n=129). A self-administrated survey was used, including the standardized Negative Acts Questionnaire-Revised (NAQ-R) to evaluate the WPB. The impact on mental health was assessed by the Rosenberg self-esteem scale, the Beck Depressive Inventory and the Hamilton Anxiety Rating Scale.

Results The response rate was 55%. The sex-ratio (M/W) was 0.57 and the mean age was 36.1 ± 1.1 years. Among the respondents, the prevalence of bullying, measured by the NAQ-R score, was 36.5%. Moreover, 46.7% of anaesthesiology caregivers self-labelled themselves as victims of WPB. According to the Beck Depressive Inventory, 61.7% of the anaesthesiology staff were depressed. Anxiety disorders were noted in 49.9% of cases. The Self-esteem was 'very low' to 'low' among 40% of the caregivers. Multivariate analysis showed that WPB was significantly associated with female gender (p=0.009), the status of medical residents (p=0.021), atypical working hours (p=0.008), lower self-esteem (p=0.002), and anxiety (p=0.004). No correlation was found between WPB and depression.

Conclusion The mental health of caregivers, especially in intensive care units, determines the quality of care and the patient safety. This mental health is negatively impacted by WPB. Thus, the worrisome high rates of WPB observed in the intensive-care and anaesthesiology environment require the implementation of preventive measures in order to overcome this behavior.

P-396 SOCIAL SECURITY BENEFITS GRANTED TO BRAZILIAN WORKERS WITH OCCUPATIONAL CANCER

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Introduction Actions to control cancer in Brazil were introduced in the early 20th century, conducted with a greater focus on diagnosis and treatment. The emphasis on prevention was limited by the lack of knowledge about the etiology of the disease. Occupational cancer originates from exposure to carcinogenic agents present in the workplace, even after exposure is suspended. It is common for a long period of exposure to elements or risky conditions in the workplace to occur, which makes difficult to diagnose certain types of cancer.

Objective To investigate the variation in the occurrence of occupational cancer among Brazilian workers.

Methods We conducted an ecological study with an investigation of temporal trends, in a quantitative approach, with exploration of absolute and relative frequencies of data on all Brazilian workers who were affected by occupational cancer and who were beneficiaries of the social system.

Results From 2006 to 2012, 798,885 social security benefits were granted to Brazilian workers due to cancer, with an

average of 1092,6 cases/year (SD=502,9) of occupational cancer, and average occurrence rate of 0.62% among all cases of cancer. Considering only occupational neoplasms, there was a higher occurrence of melanomas and other skin neoplasms (n = 2141, 55.99%), neoplasms of the respiratory system (n = 493, 12.89%) and lymphatic and hematological tissue neoplasms (n = 447, 11.69%).

Conclusion Although preventable, occupational cancer is recurrent among Brazilian workers. The main strategy for reducing risks is to reduce or eliminate exposure to carcinogenic agents within the work environment. The role of nurses in the work environment has become essential, since it contributes to a significant drop in the rate of accidents and occupational diseases, promoting quality of life, identifying risks and implementing health protective measures.

P-397 OCCUPATIONAL DERMATOSES IN PARACHUTE RIGGERS AT A PARATROOPER TRAINING SCHOOL

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10.1136/OEM-2021-EPI.311

Introduction Parachute riggers are specialised tradesmen involved in packing parachutes. Occupational dermatoses has never been studied in them despite their job entailing hard manual work.

Objective To observe and record hand and nail changes in parachute riggers.

Methods Parachute riggers working at the Paratrooper Training School (PTS) Agra consenting to participate in the study were enrolled. A brief history and hand and nail changes seen using a hand-lens were recorded. Data was analysed using R Project for Statistical Computing version R 3.6.2 for Windows.

Results Seventy-six parachute riggers were examined. All had some change and many had more than one change. The mean age was 29.66 years and mean duration of employment in PTS was 29.73 months. All were males. Callosities and loss of cuticle were the commonest abnormalities seen and were present in 61 (80.26%) and 57 (75%) subjects, respectively. Other common changes noted were fissures, xeroderma, pigmentation and dermatitis. Onychomycosis, onychoschizia and splinter haemorrhages were the commonest nail changes seen. Multiple correspondence analysis showed that there was a clustering of all findings barring deformities, digital resorption, paronychia and xeroderma. Odds for chronic irritant dermatitis was related to age of worker and duration of employment. This study is the first study documenting occupational dermatoses in parachute riggers. Since most of them did not use protective gear, repeated trauma due to thorns, and seeds ensnared in parachute fabric, micro-trauma resulting from friction and constant dryness were factors predisposing them to irritant contact dermatitis. Constant pressure during packing predisposed them to splitting of nails, and splinter haemorrhages.

Conclusion Riggers are special tradesmen involved in all steps of parachute packing. All riggers had some manifestation of occupational skin disease. Most of the changes observed were secondary to repeated friction and pressure insults and dryness of the hands.

P-398 CHEMICAL RISK ASSESSMENT FOR SMALL BUSINESS: DEVELOPMENT OF A TOOL AND RESOURCES

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Introduction Small to medium sized enterprises (SMEs) employ the majority of Canadians, but find it difficult to assess the risks of the chemicals they use and to implement effective control and prevention measures. As such, there is an ongoing need to provide SMEs with easy-to-use tools to identify chemical hazards and assess the risks posed by exposure to chemical agents.

Objective To develop CHAP-Risk, a software tool to assist SMEs to easily undertake health and safety risk assessments of the chemicals/hazardous products they use, and assist them to implement effective control measures.

Methods We have employed a 'User Centered Design' approach which allows end-users to influence how the design takes shape. Our eight step development process is: (1) establish a project reference group, (2a) develop a trial version of CHAP-Risk and its training program based on an extensive review of existing tools and resources, (2b) recruit trial workplaces – 6 workplaces in Ontario were recruited to trial the tool, (3) pre-trail evaluation, (4) training, (5) workplace trial, (6) post-trial evaluation, (7) develop final versions of CHAP-Risk and the training, and (8) CHAP-risk and resources available on website for free download (by September 2021).

Results The draft version of CHAP-Risk is currently being trialed by workplaces (trial to be completed in June/July 2021). Initial feedback is positive in regard to the potential benefits and application of the tool, particularly related to improving the 'workplace contextualization' of the WHMIS 2015 requirements. However, a number of technical improvements are currently needed to enhance the user experience.

Conclusion Tools to support SMEs in undertaking chemical risk assessments are important and the current trial of CHAP-Risk indicates that it will provide SMEs with a useful tool to assist them in assessing and more safely managing their work-place chemicals.

P-400 TELEWORKERS' FLOURISHING DURING COVID-19 LOCKDOWN: THE WORK-FAMILY RELATIONSHIP

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Introduction Although research on work-family relationship have shown the relevance of balance between these two life domains to explain well-being, the analysis of this effect during COVID-19 lockdown has not yet been examined.

Objectives In this study based on the work-family boundary theory management, we considered that the segmentation from work-to-family had a positive relationship with work-family balanced, which in turn had a positive relationship with flourishing.

Method A sample of 108 teleworkers during the first COVID-19 lockdown (March-April 2020) in Portugal without previous experience with telework answered an on-line questionnaire. **Results** The results analyzed with PROCESS (model 4) allowed us to observe that work-to-family segmentation was related with work-family balance and that this work-family balance was the mechanism that explained the positive relationship between work-to-family segmentation and flourishing.

Conclusion Telework is a situation that makes it difficult to establish boundaries between work and family. There must be tools that invest in the development of skills of teleworkers to segment work and family, in order to promote a balance between these domains and, consequently promote teleworkers' well-being.

P-407 WORK-RELATED CARPAL TUNNEL SYNDROME AND IMPACT ON MEDICAL FITNESS FOR WORK

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Introduction Carpal tunnel syndrome (CTS) is the most common occupational disease in Tunisia. It has various professional and extra-professional risk factors.

Objectives Describe the socio-professional, clinical and paraclinical characteristics of work-related CTS and specify its impact on medical fitness for work.

Methods Descriptive retrospective study on cases of CTS collected in the occupational medicine and diseases department of the Rabta Hospital in Tunis, between 2001 and 2017.

Results We identified 66 cases with a clear predominance of women (94%) and a mean age of 43 ± 7 years. The sectors of activity that provided the most CTS were the textile industry (30%), the wiring sector (14%) and the food industry (12%). The most represented job was unskilled worker (82%). The predominant occupational risk factors were extreme wrist postures (89%), fine and precise movements (61%) and repetitive movements (46%). The time to onset of symptoms was 15 ± 8 years after employment. The most frequent symptoms were paresthesia in the median nerve territory (90%), wrist pain (26%) and muscle weakness (18%). The CTS was most often bilateral (59%), of the sensory-motor type (23%) and severe (33%), justifying a transfer to another workstation (55%), a workstation adaptation (29%) or a temporary (4%) or permanent (6%) inability to work. From a medico-legal standpoint, this pathology was considered, in 79% of cases, as an occupational disease compensable under the table relating to gestures and postures.

Conclusion CTS is a multifactorial musculoskeletal disorder involving significant professional repercussions, hence the need to put in place a structured prevention plan in the most affected sectors.

P-409 MEDICAL FITNESS TO WORK FOLLOWING ACUTE CORONARY SYNDROME

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Introduction Acute coronary syndrome (ACS) may, due to myocardial ischemia, limit a person's physical abilities and affect his medical fitness to work.

Objectives Describe the socio-professional, clinical and paraclinical characteristics of ACS and their impact on medical fitness to work.

Methods Descriptive retrospective study of cases of patients with history of an ACS, who have consulted the department of occupational medicine in Rabta Hospital, between 2002 and 2020, to evaluate their medical fitness to work.

Results Our series included 43 patients with a male predominance (81%) and a mean age of 52.1 \pm 7.2 years. The main sectors concerned were transport (21%), construction (19%) and health (17%). Patients were mainly employed as unskilled workers (44%) and professional drivers (28%). Sixty two per cent of the employees were in a security position, 55% were exposed to severe weather, and 40% had a work requiring significant muscular effort. ACS was due to an ST-segment elevation myocardial infarction in 64% of cases. Coronography showed tight stenosis of the left anterior descending artery (76%), the right coronary artery (50%), and the left circumflex artery (44%). Coronary angioplasty was indicated in 85% of cases and coronary artery bypass surgery in 15% of cases. The mean left ventricular ejection fraction was 54% and was higher than 60% in 42% of cases. Workstation adjustment was proposed in 26% of patients, while 26% were transferred to another workstation. Permanent Disability was reported for 20% of patients, 14% had a temporary inability to work, 11% were kept fit to work without restriction and 3% had received early retirement.

Conclusion The management of ACS should be multidisciplinary, involving the attending and the occupational physician, including an appropriate cardiac rehabilitation programme, in order to facilitate the socio-professional reintegration of the patient.

P-410 PROFILE OF OCCUPATIONAL PNEUMOCONIOSIS IN TUNISIA: ABOUT 14 CASES.

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Introduction Pneumoconiosis are interstitial pulmonary pathology induced by prolonged inhalation of inorganic particles, especially encountered in the workplace. Despite their decline in recent years, they have continued to pose an occupational health problem in Tunisia.

Objective To study the socio-professional, clinical and medicolegal characteristics of pneumoconiosis and to assess their impact on ability to work.

Methods Retrospective descriptive study of pneumoconiosis cases referred for professional etiological investigation to the Department of Occupational Medicine of the Rabta Hospital, in Tunis.

Results These were 14 predominantly male patients, with a mean age of 56.57 ± 12.32 years and an average professional length of 23 ± 9.44 years. They mainly worked in the underground works sector (4 cases), the building materials industry (3 cases) and metallurgy (2 cases). They were exposed to free silica mineral dust (11 cases), iron oxide fumes (3 cases) and asbestos dust (2 cases), in the absence of appropriate personal protective equipment for all patients. The time to onset of symptoms from onset of exposure was 27.36 ± 12.7

years. They mainly reported exertional dyspnea (14 cases), cough (8 cases) and chest pain (5 cases). Clinically, crackling was objectified in 9 patients and digital clubbing in 3 patients. Paraclinically, radiological signs of pulmonary fibrosis were objectified in 12 cases and emphysema in 4 cases, a restrictive ventilatory disorder was found in 4 cases. Bronchoalveolar lavage was performed in 6 patients and returned pathologically in three cases. Pulmonary disease was at the stage of chronic respiratory failure in one case. Despite the occupational exposure, only 10 cases were declared as compensable occupational diseases: 7 cases of silicosis, 2 cases of asbestosis and 1 case of siderosis. This morbidity justified a workstation layout for 4 patients and permanent incapacity for 2 others.

Conclusion Given the severity of pneumoconiosis and lack of curative treatment, prevention seems essential.

P-413 WORK-RELATED STRESS IN THE OPERATING ROOM: A CROSS SECTIONAL STUDY IN DIFFERENT HEALTH STRUCTURES IN TUNIS

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Introduction Working in the operating room exposes to multiple psycho-organizational constraints that can cause negative repercussions on the health of the workers and on their performance at work.

Objectives To study psychosocial and organizational risk factors to which paramedical staffs in operating theatres are exposed, and to assess the level of stress at work and its impact on their health and on their performance at work.

Methods A descriptive cross-sectional study involving paramedical staff in operating rooms working in different health structures in Tunis, and based on a survey including the Karasek and Siegrist models.

Results The study included 91 paramedical staff with a mean age of 30.71 ± 7.9 years and a mean professional length of service of 4.80±5.55 years. They worked 7±2.2 hours/day on a fixed morning schedule 54.9% of the time and night shifts 23.1% of the time. They reported 4.5 ± 1.67 surgical procedures/day. They were dissatisfied with the general conditions of their work in 83.6% of cases and 60.5% of them reported being victim of violence. They reported stress-related symptoms such as fatigue (57.8%), headache (56.7%), muscular pain (53.3%), anxiety (45.6%), mood disorders (42.2%), memory (45.6%) and concentration disorders (37.8%). Repercussions on work were repeated delays (34.4%), absenteeism (30%) and the occurrence of errors (9.8%). The assessment of the stress at work showed high psychological demands in 81.3% of cases and low levels of decision latitude in 49.5% of cases. 40.7% was exposed to Efforts-Rewards imbalance. Statistically significant associations were found between job-strain and working in the private sector (p=0.037), between the Effort-Reward imbalance and a number of surgeries >5/day (p=0.024) on the one hand and exposure to violence (p=0.038) on the other.

Conclusion A preventive strategy based on an improvement of working conditions must be implemented against the risk factors of stress in the operating room.

P-414 MUSCULOSKELETAL DISORDERS OF THE UPPER LIMBS IN A JEANS WASH COMPANY: ABOUT 220 CASES

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Introduction Musculoskeletal disorders (MSDs) of the upper limbs are the most common occupational pathology in Tunisia with an increasing prevalence in all sectors of activity, in particular in the jeans washing industry.

Objectives Identify the risk factors for MSDs in this industry and evaluate the impact of these disorders on professional life.

Methods We carried out a cross-sectional descriptive survey of employees in a jeans washing company. This study was based on a questionnaire inspired by two validated questionnaires, the Nordic and from the National Research and Safety Institute, allowing the screening of MSDs.

Results The sample consisted of 220 employees with an average age of 36 years, a clear predominance of men and an average professional length of service of 6.2 years. They mainly occupied the post of multi-skilled worker (56.8%). These employees reported a high pace of professional tasks (60.4%), significant muscular strength required (60.9%) and recourse to extreme postures (66.3%). Certain psychosocial factors were reported: precision work (83.2%), requiring great concentration (87.7%), described as monotonous (81.4%) and not very motivating (64.1%). Musculoskeletal disorders, evolving for 2.3 \pm 1.6 months on average, were also reported by 71.8% of employees. They complained of pain in the shoulders (39.5%), hands and wrists (11.8%) and elbows (2.7%). These MSDs justified medical treatment in 25.9% of cases and exploration by additional examinations in 18.6% of cases. These disorders had an impact on professional activity with a temporary stoppage of work (6.8%) and professional reclassification (1.4%) with a type of workstation arrangement or transfer to another workstation.

Conclusion The jeans wash sector is a source of MSDs of the upper limbs due to excessive exposure to biomechanical and psycho-organizational constraints. This justifies the implementation of an effective preventive strategy based on early detection and ergonomic study of workstations.

P-422 MENTAL HEALTH AND LIFE SATISFACTION AMONG CANADIAN PARAMEDICS DURING THE COVID-19 PANDEMIC

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Introduction Paramedics have treated many patients suspected of having COVID-19 throughout this pandemic. The uncertainty regarding COVID-19 contagion, effectiveness of infection protection and controls, and the uncontrolled environments in which paramedics work may adversely impact their mental health.

Objectives To characterize the impact of the COVID-19 pandemic on the mental health of Canadian paramedics using preliminary data. Methods Self-reported questionnaire data was collected from paramedics across five Canadian provinces as part of the COVID-19 Occupational Risks, Seroprevalence and Immunity among Paramedics (CORSIP) project. Validated screening scores were calculated for major depressive disorder (MDD, PHQ-9 questionnaire) and probable post-traumatic stress disorder (PTSD, PC-PTSD-5 questionnaire). Satisfaction with life (SWL) measures were adapted from validated Canadian Census questions and confirmed by reliability analysis. Bivariate relationships of screening scores were analyzed using Wilcoxon signed-ranked, Cliff's d, and differences in proportions tests where appropriate.

Results Completed questionnaires from 1,906 recruited paramedics were analyzed (95% completion rate). The overall prevalence of MDD was 31.6%. Suicidal ideation (i.e., 'thoughts that you would be better off dead, or of hurting yourself in some way') was reported by 8.3% of paramedics. In addition, 40.2% of paramedics screened positive for probable PTSD, with no significant difference being reported before vs. during the pandemic. Paramedics reported higher median SWL prior to the COVID-19 pandemic (20 vs. 16, p<0.001). There was a large effect size (d=0.52), suggesting a greater probability that paramedics would report higher SWL prior to COVID-19.

Conclusion Canadian paramedics appear to be at risk for MDD and PTSD. While the proportion of paramedics with probable PTSD does not appear to have changed during the pandemic, a reduction in SWL was observed. Incorporating follow-up data that will be collected from participants over the next year will be imperative to assess the stability of these findings and evaluate differences by province.

P-428 LOCAL NARRATIVES ON VULNERABILITIES RELATED TO PESTICIDE EXPOSURE IN THE AGROCITY OF GUICHÓN, PAYSANDÚ, URUGUAY

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Introduction Pesticide exposure involves toxicological and epidemiological events, and the perception of risks as a socially constructed process. Despite the growing and widespread research of exposure among rural workers, very few studies have focused on the risk perception on other population groups, particularly in agrocity contexts. The lack of this kind of investigation in Uruguay has limited monitoring program development that includes social dimensions of pesticides exposure.

Objectives To describe and analyze discourses produced by educational, productive, health and social actors in the agrocity of Guichón, Uruguay, regarding health vulnerabilities caused by pesticides exposure.

Methods We selected Guichón-city as a paradigmatic case and conducted exploratory interviews among key actors in 2017. The selected population consisted of pesticide applicators, heads of local health services, school principals and members of non-governmental organizations. Sixteen semi-structured interviews were conducted between 2018 and 2020. In addition, regular visits were made to the city where the geographical environment and the relationship with pesticides were observed. Field material was processed through thematic content analysis.

Results We identified two discursive formations in tension in the delimited agrocity. One set of discourse was defined as productive-preventive. Among those discourse, pesticides vulnerabilities were individualised and relativised, agronomic sources were invoked, and preventive actions were privileged. On the other hand, environmental-health discourses refered to different diseases, loss of wildlife and biodiversity and community's concerns. Direct experience or exchange with peers support these discourses, which are articulated with practices of denounce.

Conclusions In the agrocity of Guichón, discourses about health vulnerabilities of pesticides are in dispute. On the one hand, there are defensive strategies that naturalize risks while on the other, risks are problematized and questioned. Promotion of dialogical networks appears to be an indispensable premise for the development of a local monitoring policy on this topic.

P-429 BIOSAFETY IN THE FISH INDUSTRY: A CASE STUDY IN THE STATE OF RIO DE JANEIRO

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Introduction The fish industry is a growing sector worldwide, due to the increase demand for its products. To make its products competitive and attractive to consumers, the industry uses strict quality standards.

Objective To identify and understand the environmental risks that workers in the fish processing industry are subjected to, based on the field of biosafety, health and safety at work.

Methods For this purpose, an observational study was carried out with the help of a script to survey the process and flows at work and the physical-environmental aspects in a company in Macaé, Rio de Janeiro. For the analysis of the collected data a documentary research was carried out, to survey the legal requirements, which contemplate aspects related to the field of biosafety, health and safety at work. In addition, a literature review was conduced to identify the main occupational diseases that can affect workers in the sector.

Results Workers were exposed to biological, chemical, physical, ergonomic and accident risks. Among the risks identify, we can highlight: intense physical effort, manual lifting and carrying of weight, inadequate posture, high pace, contact with biological samples, bioaerosols inhale, excessive noise, intense cold, excessive humidity, vibration, contact with chemical products, poor lighting, inadequate electrical installations, handling of sharp objects, and others. The literature review allowed us to identify the possibility of occupational asthma, work-related asthma, occupational rhinoconjunctivitis, musculoskeletal disorders (e.g. carpal tunnel syndrome, epicondylitis, and tendonitis), hives, and contact dermatitis.

Conclusion The recognition and evaluation of situations at risk in the fish processing industry is of great importance to avoid unnecessary exposure and to take measures to prevent, mitigate and control existing risks in order to preserve the health of the workers and other impacts on both society and the environment.

P-430 ADVERSE CHILDHOOD EXPERIENCES AND WORKPLACE VIOLENCE VICTIMIZATION IN ADULTHOOD

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Background Research concerning the long-term effects of child maltreatment and other adverse childhood experiences (ACEs) has increased over the past decades. These researches provided a strong connection between early experiences and optimal health, wellness, and life opportunities across the life course. Additionally, victims of ACEs are at increased risk for experiencing violence across their life with accumulating risk for poorer health and social outcomes. This study aims to evaluate associations of commonly co-occurring childhood adversities with workplace violence in healthcare sector.

Methods This was a cross-sectional bi-centric study conducted on healthcare workers of two Public hospitals in the centraleastern region of Tunisia for a period of eight months. A selfadministered questionnaire was used to assess the prevalence of workplace violence and its determinants. ACEs were evaluated by the Arabic version of the ACEs International Questionnaire (ACE-IQ) in its validated Arabic version.

Results A total of 546 healthcare workers completed the questionnaire. All respondents reported experiencing at least one ACE. Intra-familial ACEs were more frequent than social ACEs with 100% (n=546) and 80.4% (n=439) respectively. About 96% of respondents reported exposure to at least one violent incident throughout their entire career in public health settings. Non-physical violence (95.8%) was more frequent thanphysical violence (26.4%). Multiple logistic regression showed that workers with childhood experiences of peer violence and community violence were more likely to be exposed to physical violence (p=0.005 and 0.014 respectively).

Conclusion This study identified an alarming prevalence of workplace violence against healthcare workers in Tunisia. ACEs were also prevalent and identified as a determinant factor of adulthood victimisation in healthcare sector. Understanding the overlapping causes of violence and why some individuals are at greater risk for experiencing violence across their life is important, because it can help address and prevent violence.

P-431 HEALTH AND COVID: THE WORK OF ENDEMIC WORKERS DURING THE COVID-19 PANDEMIC IN RIO DE JANEIRO, BRAZIL.

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Introduction The Brazilian vectorial 'control' is characterized by the intensive use of pesticides (agrotoxics), such as organochlorines, organophosphates, carbamates, pyrethroids, benzoylureas; some of them banned worldwide or restricted by international agreements. Continuous exposure to these neurotoxic and/or carcinogenic products has resulted in damage to the health of Endemic Workers, leading to a process of illness and deaths. Thus, because they have chronic diseases and are immunocompromised, due to exposure to agrotoxics, this population is more susceptible to COVID-19, a situation that is aggravated by workplaces and working conditions, which place them at risk, due to frequent circulation and the need for entry into residences.

Method This descriptive study was part of a multicenter research with Endemic Workers from the State of Rio de Janeiro, Brazil. To investigate the work during the pandemic we used an online questionnaire, structured with open and closed questions.

Results Preliminary results from the 140 responses to the questionnaire demonstrate that: 78% of the Endemic Workers reported diagnosed disease and from these, 70% had comorbidities. The most frequent are hypertension (49%), diabetes (22%), respiratory problems (22%) and malfunction of the liver and kidneys (17%). Although 88% did not have a diagnosis of COVID-19, 64% reported having co-workers and/or family members with COVID-19. Regarding remote work: 2% reported working at home, 29% were working in scale and/or alternate time and 53% were working full time. Workers who stayed the longest time in remote work (five months) represented only 8%, with 31% remaining in full time presential work during the period in which isolation and detachment measures began in Brazil.

Conclusion Protective measures of the health of these workers and assisting this population to prevent the transmission of SARS-Cov-2, are necessary to implement health protection policies, including other exposures at work, such as agrotoxics.

P-432 CHEMICAL EXPOSURE TO PESTICIDES (AGROTOXICS) OF ENDEMIC WORKERS IN THE STATE OF RIO DE JANEIRO, BRAZIL

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Introduction The Brazilian vector control is characterized by intensive use of pesticides (agrotoxics) such as organophosphates, carbamates, pyrethroids and benzoylureas. Until the 1990s, organochlorines were also used. Some of these substances have already been banned, in other countries, but continue to be used in Brazil and are associated with several harmful health effects such as neurotoxicity and carcinogenicity. Endemic workers have been continuously exposed for decades and have a high rate of illness and death from cancer.

Objective To identify chemical exposure by agrotoxics in the work process of endemic workers in the state of Rio de Janeiro, Brazil.

Method Observational, descriptive, cross-sectional and multicenter study. 139 questionnaires answered remotely by the endemic workers in the state of Rio de Janeiro, Brazil were analyzed.

Results 61.2% worked manipulating/applying agrotoxics. 39.6% worked between 20–29 years (mean = 15.9; SD = 12.4) in direct contact with agrotoxics. 79.1% had already worked directly with agrotoxics at some point. The most commonly used agrotoxics between 2010 and 2020 were: Bacillus thuringiensis (bacterial larvicide) (40.7%); pyriproxifem (pyridyloxypropyl ether) (42.1%); benzoylphenylureas: diflubenzuron (35.0%) e novaluron (25.7%); pyrethroids cypermethrin (33.6%), deltamethrin (12.1%) e permethrin (9.3%); organophosphates: malathion (33.6%), temephos (28.6%) e fenitrothion (16.4%); and bendiocarb (carbamate) (9.3%). 71.9% reported direct contact of the agrotoxics with the skin. The most used individual protection equipment (IPE) were gloves (42.9%), boots (31.4%) and overalls (17.9%). 47.5% did not use or received IPE from employer. 53.2% of workers didn't have training and 43.9% of those who did, didn't consider it sufficient. 98.6% washed work clothes at home. 69.8% reported symptoms of intoxication after contact with agrotoxics (skin irritation, burning in the nose and mouth, difficulty breathing, vomiting or diarrhea, weakness, headache, nausea, fainting).

Conclusion Endemic workers have been exposed acutely and chronically for decades to various agrotoxics. Changes in the work process and chemical-dependent vector control are required.

P-434 'NIGHT WORK: RELATIONSHIP WITH THE RISK OF DEVELOPMENT OF DM, CARDIOVASCULAR DISEASES IN HEALTH WORKERS.'

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10.1136/OEM-2021-EPI.325

Introduction Shift work has become essential to our modern 24-hour society. While night workers have been found to experience an increased risk of cardiometabolic diseases, such as diabetes mellitus (DM) and cardiovascular disease (CVD). Conceptual hypothesis: The night shift reduces melatonin levels and increases the risk of type II DM and cardiovascular diseases in health workers in a hospital.

Objective To analyze the association between low melatonin levels and increased risk of DM and cardiovascular diseases, and night shift in workers of a hospital.

Methods We used an analytical, longitudinal, retrospective study over a 5-year follow-up of a cohort in which the results of workers suffering from DM and cardiovascular diseases are compared in two groups: a) One group, exposed to night shifts, and b) a second group, not exposed to night shifts. The population of this study will be made up of health workers who voluntarily attend health examinations (ES) of the Occupational Service of Hospital from January 1, 2009 to December 31, 2019, incuding the apparently healthy and labor-active working population, between the ages of 19 and 65.

Results and conclusion are forthcoming

P-435 MORBIDITY AND MORTALITY OF WORKERS IN THE VECTOR CONTROL OF THE STATE OF RIO DE JANEIRO, BRAZIL

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Introduction Brazilian vector control, characterized by the intensive use of pesticides (agrotoxic), has resulted in decades

of continuous exposure of endemic workers to these harmful substances, including organochlorines (BHC and DDT), organophosphates (temephos and malationa), carbamates (bendiocarb), pyrethroids (deltamethrin) and benzoylureas (diflubenzuron), which are associated with several deleterious health effects, such as neurotoxicity, carcinogenicity and endocrine disruption.

Objective To evaluate data on morbidity and mortality of endemic workers in the state of Rio de Janeiro, Brazil.

Methods The evaluation is part of a multicenter, observational, descriptive and cross-sectional study. 109 death certificates provided by work unions were analyzed through documentation provided by family members and data on work leave, between 1942 and 2018, by the Rio de Janeiro State Nucleus of the Ministry of Health.

Results 70.64% of workers died at a productive age (40-59) years), with an average of 54 years (SD: 9.77). The main causes of death were diseases of the circulatory system (38.7%) and cancer (14.7%). The number of deaths has progressively increased from around 5 annual deaths in 2010 to 40 from 2015 onwards. In addition, various types of illnesses have caused 5,024 instances of work leave.

Conclusion Considering the preliminary results, the occurrence of deaths in working age demonstrate their precocity, with a reduction of at least 20 years in life expectancy. The results show morbidity and mortality and the increase in the number of cases related to the use of agrotoxic, the precarious working conditions and the absence of work process monitoring by workers.

P-436 'STUDIES OF COMMON MENTAL DISORDERS OF ENDEMIC WORKERS IN THE STATE OF RIO DE JANEIRO, BRASIL

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10.1136/OEM-2021-EPI.327

Introduction Endemic workers are among the categories most exposed to the effects of pesticides used in vector control. They also face unsafe working conditions with reports of bullying, inadequacy or lack of training, and almost non-existent educational processes. Previous studies have observed damage to the mental health of rural workers caused by exposure to pesticides.

Objective To analyze the relationship between mental health and the activities of workers in the fight against endemic diseases in the state of Rio de Janeiro, Brazil in the current situation.

Methods To this end, an online questionnaire was applied with questions related to work, health, sleep quality, and working and health conditions in the pandemic, including the Self-Reporting Questionnaire for screening common mental disorders (CMD). We obtained 139 valid questionnaires and employed the Chi-square and Fisher's exact test for statistical analysis.

Results The study identified the frequency of 43.2% of symptoms indicative of CMD in the studied population regarding CMD. When stratified by gender, we observed that the occurrence was almost twice more likely in males than in

females (p≤0.04). Marital status and education were also associated with p≤0.01 and p≤0.05, respectively. The work associations were sprinkler pump (p≤0.02), referred intoxication symptoms (p≤0.00), and the previous diagnosis of depression (p≤0.00). Concerning cases of a previous diagnosis of depression, we identified associations with females (p≤0.03); activity involving contact, handling, or application of agrotoxic in the past (p≤0.04); referred symptoms of intoxication (p≤0.00); reported use of malathion in the last decade (p≤0.02); activities related to field agent (p≤0.05), and suicidal ideas (p≤0.00).

Conclusion The results reinforce that work conditions and processes have been a triggering factor for illness in the studied population. Changes in the work process are necessary to avoid work that is harmful to the worker's health.

P-438 UNMASKING THE TRUTH: A LONGITUDINAL STUDY EXAMINING WORKPLACE PROTECTIVE STRATEGIES, WORKING ARRANGEMENTS, AND THEIR IMPACT ON WORKERS' HEALTH, SAFETY AND PRODUCTIVITY IN NEWFOUNDLAND AND LABRADOR DUR

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Introduction Under federal and provincial legislations, employers across Canada have a responsibility to reasonably protect the health and safety of their workforce. The COVID-19 pandemic has created many challenges for employers to meet these responsibilities. Employers have been particularly hindered in their efforts to protect their workers due to changing understandings of COVID-19 risks over time. Knowledge of effective public health measures is continuously evolving, with new evidence emerging almost daily. Workplace-led strategies have been designed and implemented to specifically protect workers from exposure to the COVID-19 virus. What we don't know is the unintended long-term consequences these workplace protection measures may be having on workers' health and ability to work safely during the pandemic.

Objectives To examine the influences of geographical region, sex and gender, industry, occupation, and perceptions of worker autonomy on the relationship between workplace-led strategies to protect workers from exposure to COVID-19 on measures of worker health safety and productivity.

Methods Using a longitudinal survey with a purposive sampling of Newfoundland and Labrador workers at regular intervals over a 12-month period, data were collected across six domains: participant demographics, pandemic-specific workplace policies and practices, working environment (including remote and on-campus work), psychosocial working conditions, physical health and mental health.

Results Findings from the baseline, 3 month and 6-month follow-up surveys will be presented. Preliminary results from this work highlight the challenges faced by workers under remote and standard work arrangements and the relationship among these working conditions and impacts on worker health, safety and productivity during the changing nature of work throughout the COVID-19 pandemic.

Conclusion The outcomes from our research will provide new knowledge through the collection of stakeholder perspectives

about how current workplace strategies to prevent the spread of COVID-19 may be having unintentional consequences on worker health and safety.

P-440 CHRONIC EXPOSURE TO PESTICIDES (AGROTOXICS) BY ENDEMIC WORKERS IN THE STATE AND MUNICIPALITY OF RIO DE JANEIRO, BRAZIL.

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Introduction The use of pesticides (agrotoxics), including some that were restrict or banned wordwide, is a key element of the Brazilian vector control strategy, making them potential exposure sources. This exposure is more intense for professionals directly involved with the manipulation and application of these substances, like the Endemic Workers (EW), who suffered for decades a process of continuous exposure to agrotoxics associated with several health problems, including neurotoxic damage and cancer.

Objectives Identify and characterize the harmfulness of agrotoxics used by endemic workers.

Methods Through a documentary research using official documents from the health departments of the state and municipality of Rio de Janeiro and a literature review, the agrotoxics used by the EW in the region between the years 2000 and 2019 and its implications to human health, were identify and analysed, aiming to contribute to the elaboration of the exposure profile of these workers.

Results The study identified a total of 11 active ingredients of pesticides in the products used in the state and municipality of Rio de Janeiro. Among the effects on humans associated with exposure to these substances, the neurotoxic effect of 7 of them (alpha-cypermethrin, bendiocarb, deltamethrin, phenitrothione, malathion, permethrin and temephos) and the carcinogenic potential of alpha-cypermethrin, malathion and permethrin stands out. During the pandemic, new agrotoxics have been introduced in vector control actions, containing clothianidin, deltamethrin, pralethrin, imidacloprid and Saccharopolyspora spinosa, agrotoxics that already have been associated with several health effects, so is likely that the EW will continue to be chronic exposed to harmful substances in their labour activities.

Conclusion The implications of the exposure to agrotoxics reinforce the need to reformulate the national vector control policy that employs them in a massive volume, exposing the EW category, as well as the general population and the environment to these harmful effects.

P-442 ALLERGIC ASTHMA IN THE WORKPLACE

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Introduction Allergic asthma is currently the most frequent respiratory pathology in the workplace. Whether induced or aggravated by the work environment, the adequacy **Objectives** Study the socio-professional, clinical, para-clinical characteristics of allergic asthma in the workplace, to assess their impact on the ability to work and to compare occupational asthma (OA) and work exacerbated a sthma (WEA) in terms of associated professional and extra-professional factors and in terms of repercussions on aptitude.

Methods retrospective study of occupational allergic asthma collected from the Department of Occupational Medicine of La Rabta hospital during the period from January 2000 to December 2020.

Results This is a series of 232 cases of work-related allergic asthma, including 76.7% OA and 23.3% WEA. The mean age was 40.28 ± 8.96 years. The female gender was represented in 50.9% of cases. The sectors that provided the most asthma were textile sector (10%) and health sector (10.9%). The clinical symptoms were dominated by wheezing dyspnea (51.5%). The responsible agents were high molecular weight allergens (HMW) in particular vegetable textile dust (9.9%), low molecular weight (LMW) such as isocyanate (11.6%), formaldehyde (11.2%). The age and seniority were higher in the OA group, (p = 0.002) and (p = 0.002)= 0.005). This group was associated with the grade of unskilled worker (p = 0.035), exposure to HMW allergens (p = 0.008), and the mutation of workplace ($p \le 10^{-3}$). In addition, WEA was associated with a history of personal and family atopy with respectively $(p \le 10^{-3})$ and (p =0.017), work in the transport sector ($p \le 10^{-3}$) and temporary unfitness to work ($p \le 10^{-3}$).

Conclusion Allergic asthma in workplace, reflects inappropriate working conditions. The adoption of preventive measures at the same time as medical treatment is the only guarantee to keep the ability to work.

P-443 MANAGEMENT OF BLOOD EXPOSURE ACCIDENTS VICTIMS EXPOSED TO HIV BY THE OCCUPATIONAL HEALTH DEPARTMENT OF RABTA HOSPITAL

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Introduction Post-exposure prophylaxis (PEP) reduces the risk of transmission of human immunodeficiency virus (HIV) following blood exposure accidents (BEA). However, there are no updated Tunisian recommendations for its use.

Objectives To describe the circumstances of BEA requiring PEP and to evaluate the prescribing practices of PEP and clinical, biological and serological follow-up of victims.

Methods We conducted a descriptive retrospective study of victims of BEA who sought medical care in the occupational medicine department of Rabta hospital in Tunis, from 1998 to 2018 and for whom a PEP was prescribed.

Results A total of 456 cases were included with a median age of 30 ± 10.3 years and a sex-ratio of 0.56. They were healthcare workers in 98% of cases, mainly physicians (35.4%), hospital porters and cleaning staff (22.3%). The most frequent tasks leading to the accidents were waste disposal (16%) and taking blood samples (10.8%). In cases of known sources (72.6%), the PEP was prescribed because the sources were HIV positive (23.6%) or had risk factors for

HIV infection, mainly scarifications and/or tattoos (23.1%), drug abuse (12.9%) or history of hepatitis B and/or C (12%). In cases of unknown sources, PEP was prescribed if the BEA occurred in a suspicious socio-epidemiological context. The PEP was started within four hours of the BEA in 42.8% of cases and covered 28 days in 56.8% of cases. Poor compliance with PEP was noted in 55% of cases. The serological follow-up at one, three and six months was carried out in 11.6%, 6.5% and 4.5% of cases, respectively. Positive HIV serology of the source was significantly associated with compliance to serological follow-up at one month (p=0.023) and at three months (p=0.029). None of the cases had a seroconversion.

Conclusion A well-managed PEP prevents the risk of HIV seroconversion following a BEA. It is crucial to develop a national updated guideline for management of BEA and PEP.

P-444 SMALL BUSINESS EXPERIENCES WITH COVID-19 PROTECTION MEASURES: A CROSS-SECTIONAL STUDY COMPARING EMPLOYER AND EMPLOYEE PERSPECTIVES IN RURAL NEW BRUNSWICK.

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Introduction There is a limited understanding of what is known about the implications of recent occupational health and safety (OHS) protection measures on small business management and employees during the coronavirus disease (COVID-19) pandemic. The study examines the different COVID-19 measures that have been used by small businesses in Miramichi, New Brunswick.

Objectives The study identifies the most common OHS protection measures in use within small businesses during COVID-19 and explores whether differences exist in perspectives of employees and managers of small businesses on the most effective OHS protection measures used.

Methods Recruitment was collected through convenience sampling between February 6th, 2021 and March 9th, 2021. Participants for the online survey included business management personnel and employees from Miramichi, NB. The cross-sectional study used a web-based survey containing 25 items concerning demographics (n=7), experiences working during COVID-19 (n=7), and information and experiences with characteristics of personal protective equipment (PPE) used (n=11).

Results Results showed moderate ratings of positive endorsement (60%) from both employers and employees on the use of COVID-19 OHS protection measures. No significant differences were found between employer and employee perceptions on the effectiveness of employed protection measures. The most frequently used protection measures utilized in these small businesses constitute the three lowest levels of control represented on the NIOSH Hierarchy of Controls: engineering controls, administrative controls, and PPE.

Conclusion This study provides new knowledge through the collection of stakeholder perspectives about how current work-place strategies to prevent the spread of COVID-19 in small businesses and may help guide future recommendations for small businesses dealing with other OHS and public health crises.

P-448 SERIOUS WORK ACCIDENTS IN CIVIL CONSTRUCTION IN BRAZIL IN 2019

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Introduction Civil construction is responsible for most occupational accidents, generating social and economic losses and causing serious damage to workers' health.

Objective To characterize the cases of serious work accidents (SWA) reported in civil construction in Brazil.

Methodology: This is a descriptive study with a quantitative approach with secondary data in the public domain extracted from SWA records from Notifiable Diseases Information System occurred in 2019. Population data were obtained from the Continuous National Household Sample Survey, from the Brazilian Institute of Geography and Statistics. The incidence coefficient was calculated and presented by 100 thousand workers.

Results 10,551 cases of SWA were reported in civil construction in 2019, most of them concentrated in the Southeast (33.14%) and South (22.72%) regions of the country. The occupations with the highest number of registered cases were bricklayers (70.10%), installation electricians (12.10%) and carpenters (10.56%). Most of the injured workers were male (99.02%), black (57.35%), aged between 30–59 years (73.19%) and with incomplete elementary education (31.75%). Accidents were mainly caused by contact with other and unspecified machinery (8.81%), fall on and from scaffolding (6.81%) and fall from, out of or through building or structure (5, 94%). The most affected part of the body was the hands (27.28%) and most cases evolved with some type of disability (61.73%). Fatal accidents stand for 3.07%. The incidence coefficient was 154.64 cases/100 thousand workers.

Conclusion SWA were concentrated in the most productive regions of the country and occur mainly in adult workers, blacks and with low education. In addition, it assumes that the causes of accidents were mainly related to the work environment and the use of individual and collective protective equipment. Thus, measures for the prevention and promotion of workers' health are recommended to minimize the occurrence of work accidents.

P-451 BIOLOGICAL AGE AS AN INDICATOR OF THE HEALTH STATE OF MINERS

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Introduction The study of the biological age of miners living and working in the central Kazakhstan allows us to talk about such a phenomenon as premature aging. The main group of men with a moderate acceleration in the rate of aging was made up of workers in occupations with the most harmful working conditions, i.e., tunnellers and drillers with more than 10–15 years of work experience.

Objectives The purpose of our research was to study the health status of workers in the mining industry of central Kazakhstan, based on the results of determining the biological age.

Methods To determine the biological age, the method of V.P. Voitenko, in which the indicator of biological age is compared with the value of the proper biological age, calculated by the formula using the calendar age of the subject. The number of respondents was 300 workers of mines of the following professions: 80 tunnellers, 50 drillers, 50 electrical fitters, 100 miners and 20 foremen.

Results The average biological age of workers, equal to 46.6 years, exceeded the proper biological age by 6 years (with an average work experience of 14.2 years) and was more than 10 years higher than the calendar age. This means that the aging of miners was more pronounced in comparison with the population standard of aging. It should be noted that the differences between the values of the calendar age and the proper biological age in miners increased with an increase in the calendar growth, which indicates that the rate of aging in miners was most pronounced in middle and older age.

Conclusion The average biological age of miners, equal to 45.6 years, exceeded the proper biological age by 5 years (with an average work experience of 14.5 years) and was 9 years higher than their calendar age.

P-454 LOW BACK PAIN IN THE CARE SETTING: STUDY AMONG 300 HEALTHCARE STAFF FROM TWO UNIVERSITY HOSPITAL IN TUNISIA

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Introduction Low back pain (LBP) is one of the leading musculoskeletal disorders and it is a disabling occupational hazard. It is also a common cause of morbidity among the healthcare staff within were more vulnerable to LBP.

Objectives This study aimed to assess prevalence of LBP among healthcare staff and identify the socio-occupational hazards of this morbidity.

Methods This is a cross-sectional study, carried out over 14 months, with 300 healthcare staff from two university hospitals in Tunisian center. It is based on an analysis of sociooccupational profile, the assessment of the Work Ability Index (WAI), the Nordic musculoskeletal questionnaire as well as assessment tests of physical condition and flexibility of the spine (hand-floor distance; sit-stand test; balance test)

Results The sex ratio of the sample was 1.06, the average age was 42.64 ±11.65. 20% of the healthcare staff in the sample had a BMI larger than 30 and 51.9% of them did not practice any regular sports activity. The perceived physical workload was considered « heavy » by 41.6% of the staff questioned. 75% of the healthcare staff in the sample had a good to excellent work ability according to the WAI. Over the 12 months preceding the survey, two third of the healthcare staff in the sample complained of LBP, with pain assessed as 'severe' or 'extremely severe' in 54.4% of cases. The LBP was statistically correlated with female gender (p=0.01) and with impaired work ability (p< 10^{-3}). The average finger-ground distance was 7.10 ± 7.5 cm and it was statistically correlated with LBP (p=0.05), with age $(p<10^{-3})$, with seniority $(p<10^{-3})$ and with a BMI > 25 $(p=10^{-3}).$

Conclusion LBP persists as a real health problem among healthcare staff with heavy professional and social

repercussions. Reducing their prevalence and impact is based on improving working conditions and multidisciplinary care.

P-455 ASSESSING QUALITY OF LIFE, PRODUCTIVITY LOSS AND ACTIVITY IMPAIRMENT IN ASTHMA

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Background Asthma can be associated with substantial quality of life (QoL) alteration, productivity loss and activity impairment. We sought to assess the quality of life and the performance characteristics of an asthma-specific adaptation of the Work Productivity and Activity Impairment Questionnaire (WPAI:Asthma) in Tunisian young and active patients with asthma

Patients and Methods A prospective study was carried out during a year in active asthmatic patients, aged less than 65 years and consulting in the pulmonology department of a public hospital in central region of Tunisia. The WPAI:Asthma was administered to assess productivity loss. Asthma Quality-of-Life Questionnaire (AQLQ) in its validated arabic version was used to assess the QoL.

Results One hundred and one patients were enrolled in this study. Patients had a mean age of 44.2±13.2 years and were predominantly female (66.3%). The mean job tenure was 7.3 ± 7.7 years. Workers belonged to the textile sector in 29.3% of cases. Asthma was allergic in 84.2% of cases and occupational in 18.2%. Asthma was uncontrolled in 62.4% and worsened at work in 71.3%. The mean AQLQ score was 5.08 ± 1.2 . This score was statistically correlated with the occupational etiology (p=0.001), the worsening of asthma symptoms at work (p=0.016), the absence of professional reclassification (p=0.002), the severity asthmatic disease (p= 0.001) and uncontrolled asthma (p=0.001). Absenteeism was 4.2±14.6% while presenteeism was 33.1±25.9%. The resulting loss of productivity was 30.4±22.2%. Activity impairment was statistically correlated with female gender (p=0.02), alcohol consumption (p=0.001), occupational etiology (p=0.03) and uncontrolled asthma (p=0.001).

Conclusion This study revealed significant levels of activity impairment and QoL alteration among active and young patients suffering from asthma. Improving asthma control, working condition and mental health may be important targets for enhancing workplace productivity in asthma. Presenteeism, absenteeism and productivity loss may represent key metrics to assess intervention effectiveness in active and young patients.

P-457 WORK ORGANIZATION AS A PREVENTIVE FACTOR OF WORK-RELATED LOW BACK PAIN IN TUNISIAN CRAFTSMEN

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Introduction Work-related low back pain (WRLBP) is a complex phenomenon accounting for a high proportion of occupational costs. Growing evidence links organizational risk factors to WRLBP.

Objective To examine the impact of work organization on WRLBP and mental health of Tunisian craftsmen.

Methods A cross-sectional study was conducted among the registered craftsmen of the governorate of Monastir (Tunisia) (n=8526). The research was implemented on a representative sample, stratified by gender and craft activity. The survey included items related to health status, work organization, in addition to the Nordic Musculoskeletal and the Job Content Questionnaires.

Results The sample consisted of 368 craftsmen with a mean age of 42.7±8.5 years and a sex-ratio of 0.88. Work schedules were fixed with a mean duration of 8±2 hours. Craftsmen had at least one break per day with a mean duration of 60±12 minutes. Freedom in item design was found in 39% of cases. Room for manoeuvre was acceptable in 53% of cases. Mutual help was possible in 40% of cases. Relationships with colleagues and superiors were 'good' in more than 80% of cases. According to the Karazek model, 13.6% were in a Iob Strain situation. WRLBP during the week preceding the survey were reported by 0.8% of the workers and 14.9% of them reported WRLBP during the last 12 months. Statistical analysis showed that WRLBP were less frequently reported by craftsmen with fewer hours of work ($p < 10^{-3}$), those who had more than one break per day $(p < 10^{-3})$ and the freedom of item design with non-monotonous production $(p < 10^{-3})$. WRLBP was also less reported by workers non-constrained by an accelerated pace of work $(p < 10^{-3})$, by a strict monitoring of work (p=0.008), or by an increased sense of responsibility $(p < 10^{-3}).$

Conclusion The risk factors for WRLBP are complex. Our research suggests that the role of organizational and psychosocial factors need to be better examined.

P-458 GENDER INFLUENCE OF THE CLINICAL EXPRESSION AND SEVERITY OF COVID-19 INFECTION AMONG HEALTH CARE WORKERS

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Introduction Since the start of the COVID-19 epidemic, hospital staff have been massively affected in most countries, including Tunisia.

Objective This study aimed to examine the influence of the gender dimension on COVID-19 contamination expression among Tunisian hospital staff.

Methods Based on the COVID-19 register kept by the occupational medicine service and dedicated to hospital staff, data over 8 months were analyzed (September 2020-April 2021). COVID-19 screening was performed among all symptomatic hospital employees, or asymptomatic ones identified as close contact of a patient, colleague or relative confirmed positive for COVID-19. A nasypharyngeal swab was used for viral testing (reverse transcription polymerase chain reaction (RT-PCR) and SARS-CoV-2 Rapid Antigen Test). Chest tomography was reserved for suspected cases with negative viral tests. Results In total, 419 COVID-19 infections were confirmed by rt-PCR in 63.96%, by rapid antigen testing in 33.65% and tomography in 2.39% of cases. Women represented 72.21% of contaminated staff, with average age of 21.75 \pm 9.78 years but with no difference between gender groups. The department most affected was gynecology (43 cases), and nurses were the most affected category, especially among female staff (p=0.016). In addition, fever (p=0.012), neurological symptoms (p = 0.049), such as aguesia (p = 0.003), were more common in female workers. In contrast, digestive symptoms were more frequent in men (p = 0.0049), especially diarrhea (p = 0.00). In addition, chest tomography COVID-19 confirmation was significantly more common in men (p = 0.012). Hospitalization was indicated in 16 cases, in intensive care in 2 cases with one case of death. No significant difference was noted between genders based on the severity of the COVID-19 infection.

Conclusion Gender clinical difference of COVID-19 clinical expression was suggested by our results among health workers without impact on severity. These observations should be confirmed in larger studies.

P-459 COPING STRATEGIES OF HOSPITAL NURSES IN THE COVID-19 PANDEMIC CONTEXT

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Introduction Occupational stress is one of the negative factors present in nursing work, especially in the hospital context; that factor was exasperated by the Covid-19 pandemic. Organizational strategies are very useful to reduce stress at work, individual coping behaviors can also contribute to the understanding of this factor.

Objective This study aims to understand coping strategies of hospital nurses with occupational stress in the Covid-19 pandemic context.

Method This is a qualitative, descriptive and exploratory study, which was developed at a university hospital located in the state of São Paulo, Brazil. The target population was male and female nurses who were employed in the research hospital. Data were collected through virtual individual interviews, based on a previously defined semi-structured questionnaire, and analyzed according to thematic content analysis. Intentional sampling was used and the participants were recruited until data saturation. The project was approved by study scenario and Ethics Committee for Research with Human Beings at Federal University of São Carlos; all ethical precepts were observed.

Partial Results Thirteen nurses participated in the data collection: 10 (76.92%) women and 3 (23.07%) men, aged between 31 and 55 years old. Working as a nurse: 1 (7.69%) worked between 1 to 5 years, 3 (23.07%) between 5.1 to 10 years, 6 (46.15%) between 10.1 to 20 years and 3 (23.07%)> 20 years. For the duration of work experience at the studied institution: 1 (7.69%) < 1 year, 9 (69.23%) between 1 to 5 years and 3 (23.07%) between 5.1 to 10 years. It was expected, with the results of this research, to understand the coping strategies used by hospital nurses to cope with occupational stress in the current pandemic scenario of COVID-19.

P-468 DEMOGRAPHIC AND OCCUPATIONAL FACTORS ASSOCIATED TO MENTAL SUFFERING AMONG HEALTHCARE WORKERS IN BRAZIL DURING COVID-19 PANDEMIC

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10.1136/OEM-2021-EPI.340

Introduction COVID-19 pandemic changed healthcare routines and increased occupational stress among workers.

Objectives To analyze the factors associated with mental suffering among frontline healthcare workers (HCW).

Methods National cross-sectional study carried out in May-June 2020 in Brazil. Participants were invited through social media to fill a questionnaire about sociodemographic, occupational, and clinical data. The Swedish Demand-Control-Support Questionnaire was applied to characterize the work psychosocial context. The World Health Organization' Self-Reporting Questionnaire (SRQ-20) was used to evaluated the mental suffering. A multiple logistic regression was performed to analyze factors associated to the outcome.

Results Data were obtained from 437 workers; their average age was 38.4 years (sd±10.0). Most of them were from nursing team (65.0%), female (71.0%) and working in public services (70.1%). Job strain was reported from 23.8% and 52.9% indicated low social support. The overall prevalence of mental suffering was 61.6% and associated factors were: : females (odds ratio - OR 1.93; 95% confidence interval - 95% CI 1.22–3.07), age < 40 years (OR 1.64; 95% CI 1.07–2.52), weekly workload \geq 60 hours (OR 1.87; 95% CI 1.15–3.11), job strain (OR 2.45; 95% CI 1.41–4.40) and low social support at work (OR 3.47; 95% CI 2.26–5.38).

Conclusion Individual characteristics and occupational aspects are associated to the suffering in this Brazilian sample of healthcare workers. Policies to improve occupational psychosocial conditions are needed in order to reduce negative mental outcomes, in special during COVID-19 pandemic.

P-470 ASSOCIATION BETWEEN OCCUPATIONAL STRESS AND DEPRESSIVE SYMPTOMS AMONG HEALTHCARE WORKERS IN NORTH-EASTERN BRAZIL: A PRE-PANDEMIC SCENARIO

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Introduction Healthcare workers (HCW) have been reported to be at high risk for several mental health problems due to occupational stress. The outbreak of COVID-19 pandemic in early 2020 raised new concerns about the mental health of HCW workers, which may be affected by new demands and the organization of work. Studies comparing pre- and post-pandemic work environments in health settings are necessary to evaluate the effect of the pandemic on HCW's mental health.

Objectives We aimed to investigate the association between occupation stress and depressive symptoms among HCW in a city in northeastern Brazil at the end of 2019, before the COVID-19 outbreak.

Methods This is a cross-sectional study with a representative sample of 355 HCW from a city in northeastern Brazil. Occupational stress, based on the demand-control model, was

measured by the Job Content Questionnaire (JCQ), and depressive symptoms were evaluated by the Patient Health Questionnaire (PHQ-9). Poisson regressions were used to estimate prevalence ratios (PR) and to analyse associations of interest.

Results The prevalence of depressive symptoms (PHQ- $9 \ge 9$) was 22.4%. Occupational stress was strongly associated with the outcome. In the crude analyses, the prevalence of depression symptoms among workers eposed to high job strain was 3.54 (95% CI: 1.60–6.90) times that of those with low strain. After adjustment for sex, age and income, the prevalence ratio remained highly significant (PR=3.34; 95%CI: 1.80–6.18).

Conclusions Occupational stress was a strong risk factor for depressive symptoms in a pre-pandemic scenario. The prevalence of depressive symptoms is expected to increase during the pandemic. Assessing occupational stress and depression during follow-up over the next few years may elucidate the impact of the pandemic on work processes and on HCW's mental health.

P-471 RISK OF ENVENOMING BY POISONOUS ANIMALS IN WORKERS FROM BRAZIL (2007–2019)

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10.1136/OEM-2021-EPI.342

Introduction Envenomation by poisonous animals is an important public health issue in the world. The relationship between this health issue and occupation is little investigated in Brazil, and is a dimension of the accident that require more attention.

Objectives Estimate the incidence rate of poisonous animal's accidents for each occupational group and region of Brazil, between 2007–2019.

Methods Snakebite, spider and scorpion stings cases reported by Brazilian regions (2007–2019), aged 18–65 years, were collected from the Notification of Injury Information System (Sinan). The occupation identification of workers followed Brazilian Classification of Occupations (CBO). Worker population data were obtained from Brazilian Institute of Geography and Statistics (IBGE). Analyzes were conducted by Stata 16.

Results In this period, 1,523,271 accidents by poisonous animals were reported, which 49.2% were caused by scorpions, 18.4% by snakes, 17.6% by spiders and 14.8% by other etiological agents. In Brazil, the cumulative incidence for snakebite was 9.1/100,000 workers and higher in the North (36.1/100,000 workers). For spider stings, the national incidence was 7.9/100,000 workers, with emphasis on the South (32.9/100,000 workers). The scorpion stings incidence was 16.1/100,000 workers). The scorpion stings incidence was 16.1/100,000 workers). Occupation was reported in 480,614 (31.6%) cases and agriculture workers were the most affected group (51.8%). They presented the highest incidence rates among Brazil regions for all three envenomations (snake-bite=57.9/100,000 workers; spider stings=29.2/100,000 workers).

Conclusion Rural work is considered a risk factor for envenomation by poisonous animals. The rural area is the major natural habitat for many snake species. In addition, food storage sites are attractive to prey for snakes, spiders and scorpions, such as mice and cockroaches. Knowledge about those risks can lead to a collective and individual accident prevention policy, with adequate personal protective equipment and work environment.

P-473 THE INFLUENCE OF SEX ON THE ASSOCIATION BETWEEN CHIKUNGUNYA INFECTION AND DEPRESSIVE SYMPTOMS IN HEALTHCARE WORKERS

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10.1136/OEM-2021-EPI.343

Introduction Chikungunya viruses are endemic in tropical countries like Brazil. Healthcare workers (HCW) are at risk of infection in endemic areas. Besides causing chronic joint pain, the infection is hypothesised to be associated with mental health problems such as depression. However, no studies investigated this association and its relationship with sex are available.

Objectives To evaluate the association between previous infection by Chikungunya and depressive symptoms in HCW, investigating the role of sex in this relationship.

Methods This is a cross-sectional study with a representative sample (n = 343) of primary care and medium complexity HCW in the municipality of Santo Antônio de Jesus, Bahia, Brazil, in 2019. The DPP ZDC IgM/IgG rapid test was used to investigate recent infection (measured by IgM) or previous infection (by IgG) by the Chikungunya virus. The Patient Health Questionnaire (PHQ-9) was used to measure depressive symptoms. Poisson regression with robust variance estimation was used to estimate prevalence ratios (PR) and adjust for confounders. Stratified analyses by sex were performed.

Results The prevalence of recent or old Chikungunya infection was 8.9%, while the prevalence of depressive symptoms was 22.4%. Chikungunya infection was associated with a 2.05 (95%CI: 1.31–3.22) times higher prevalence of depressive symptoms in the bivariate analysis. After adjusting for sex, age, education, skin color and sequelae of chronic pain, the association remained strongly positive (PR = 1.74 (95%CI: 1.04-2.90)). Effect modification by sex was identified. The PR in men was 6.00 (95%CI: 1.98-18.16), while the in women was PR = 2.11 (95%CI: 1.29-3.44) in women.

Conclusions Findings reinforce the hypothesis that arboviruses, particularly Chikungunya, are independently associated with depression. Physiological viral action, as well as emotional, behavioural and psychosocial factors may partially justify these findings. Sex differences are notably high and must be further investigated, in order to understand possible mechanisms related to this association.

P-475 SOCIOECONOMIC AND CLINICAL FACTORS ASSOCIATED WITH DEATH AND HOSPITALIZATION OF HEALTH PROFESSIONALS AFFECTED BY COVID-19 IN BRAZIL, 2020

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Introduction The new coronavirus pandemic affected the lives of millions of people across the planet in 2020. Brazil, in just

a few months, became the epicenter of the pandemic in Latin America. This, due to the absence of vaccines and the ineffective isolation measures adopted. In this context, health professionals stand out as a group with greater exposure and risk of being affected by COVID-19.

Objective To analyze clinical and sociodemographic characteristics associated with death and hospitalization of health professionals due to COVID-19, in addition to calculating the incidence rates per occupation.

Methods We conducted a cross-sectional observational study that used secondary data from the State of Espírito Santo Health Department. COVID-19 cases in healthcare professionals were recorded between February 27 and August 17, 2020 in Espírito Santo, Brazil. Cases with a lack of information were excluded. To compare the sociodemographic and clinical characteristics of health professionals with the clinical outcomes (cure or death) and the need for hospitalization, a bivariate analysis was performed using the X^2 tests of independence or Fisher's exact test. Data analysis was performed using the SPSS 20.0 software.

Results 75.6% (n = 9,191) of the cases were female; the general lethality rate was 0.27% and the general hospitalization rate was 1.0%. The clinical outcome of death and the occurrence of hospitalization were associated with: male gender, age greater than or equal to 50 years, higher education, fever, difficulty breathing, cough, cardiac comorbidity, diabetes and obesity (p <0.05). Only the occurrence of hospitalization was associated with: case reported in the metropolitan region of Vitória-ES, runny nose, sore throat, headache and renal comorbidity (p <0.05). The occupation with the highest incidence rate was nurses (16,053 cases/100,000 nurses).

Conclusion The study demonstrated a high frequency of cases in females, low general lethality and high incidence in nurses.

P-476 TRENDS IN TIME SERIES OF COMMUTING ACCIDENTS OF THE MOST AFFECTED ECONOMIC ACTIVITIES IN BRAZIL, 2008 TO 2017

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Introduction Accidents at work are an important public health problem in Brazil. Among them, commuting accidents stand out, which can be defined as a type of work accident suffered on the way from home/place from meal to work or vice versa. Its consequences interfere in the national economy and generate suffering for the victim and his family.

Objectives To evaluate the trends of time series (2008–2017) of commuting accidents in the five most affected economic activities and to identify the epidemiological profile of the injured in Brazil.

Method This study is based on official Social Security data. The five most affected economic activities were determined by means of simple sums of absolute numbers. Time series trends were performed using simple time regression models. The epidemiological profile was determined based on the variables of sex and age. The regressions were performed with the SPSS 20.0 software, being considered significant, with reference to the F test, when p-value ≤ 0.05 .

Results The most affected economic activities were Hospital Care.

P-477 EXPOSURE TO SARS-COV-2 AT WORK AND CORONAVIRUS DISEASE (COVID-19): SURVEY WITH WORKERS

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Introduction With COVID-19 world dissemination, WHO declared a Public Health Emergency of International Relevance on March, 11th, 2020. In the face of absent effective treatment or vaccine for all, workers unable to comply with social distance were subjected to company health and security management policies. This study explored the knowledge on work-space safety measures.

Methods 2002 workers had accessed to self-reporting forms from December/2020 through March/2021. From these, over a thousand answered some of the questions, while 687 had filled most of the forms on the RedCap platform.

Results From 687 workers distributed in 22 Units of Federation, the greater representation were SP (33%), RJ (30%) RS (19%) states. The majority belonging to health (22%), post office (11,3%), services (9,5%), education (9%) and extractive industry (9%). Participants were 54% women and 59% white. Among them, 24% were confirmed as positive for COVID-19. More than half (53%) believed contamination occurred at or during commute to work and 18% were undetermined. Regarding capacitation promoted by employers, 63% reported it as non-present or insufficient. The majority (70%) considered the collective space to address preventive measures as absent and/or insufficient, as well sanitary barriers use in employee and costumer distancing (2 m). 55% stated individual protection equipment were not supplied regularly and sufficiently since the beginning of pandemic.

Conclusion The findings in this study revealed deficiencies in contingency plans adopted by companies and workplace safety measures policy as well. Furthermore, inadequate protection equipment supply during COVID-19 pandemic was also reported. This situation increased insecurity and exposure risk to SARS-CoV-2 in workers, reducing preventive measures effectiveness to mitigate pandemic, turning workplace in an important locus for virus spread. Financial support: Vice-Presidency of Environment, Attention and Health Promotion of the Oswaldo Cruz Foundation and Public Ministry of Labor - 4th Region.

P-478 ASSOCIATION BETWEEN WORKPLACE BULLYING AND NECK PAIN: A STUDY WITH CIVIL SERVANTS FROM A MIDDLE-INCOME COUNTRY

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Introduction Workplace bullying is associated with several health outcomes, including musculoskeletal pain. Most studies on the subject are from high-income countries. Studies on the relationship between bullying and neck pain are scarce, and no studies were found in low- and middle-income countries. Objectives Therefore, we aimed to examine the association between workplace bullying and neck pain among civil servants from a state in southern Brazil. Methods This is a cross-sectional study with 1,615 judicial civil servants from a Brazilian state. Workplace bullying was measured by the Negative Acts Questionnaire (NAQ-r) and Neck Pain by the Nordic Questionnaire for Musculoskeletal Symptoms (NQMS). Logistic regression was used to estimate prevalence odds ratios (POR) and test associations of interest. Results The prevalence of workplace bullying was 17.8%. The overall prevalence of neck in the last 7 days was 45.3%. After controlling for sex and age, workplace bullying was strongly associated with neck pain (POR=1.74; 95% CI: 1.34-2.25). The association remained significant in the full model, after adjustment for sex, age, skin colour, body mass index, educational level, job type, ergonomic factors and physical inactivity. The odds of neck pain in the last 7 days were 52.0% higher among bullied workers (POR= 1.52; 95% CI: 1.15-2.00), compared to non-bullied employees.

Conclusions Workplace bullying may increase the risk of neck pain in civil servants, particularly in middle-income countries like Brazil. Etiological hypotheses were raised. Interventions to minimize the burden of neck pain may focus on psychosocial factors at work, particularly bullying. Further longitudinal studies should also evaluate this association, investigating possible causal paths, mechanisms and mediation.

P-479 COVID-19: FACTORS ASSOCIATED WITH THE DEATH OF HEALTH PROFESSIONALS IN A STATE IN THE BRAZILIAN AMAZON

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Introduction Amapá is a state in the Brazilian Amazon, located on the left bank of the Amazon River, which in 2020 had a population of 860,000 inhabitants. It is one of the Brazilian states with the greatest socioeconomic vulnerability and with low medical and hospital density. In the context of COVID-19, the health services of the State presented a high burden, with the lack of personal protective equipment for health professionals and many absences from work due to illness.

Objective To analyze factors associated with the death of health professionals by COVID-19 in the State of Amapá.

Methods Case-control study that used official data produced and made publicly available by the State Department of Health of Amapá. The events of interest were deaths of health professionals, residing in the State, by COVID-19 and the controls were individuals cured of the disease. Active cases of the disease were excluded from the analysis. The analyzed data were recorded between March 2020 and January 2021. . Logistic regression was used for analysis, with a significance level of p-value < 0.05.

Results Data from 1,258 professionals were included in the analysis. Of this total, 20 had an outcome of death and 1,238 had a cured outcome of COVID-19. The majority were female (67.7%), race/brown (66.9%), without comorbidity (86.6%), living in the Metropolitan Region of Macapá (capital of the State) (56.7%). Factors associated with death were: age ≥ 65 years (odds ratio (OR) 10.43; 95% confidence interval (CI) 2.78–39.11), presence of comorbidity (OR 4.52; 95% CI 1.74–11.74) and residence in the region metropolitan area of Macapá (OR 4.37; 95% CI 1.25–15.29). The model was adjusted by the gender variable.

Conclusion Protective actions for workers most susceptible to death, such as moving to activities with less exposure and/or teleworking, are necessary.

P-480 CANCER MORTALITY IN MALE WORKERS EMPLOYED IN THE METALLURGICAL SHOP OF AN ENTERPRISE FOR THE BLISTER COPPER PRODUCTION

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Introduction Currently, in Russia, malignant tumours (MT) are the second leading cause of the population mortality. Longterm, regular and intense occupational contact with exogenous chemical or physical carcinogens can lead to an occupational cancer. Occupational cancer risk assessment is required.

Objectives Revealing the influence of carcinogenic factors of the working environment on the cancer mortality rate among workmen in the metallurgical shop of an enterprise for blister copper production.

Methods A retrospective epidemiological study of cancer mortality among workmen and the population living in the area where the studied copper-smelting plant is located, for 20 years (1995–2014) was carried out. Intensive rates were calculated per 100,000 (age-specific and general, age-standardized). The so-called 'expected' mortality was calculated, which is the mortality of the 'other' population, standardized by age (in the workmen was taken as the standard). The excess of the observed cancer mortality rates determined the degree of additional risk associated with work, and made it possible to roughly estimate the intensity of the influence of production carcinogenic factors. The confidence intervals were calculated at p<0.05.

Results The intensive cancer mortality rate in workmen for lung cancer was 495.87 ± 201.94 versus 120.51 ± 19.04 (4.1, p<0.05). Significantly higher in the 50–59 age group for all tumours: 1239.67 ± 318.09 versus 307.3 ± 30.38 (4.0, p<0.05). In the same group, the respiratory cancer mortality was significantly higher by 5.5 (p<0.05). The 'expected' cancer mortality rates in workmen had statistically significant differences in all tumour localizations are 2.3 times, and for the respiratory cancers by 4.0 times, incl. on the trachea, bronchi and lungs tumours by 3.5 times (p<0.05), as well as the ratio of observed cancer mortality rates to 'expected' in workmen.

Conclusion Intensive and standardized cancer mortality rates for blister copper workmen are significantly higher than control, indicating an occupational cancer hazard with the highest levels according to the highest carcinogenic load (respiratory and digestive organs).

P-482 THE ROLE OF SELF-REPORTED STRESSORS IN RECOVERY FROM LONG-TERM EXHAUSTION: A LONGITUDINAL STUDY

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Introduction Stress-related exhaustion is characterized by both physical and mental symptoms of exhaustion and for many patients the prognosis seems to be long lasting. Little is known what factors may influence such long-term prognosis. One plausible explanation could be differences in exposure to certain stressors, or vulnerability related to previous life events.

Objectives The purpose of this study was to examine if work and private related stress-exposure, as well as adverse childhood experiences differ between patients that are still exhausted at a long-term follow-up, with a group of patients that have recovered from their exhaustion.

Methods Patient records from 150 patients diagnosed with Exhaustion Disorder (ED) at a specialist outpatient stress clinic was analysed regarding work- and private-related stressors, and adverse childhood experiences. The first part of data analysis consisted of a qualitative text analysis, creating a coding scheme. Frequency statistics regarding each stressor was calculated to compare the two groups. At the 7–10 year follow-up, 34% of the patients still fulfilled the criteria for ED, compared to 66% that had recovered.

Results Compared to the patients that had recovered, significantly more patients with long-term exhaustion, reported managerial responsibilities (8% versus 0%) and caregiver stress related to children (24% versus 6%) at follow-up. Significantly more recovered patients reported work related quantitative demands (73% versus 53%) and managerial responsibilities (14% versus 2%) at first visit, and experienced more caregiver stress related to parents at follow-up (6% versus 0%). There were no differences regarding adverse childhood experiences.

Conclusions The main conclusion is that neither adverse childhood experiences nor any of the stressors at the onset of exhaustion seem to be associated with a lack of recovery. However, stressors at follow-up relating to having responsibility for other people, such as managerial responsibilities or caring for a child with a chronic disease or psychiatric disorder, may be associated with prolonged recovery.

P-489 SYSTEMATIC REVIEW OF INTERVENTIONS TO MITIGATE PRECARIOUS EMPLOYMENT AND ITS EFFECTS ON THE HEALTH AND WELL-BEING OF INDIVIDUALS AND COMMUNITIES

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Objectives The review is part of the Sweden-based research programme PWR, which consists of early-career and senior researchers in public health, occupational health as well as social sciences from a range of European countries, the United States, Canada and Chile. PWR started in 2019. The purpose of our review is to identify implemented initiatives that aim to or have the potential to eliminate, reduce or mitigate workers' exposure to precarious employment and/or its effects on the physical and mental health, health equity, safety and wellbeing of workers.

Methods We use the PRISMA guideline for systematic reviews, including its extension for equity-focused reviews. Our comprehensive search covers a combination of social, public health, medical, and public policy databases along with relevant sources of grey literature. Inclusion criteria: 1. All

evaluated initiatives: successful, unsuccessful, and inconclusive; 2. Initiatives implemented in any region, sub-region, or country, etc. no matter the level of economic development or government unit level; 3. Initiatives targeting at micro, meso, or macro-level, within or outside the realm of precarious employment; 4. Reports and peer-reviewed primary studies with a qualitative, quantitative, or mixed-methods design; 5. English, Catalan, Danish, Dutch, French, Italian, Norwegian, Romanian, Spanish or Swedish language studies.

Results Our results will be grouped according to the specific outcomes targeted by interventions, such as health, well-being, health equity, work environment conditions and characteristics, access to social security services or benefits, and worker skills. **Conclusions**

By sharing our intermediate findings, we hope to get feedback from key stakeholders and learn of interventions that we may have missed through the literature search. Given the increase in precarious work in both highly-developed and developing countries, we have to strengthen and diversify our efforts to address such challenges.

Rapid-Fire Presentations

Agricultural exposures

RF-33 OCCUPATIONAL RISK EXPOSURES TO PESTICIDES AMONG FARMERS AND FARMWORKERS IN THE PHILIPPINES

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Objective This was a cross-sectional study conducted among 534 farmers in the largest vegetable –producing area in the northern part of the Philippines. This study assessed ergonomic risk factors, and occupational health and safety conditions, among farmers exposed to multiple pesticides.

Methods Methods consisted of interviewer-guided survey questionnaires on pesticide use among farmers, agricultural safety risk factors associated with pesticide exposure, and physical health assessment. Subjects were selected using multi-stage random sampling, yielding a total of 534 farmers.

Results The majority of study subjects were males (53.3%), with a mean age of 47 years old. Occupational exposure accounted for major exposure (84.8%). Farmers often complained of headache (69.4%) and dizziness (41.0%) after their exposure to pesticides. As for common respiratory symptoms, farmers often complained of coughing (39.4%), difficulty of breathing (15.6%), breathlessness (14.9%) and having pulmonary secretions (13.3%). Farmers reported pesticide spills on their body parts while spraying (79%), and 49% complained of getting sick because of their work. Of those who got ill, 69.8% did not receive any medical attention. 40.9% of the farmers were diagnosed with abnormal physical examination findings and less than 10% of the farmers exhibited abnormal laboratory results.

Conclusion The results showed that farmers were exposed to pesticides while undertaking their agricultural work and that certain occupationally-related health symptoms manifested themselves. This underscores the need to improve protection measures so as to reduce the exposure of farmers to pesticides.

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Introduction Ovarian cancer is uncommon, with poor prognosis, and it ranks among the 1st causes of gynecological cancer death in females in developed countries. Few risk (age, genetic, hormonal) and protective (oral contraceptive) factors are established. The role of asbestos, estrogen menopausal therapy and tobacco smoking in ovarian cancers is supported by sufficient evidence in humans (CIRC). The influence of hormones and reproductive factors on ovarian cancer suggests that endocrine disrupters may impact risk.

Objectives We assessed the risk of ovarian cancer among women farmers, and studied associations with livestock, crops and related tasks.

Methods Our analysis included 83,048 women, enrolled in AGRICAN cohort in 2005–2007 in France, who completed an enrolment questionnaire on lifelong agricultural exposures and reproductive life. Ovarian cancer cases were identified by cross-linkage with cancer registries.

Results Until 2015, 186 incident cases of ovarian cancer were identified. Late menopause increased the risk of ovarian cancer, while parity and oral contraceptive use were protective. Decreased risks of ovarian cancer were observed (1) in female farmers compared to non-farmers (HR=0.65[0.43-0.98]), but remained only for those who used oral contraceptive, (2) for some activities (wheat and corn, poultry and sheep/goat), probably due to residual confounding. However, increased risks were observed among (1) female pig-breeders (HR>15 pigs = 1.93[1.08-3.44]), (2) female fruit-growers (HR HR=2.58[1.03-6.41]). Increased risks observed on crops were reinforced among women who did not use oral contraception and results in livestock were unchanged according to oral contraception use.

Conclusion In the AGRICAN cohort established risk (late menopause) and protective factors (oral contraceptive and parity) were confirmed in female farmers. We found positive association for some crops and animal breeding but we also found decreased risks possibly due to residual confounding.

RF-210 EXPOSURE TO PESTICIDES AND RISK OF HODGKIN LYMPHOMA IN AN INTERNATIONAL CONSORTIUM OF AGRICULTURAL COHORTS (AGRICOH)

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Introduction Hodgkin lymphoma is a rare cancer of B-lymphocytes diagnosed in approximately 80,000 individuals worldwide each year. While the use of some pesticides may increase the risk of other lymphoid malignancies, associations with Hodgkin lymphoma remain poorly understood.

Objectives We investigated associations of use of 22 pesticide active ingredients and 13 chemical groups with Hodgkin lymphoma incidence in three large agricultural cohorts from France, Norway and the USA participating in an international consortium of agricultural cohorts (AGRICOH).

Methods Use of each active ingredient was estimated from self-report (USA) or crop production combined with crop pesticide exposure matrices (France and Norway). Multivariable Cox regression was used to estimate overall and age-stratified (adjusted for exposure to other pesticides and other potential confounders. Cohort-specific estimates were combined using random effects meta-analysis.

Results Among 316,270 farmers (75% male), 63% had ever used at least one pesticide, and 91 incident Hodgkin lymphoma cases were diagnosed during follow-up from 1993 to 2011 (3,574,815 person-years). Risks were elevated in association with use of the herbicide dicamba (meta-HR=1.63, 95% CI: 0.83–3.22; 35 exposed cases), DDT (meta-HR=1.79, 95% CI: 0.73–4.37; 27 exposed cases), and the synthetic pyrethroid insecticides deltamethrin (meta-HR=1.86, 95% CI: 0.76–4.52; 25 exposed cases) and esfenvalerate (meta-HR=1.86, 95% CI: 0.78–4.43; 22 exposed cases), though precision was low.

Conclusion This was the largest effort from prospective studies to evaluate associations between the use of specific pesticides and the risk of Hodgkin lymphoma. Nevertheless, analyses were relatively underpowered due to low numbers of exposed cases. Future studies should aim to include data on Hodgkin lymphoma incidence among younger farmers and strive to further refine exposure assessment methods.

RF-289 COLLECTING REAL-TIME SELF-REPORTED INFORMATION ON INTERMITTENT AGRICULTURAL ACTIVITIES USING SMARTPHONES

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Introduction/Objective Farming is a highly variable occupation, with many tasks and exposures, making exposure assessment for epidemiologic studies challenging. We developed and deployed a smartphone app to collect real-time information on intermittent agricultural activities to characterize farming task variability.

Methods We recruited 19 male Iowa farmers, age 50–60 years, to log their farming activities in the app on 24 randomly selected days over 6 months. We populated the app with 350 farming activities; 152 activities were also linked to contextual questions (e.g., pesticide application method, PPE use). We calculated descriptive statistics on the number of activities reported and their duration.

Results The farmers provided activity information for 283 days. The farmers submitted 1,331 activities, representing 124 unique farming tasks. The median duration of a logged day was 545 minutes (interquartile range, IQR: 431–698). The median number of tasks reported per farmer was 18 (IQR: 5–31), with a median of 4 activities per day (maximum 17). The median duration of activities was 63 minutes (IQR: 32–133). The three most frequently reported tasks were related to animal work (36% of activities), transportation (12%), and crops (10%). The tasks with the longest daily duration were planting crops (median: 415 minutes), mixing/loading/applying pesticides (365 minutes), and loading corn (270 minutes). The

shortest tasks (median duration 10 minutes), were fueling trucks, collecting/storing eggs, and tree work. Over 36% of the submitted activities also included responses to contextual questions; these were most frequently about feeding animals (56%), transportation (25%), and mixing/loading/ applying pesticides (6%).

Conclusion Our findings show that it is possible to collect real-time, intermittent activity information over the span of several months. We captured most of the farming day and, as expected, observed substantial heterogeneity in activities and their durations, highlighting the need for individual-level activity data when evaluating risks in farmers.

RF-401 AGRICULTURAL EXPOSURES AND RISK OF LYMPHOPLASMACYTIC LYMPHOMA/WALDENSTRÖM'S MACROGLOBULINEMIA IN THE AGRICULTURE AND CANCER (AGRICAN) COHORT

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Introduction Many studies and meta-analyses concluded that farmers have an excess risk of Non-Hodgkin's Lymphoma (NHL) overall but results remain scarce for rare subtypes, like Lymphoplasmocytic Lymphoma/Waldenström macroglobulinemia (LPL/WM). In the AGRICAN cohort, the incidence of LPL/MW was found significantly higher among farmers than in the general population.

Objective Our aim was to study the association of LPL/WM with some agricultural exposures, like specific crops and live-stock, or related tasks.

Methods Our analysis included 155,192 individuals from the 181,842 affiliated to the social agricultural scheme enrolled in 2005–2007 in 11 French areas. Exposure was determined from the report of work on 13 different crops and 5 live-stock, for which 2 to 5 specifics tasks (including duration and size information) were collected. Incident cases were identified by cross-linkage with population-based cancer registries. Associations with crops, animals and specific tasks were analyzed using Cox models with age as time scale and farmers who were not exposed to the crop/livestock of interest as the referent group.

Results From enrollment to 2015, 1,349 incident NHL cases were identified including 122 LPL/WM cases. Elevated LPL/ WM risks were observed in (i) users of pesticides on crops (HR=1.56, 95%CI=1.03-2.38), especially on grasslands (HR=1.85, 95%CI=1.01-3.38), wheat/barley (HR=1.98, 95% CI=1.24-3.16), and corn (HR=2.21, 95%CI=1.41-3.47); (ii) hay-makers (HR=1.66, 95%CI=1.02-2.71); (iii) sowers (HR=1.28, 95%IC=0.75-2.20), especially on wheat/barley: (HR=1.70, 95%CI=1.09-2.65), corn (HR=1.59, 95%) CI=0.997-2.551) and root (HR=1.52, 95%IC=0.93-2.50); (iv) cattle breeders (HR=1.92, 95%CI=1.00-3.70), particularly with care (HR=1.97, 95%CI=1.02-3.81). Inverse associations were observed in poultry breeders (HR=0.44, 95%CI=0.28-0.70), particularly with care (HR=0.52, 95%CI=0.32-0.85), and disinfection of livestock premises (HR=0.28, 95%) CI=0.11-0.68).

Conclusion Elevated LPL/WM risks were linked with use of pesticide, haymaking and sowing tasks on several crops. Furthermore, specific associations were observed with some

livestock in both directions (positive with cattle breeding and inverse with poultry), although based on small numbers for some activities.

Burden of Disease

RF-184 ESTIMATING THE BURDEN OF CARDIOVASCULAR DISEASES AND DEPRESSION ATTRIBUTABLE TO PSYCHOSOCIAL WORK EXPOSURES IN 28 EUROPEAN UNION COUNTRIES

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Objectives This study aimed to estimate the annual burden of cardiovascular diseases and depression attributable to psychosocial work exposures in 28 EU countries (EU28) in 2015.

Methods This study was based on up-to-date estimates of the fractions of cardiovascular diseases and depression attributable to five psychosocial work exposures in EU28: job strain, effort-reward imbalance, job insecurity, long working hours, and workplace bullying. The outcomes included: coronary/ ischemic heart diseases (CHD), stroke, atrial fibrillation, peripheral artery disease, and depression. Burden indicators were prevalent cases, deaths, Years of Life Lost, Years of Life Lost due to Disability, and Disability Adjusted Life Years (DALY). Health outcome data were extracted from the Global Health Data Exchange database, provided by the Institute for Health Metrics and Evaluation. To take into account differences in population sizes between countries, we calculated the prevalence rate, the mortality rate, and the DALY rate per 100,000 workers for each health outcome attributable to each exposure and tested the differences between countries using the Wald test. Results were plotted on maps.

Results The overall burden of CHD attributable to all studied psychosocial work exposures in EU28 was 181,870 to 415,368 prevalent cases, 3,759 to 8,586 deaths, and 129,280 to 295,259 DALYs in 2015. The overall burden of depression was 1,715,026 to 3,645,262 prevalent cases, 8,471 to 18,005 deaths, and 651,665 to 1,385,104 DALYs. Differences between countries for DALY rates per 100,000 workers were significant for all exposures and health outcomes. The highest burdens in DALY rate corresponded to depression attributable to job strain (680 DALY rate per 100,000 workers in Lithuania, 418 in Hungary) and to depression attributable to workplace bullying (371 in France).

Conclusion Such results are necessary as decision tools for decision-makers and policy makers (governments, employers, trade unions) when defining public health priorities and preventive strategies in European countries regarding work stress prevention.

RF-223 CAUSE-SPECIFIC MORTALITY AND SITE-SPECIFIC CANCER INCIDENCE AMONG GREENSPACE WORKERS IN THE AGRICAN COHORT STUDY.

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Introduction Workers in the greenspace industry are exposed to a range of occupational hazards including pesticides. Occupational exposure to pesticides and their health effects have been mainly studied among farmers while data on greenspace workers remain scarce. Exposures in greenspaces are not similar to those in farming: there are differences in applied substances, equipment, application scenario, general environment etc. Studying the impact of pesticides highly used in this specific population provides relevant data on some specific substances like total herbicides (glyphosate, paraquat, etc.).

Objectives To analyse the causes of death and the incidence of main cancers among greenspace workers.

Methods Within the AGRICAN cohort - that enrolled more than 181,000 workers affiliated to the health insurance for agriculture in 2005–2007 in 11 French areas – we defined a sub-cohort of 6,247 workers from the greenspace industry. We run survival analyses (Cox-proportional hazards models) on main causes of death and on cancer incidence from enrolment to the end of 2015. Comparisons with farmers and non-agricultural workers have been performed.

Results Overall mortality among greenspace workers was comparable to that of farmers and non-agricultural workers. However, greenspace workers' overall cancer incidence (n=446) was higher than among farmers (HR=1.15 [1.04–1.27]). Compared to farmers, increased risks have been found in men for: skin melanoma (HR=2.15 [1.33–3.47]), prostate (HR=1.21 [1.02–1.44]), testicular (HR=3.98 [1.50–10.58]), and thyroid (HR=2.84 [1.60–6.41]) cancers; and in women for breast cancer (HR=1.71 [1.17–2.50]). Elevated risks were also found for cancers of the larynx and bladder and sarcomas. These associations have been found among pesticide applicators as well.

Conclusion The differences in cancer incidence between greenspace workers and farmers could suggest the impacts of occupational risks specific to this population. Additional research is underway to better characterize their exposures and will be used in further analyses.

RF-255 OCCUPATIONAL FACTORS RELATED TO MUSCULOSKELETAL DISEASES (MSD) AMONG NURSING AIDES IN NURSING HOME IN TAIWAN

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10.1136/OEM-2021-EPI.359

Introduction The percentage of elderly citizens is continually rising due to improved living conditions and health care system around the world. Nursing aides (NAs) were reported at high risk of musculoskeletal disorders (MSDs) in several studies.

Objective The aim of the study was to investigate the association between occupational risk factors in the workplace and MSD among NAs in nursing home.

Methods A cross-sectional study was conducted among female NAs from nursing home. A self-administered questionnaire, including Nordic questionnaire was used to collect data. The association between work-related risk factors and MSDs were analyses by multiple logistic regression.

Results A total of 329 nursing aides were included in the analysis of the study. The average age and tenure of NAs

were 44.3 years old and 7.0 years. Shoulder (77.9%) was the most commonly reported affected area, followed by the lower back (75.7%), neck (69.2%), wrist and hand (62.5%), ankle (59.1%), elbow (57.2%), knee (56.3%) and thigh (46.2%). In work-related risk factors, 60% NAs reported more than 8 hours standing per day, and 34.3% NAs had to lifted over 10 Kg heavy more than 20 times a day. 37.7% NAs reported that they were injuried or had disease from this job in this year. The presence of shoulder pain was significantly related to tenure (OR 2.3), awkward postures (OR 2.5), inadequate height of work desk/chair (OR 3.2). Low back pain was related to awkward postures (OR 2.7) and standing hours per day (OR 4.7). Neck pain was related to awkward postures (OR 2.3) and inadequate height of work desk/chair (OR 3.1). Wrist and hand pain was related to awkward postures (OR 3.7).

Conclusion The prevalence of LBP among NAs in Taiwan is high. Any MSD reduction interventions that aim to improve ergonomic and work environments for NAs should take this information into consideration.

RF-424 SICKNESS ABSENCE AND MECHANICAL AND PSYCHOSOCIAL WORK EXPOSURES ACROSS OCCUPATIONAL GROUPS IN NORWAY

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Introduction The working environment may contribute strongly to the development and manifestation of health problems leading to reduced work participation. To maintain high workforce participation, it is important to target workplace interventions to occupational groups at high risk of sickness absence (SA).

Objectives To identify occupational groups with excessive SA and develop occupation-specific knowledge about the contribution of work-related factors to SA and the potential for prevention.

Methods We performed a register-based study on employees aged 25-59 in 2013 (N=1,331,547) and calculated genderand occupation-specific (4-digit ISCO codes) one-year incidence of all-cause and cause-specific SA. We selected the following job exposures: heavy physical work, high job demands and low job control, assessed by a Job Exposure Matrix and compared the gender-specific risk of SA among exposed workers to non-exposed workers. Lastly, we compared the genderspecific risk of SA in ten occupational groups to professionals (reference), controlling for (i) age and (ii) age and job exposures. We used Cox proportional hazards model for all analyses.

Results Workers exposed to heavy physical work or low job control had higher risk of SA (RR=3.65; 95% CI 3.54–3.78 and RR=1.41; 95% CI 1.39–1.42, respectively). The ten selected occupational groups all had higher risk of SA, relative to professionals. The relative risk was particularly high among male drivers and mobile plant operators (RR=2.57; 95% CI 2.49–2.64) and female personal care workers (RR=1.43; 95% CI 1.41–1.45). Adjusting for job exposures resulted in attenuation of the RR estimates, most for male building and related trade workers (37% attenuation) and female personal care workers (84%).

Conclusion We identified occupational groups with high risk of SA and the selected job exposures. Excess risk of SA in ten selected occupational groups, as compared to professionals, could partly be attributed to the job exposures.

RF-4 INTER-RATER RELIABILITY OF OCCUPATIONAL EXPOSURE ASSESSMENT IN A CASE-CONTROL STUDY

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Objective To estimate inter-rater reliability of expert assessment of occupational exposures.

Methods A population-based case-control study conducted in Montreal was used to obtain detailed information on lifetime occupational histories. Two trained industrial hygienists assessed the 4,362 reported jobs to assign exposures using a checklist of 258 agents. The jobs were divided between the two experts for evaluation (initial coding); then, each reviewed the others' to reach a consensus. A job was considered 'exposed' to an agent if that agent was present at levels above the non-occupational environment. Experts rated exposure for each job/substance combination according to confidence that the exposure occurred (possible, probable, definite), and to concentration (low, medium, high), where, low and high represented the extremes in the range of levels encountered in a work environment. An inter-rater reliability sub-study was conducted among a random sample of 185 jobs. Each expert coded the 185 jobs (1st coding); then, 6 months later, a 2nd coding occurred, whereby each expert coded the other's evaluation but did not have access to their own 1st evaluation. The statistical unit of observation was each job/substance decision (185 $jobs \times 258$ substances=47,730 decisions/expert). Chance-corrected weighted kappa statistic and Gwet's AC1 estimated the concordance between the experts in the 1st and 2nd coding.

Results Over 98% agreement was found and >97% (n=36,497) of decisions were to attribute no exposure to a particular job/substance combination by both experts. Restricting to combinations rated as exposed by both experts (n=508), Kappa=0.44 (95%CI: 0.37–0.50) and Gwet=0.55 (0.48–0.61) was found for confidence; while, Kappa=0.30 (0.15–0.45) and Gwet=0.92 (0.90–0.95) was found for concentration. After the 2nd coding, agreement improved for both confidence (Kappa=0.68, 0.63–0.73; Gwet=0.70, 0.65–0.75) and concentration (Kappa=0.65, 0.50–0.80; Gwet=0.96, 0.95–0.98).

Conclusion This sub-study provides some evidence supporting the reliability of expert assessment of occupational exposures in large-scale epidemiologic studies.

RF-285 THE EXPOSURE RESPONSE RELATION BETWEEN OCCUPATIONAL EXPOSURE TO WOOD DUST AND SINONASAL CANCER

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Introduction Occupational exposure to wood dust is associated with increased risk of adenocarcinoma and probably also squamous cell sinonasal cancer. There is, however, still limited knowledge about the exposure-response relation and possible threshold levels.

Objectives To analyze the exposure-response relation between quantitative measures of wood dust exposure and risk of sino-nasal cancer.

Methods A cohort study was conducted of the entire Danish working population 1979–2015 (n=5,421,248) with annual information on occupation since 1977. An inception population of workers 20 years or younger in 1977 was also established (n=3,012,247). Annual wood dust levels were assigned to each participant with a quantitative job exposure matrix (JEM) modelled from 12,653 personal measurements. A total of 2,576 incident cases of sinonasal cancer were identified in the National Patient Register during follow up. Incidence rate ratios (IRR) were analyzed in discrete time hazard models adjusted for gender, age, calendar year, education and JEM estimates of smoking probability.

Results During 36 years of follow up we identified 309 wood dust exposed cases. The adjusted IRR (95%CI) was 1.83 (1.56-2.15) for the highest cumulative exposure tertile (>11.2 mg/m³-years), 1.66 (1.41-1.97) for the longest duration of exposure (>5 years), and 1.64 (1.38-1.95) for the highest mean exposure tertile (>2.06 mg/m³) compared with no exposure. Trend tests were statistically significant only for mean exposure (P>0.001). No increased risk of sinonasal cancer was observed in the inception cohort that, however, only included 28 wood dust exposed cases.

Conclusion We found increased risk of sinonasal cancer associated with high-level wood dust exposure, but with no consistent trends. Future analyses of this material should separate adenocarcinomas from other histological subtypes.

RF-287 THE OCCUPATIONAL ENVIRONMENT AND OVARIAN CANCER RISK

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Introduction High-quality epidemiological evidence on the relationship between the occupational environment and ovarian cancer risk is limited. Most studies had very few cases, did not adjust for important confounders, and lacked information on specific workplace exposures.

Objectives To investigate the relationship between occupation, specific workplace exposures, and ovarian cancer risk.

Methods In a population-based case-control study conducted in Montreal, Canada (2011–2016), lifetime occupational histories were collected for 492 cases and 897 controls. For each job held by a participant, occupational and industrial classification codes were coded by an industrial hygienist. To identify specific workplace exposures, job codes were linked to the Canadian job-exposure matrix. Twenty-three agents with relatively high prevalence were selected. Occupations were examined by comparing participants ever employed in a given occupation for at least ten years vs. never employed in that occupation. For specific exposures, ever exposure, exposure duration, and cumulative exposure to selected agents were analyzed. Odds ratios (OR) and 95% confidence intervals (CI) for associations with ovarian cancer risk were estimated using logistic regression.

Results Elevated ORs were observed for accountants (OR=2.03, 95% CI: 1.09-3.76); hairdressers, barbers, and beauticians (OR=3.22, 95% CI: 1.25-8.28); sewers and embroiderers (OR=1.89, 95% CI: 0.78-4.59); saleswomen, shop assistants, and demonstrators (OR=1.42, 95% CI: 0.70-2.89); and occupations in retail trade (OR=1.59, 95% CI: 1.05-2.39). For specific exposures, increased risks were suggested for cosmetic talc, ammonia, hydrogen peroxide, hair dust, propellant gases, fluorocarbons, ethanol, cellulose, and polyester fibres. Hairdressers, barbers, and beauticians were the most frequent occupation exposed to six out of nine specific workplace exposures among participants.

Conclusion Study results suggest that certain occupations may be associated with increased ovarian cancer risks, but it is difficult to determine specific exposures that may contribute to the increased risks. Future larger studies with expert assessments of specific occupational exposures may better characterize co-exposures.

RF-291 LONG WORKING HOURS AND PROSTATE CANCER RISK: RESULTS FROM A POPULATION-BASED CASE-CONTROL STUDY

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Introduction Recent evidence suggests that long work hours have a detrimental effect on health, possibly through unhealthy lifestyle behaviours, stress, diet and sleep disturbances. Hardly any research has evaluated whether long work hours relate to cancer incidence.

Objectives To investigate the association between long work hours and prostate cancer risk, overall and by cancer aggressiveness.

Methods We used data from the Prostate Cancer & Environment Study, a case-control study conducted in Montreal, Canada, in 2005–2012. In all, 1,931 incident cases, aged < 7 6, were ascertained across hospitals in 2005–2009 and 1,994 age-matched (\pm 5 years) controls were randomly selected from the electoral list. Detailed descriptions of each job held for \geq 2 years, including working hours, were elicited through in-person interviews. Long work hours were defined as working time exceeding the Canadian standard of 40 hours/week. Unconditional logistic regression was used to derive odds ratio (ORs) and 95% confidence intervals (CIs) for the association between long work hours and prostate cancer risk, adjusted for age, education and ancestry. We also investigated whether associations varied according to a history of work at night.

Results Overall, 2,477 subjects (64.6%) reported ever working > 40 hours/week. Occupations entailing long hours were most often related to management, administration and sales. Ever exposure to long work hours was associated with an OR of prostate cancer of 1.21 (95%CI 1.06–1.39), while it was of 1.50 (95%CI 1.23–1.83) for a cumulative duration of 11–23 years of long work hours. The ORs for aggressive cancer among men who engaged in long work hours and who had a history of work at night were 1.40 (95%CI 0.85–2.30), and 1.20 (95%CI 0.91–1.57) among those without such a history.

Conclusion Findings suggest that long work hours, especially among men with a history of work at night, may influence prostate cancer risk.

RF-327REINCORPORATION TO LABOUR MARKET OF A SAMPLEOF CANCER SURVIVORS IN CATALONIA (SPAIN)BETWEEN 2012 AND 2015. A COMPARISON BETWEENWOMEN AND MEN.

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Introduction Incidence and survival rates of cancer have increased in the last decade. The number of people diagnosed with cancer in the workplace are expected to increase steadily. **Objective** To describe the employment status of a sample of salaried workers who suffered a previous sickness absence (SA) due to cancer, up to 4 years after diagnosis.

Methods Cohort study based on a sample of workers (N=145,614), affiliated with the Spanish Social Security System, residents in Catalonia, with at least one SA episode due to a cancer between 2012 and 2015 (N=516; average age 50 in men and 47 in women). Individuals were followed up from the end of the SA episode, and future employment status was assessed in five outcomes: early retirement before age 65, partial retirement, permanent disability, unemployment with subsidy and employment. Last available working outcome was assigned to each individual and Chi-square test was used to assess differences between sexes.

Results For both, men (N=225) and women (N=291), employment was the most frequent outcome at the end of the period (73.5% and 82.7%) followed by permanent disability (10% and 7.6%). In men, early retirement was found to be higher than in women (7.8% vs 3.8%). Women experienced a very low proportion of partial retirement (1.4%) compared to men (4.35%). All differences between sexes were found to be statistically significant (p<0.05).

Conclusion Preliminary results show that most of the people who survive a cancer go back to employment. However, there is a high proportion of people who get a permanent disability, retire or become unemployed, with differences between sexes. Characterizing reincorporation to labour market of people who survive a cancer allows us to determine how the disease affects survivors and society in order to understand where public policy can act.

Disease Surveillance

RF-102 WORK-RELATED HEAD INJURY AND INDUSTRY SECTORS IN FINLAND – CAUSES AND CIRCUMSTANCES

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Objectives Despite of continuous development of occupational safety, there is still an excess of work-related head injuries. Prevention of head injuries can be promoted by evaluating risks and pathways of events preceding injuries.

Methods In Finland, more than 90% of employees are insured with inclusive mandatory coverage. Data on occupational head injuries in 2010–2017 was obtained from a workers' compensation insurer database. European Statistics on Accidents at Work (ESAW) variables represented the conditions of the accidents and characteristics of the injury. Risk factors, contributing events, and injury mechanisms in 20 industry sectors, based on the Statistical classification of economic activities in the European community (NACE) were analysed.

Results Among the 32,898 cases, the most common area affected was eyes (49.6%), followed by brain and cranial nerves and vessels (21.0%). The highest incidence of head injuries was in construction (15.7 per 1,000 insurance years). Construction, manufacturing, and human health and social work activities stood out by their distinctive ESAW category counts. 'Working with hand-held tools' (odds ratio [OR] 2.99, 95% confidence interval [CI] 2.81–3.18) in construction and 'operating machine' (OR 3.58, 95% CI 3.22–3.98) and 'working with hand-held tools' (2.52, 2.37–2.67) in manufacturing predicted head injury. There were over tenfold increased risk related to parameters of violence and threat in health and social work activities.

Conclusions Risks and pathways preceding head injuries varied considerably in the 20 industry sectors. The highest head injury rates were in construction and manufacturing. Violence emerged as a major risk factor in human health and social work activities.

RF-203 OVERLAPPING VULNERABILITIES IN WORKERS OF THE ELECTRONICS RECYCLING INDUSTRY FORMAL SECTOR

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Objective Vulnerabilities in workers performing electronics recycling (e-recycling) in the informal sector worldwide have been well documented. However, the growing electronics waste industry formal sector still brings many challenges to protect the health of workers and their environment, even in high income countries. This presentation aims to draw attention to the overlooked vulnerabilities faced by the workers of the e-recycling industry in high-income countries and to discuss the potential impact on health inequalities experienced by these workers.

Methods We performed a review of the peer-reviewed and gray literature in the e-recycling industry.

Results Workers in the e-recycling formal sector often come from sectors of society known to be more susceptible to exposures and health effects, such as young workers, immigrants or ethnic minorities, prisoners, and workers with mental or physical disabilities.

Discussion This phenomenon in high-income countries is not restricted to the e-recycling industry alone. It is rather a symptom of more generalized macro socio-economical phenomena of challenges in line with the new gig economy and changes in the global market, and their consequences on the solid waste sector. Continued efforts to strengthen the inclusion of social aspects of health into the complex interaction of the structural vulnerabilities met by e-recycling workers will be essential to anticipate and prevent health issues in this essential but still emerging workforce, not only in high-income countries but also worldwide.

RF-405OCCUPATIONAL SKIN DISEASE SURVEILLANCE USING ACLINICAL PATCH TEST DATABASE OVER TIME: THE
RESULTS OF THE NORTH AMERICAN CONTACT
DERMATITIS GROUP: 2001–2016.

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Introduction Clinical databases may provide useful information on occupational diseases. Occupational skin diseases are common. Patch testing is performed as part of the diagnostic process for contact dermatitis. There are several large, pooled patch test databases that track results over time. The North American Contact Dermatitis Group is a group of dermatologists in the United States and Canada who use standardized methods for patch testing and reporting and undertake regular analysis of their pooled results.

Objectives Using NACDG data, to examine the diagnoses, common workplace allergens and trends over time for work-related allergens.

Methods Data from North American Contact Dermatitis Group (NACDG) datasets from 2001–2016 were analyzed to determine the frequency of occupationally relevant allergic patch test reactions to a screening tray of allergens and examine trends over time. NACDG members record diagnosis, work-relatedness and industry and occupation using the United States 1990 Census Bureau codes. Descriptive analysis of workers with occupational skin disease was performed using standard statistical tests; logistic regression was used to examine trends over time.

Results Of 38,614 patients tested, 4471 (11.6%) had occupationally-related skin disease; 70.5% of individuals with occupationally-related skin disease had a final diagnosis of allergic contact dermatitis. Fifty one percent were male and the median age was 43. The most common occupationally related agents were rubber accelerators (carba mix, thiuram mix, diphenylguanidine), Bisphenol A epoxy resin, formaldehyde, methylisothiazolinone and metals (nickel sulfate hexahydrate and potassium dichromate). Over the 16 year period there was a significant increase in occupationally relevant responses to carba mix and methylchloroisothiazolinone/methylisothiazolinone and a decrease in 2-mercaptobenzothiazole.

Conclusion Ongoing analysis of pooled patch test databases provides information about the common work-related allergens that can be used to inform prevention activities. Examining trends over time can identify particular allergens for more careful assessment of exposures and help target prevention efforts.

RF-412 SURVEILLANCE OF COVID-19 CASES AMONG MEDICAL LABORATORY STAFF IN SOUTH AFRICA

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Introduction Medical laboratory workers are exposed to COVID-19 in the community and through their interaction with samples received for testing. The National Health Laboratory service in South Africa serves 80% of the population providing medical tests. Information on all staff cases was collected in the Occupational Health and Safety Information System.

Methods Surveillance data from the OHASIS system was extracted from 01 April 2020–30 March 2021. All staff with a laboratory-confirmed positive test for SARS-COVID-19 were included in the study. NHLS staff had increased access to testing compared to the general public. An epidemic curve was plotted and compared to that for the country along with descriptive statistics.

Results A high proportion of NHLS staff tested positive for SARS Cov 2, 25.7%. This varied across occupation groups with more educated occupations such as pathologists at less risk of COVID-19 compared to messengers and laboratory clerks. The epidemic curve for the facility peaked higher in the first wave compared to the rest of the country.

Conclusion The prevalence found in the laboratory staff may be a proxy for the country prevalence of COVID-19 if more access to testing had been available. The lower rate of positive cases in more educated staff may indicate the role of education in adherence to COVID-19 prevention measures.

RF-453 SCORPION STING IN DOMESTIC SERVICE WORKERS (HOMEMAKERS) IN BRAZIL: AN EPIDEMIOLOGICAL APPROACH

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Introduction Scorpion stings (scorpionism) have common occurrence in home areas, which may predispose workers who perform domestic services, such as homemakers.

Objective To describe the incidence and clinical-epidemiological characteristics of cases of scorpionism in homemakers notified in Brazil, 2007–2019.

Methods Incident case study, individual, with 84,538 homemakers stung by scorpion, with economically active age (18– 65 years), occurred in Brazil from 2007–2019 and notified to the National System of Notifiable Diseases (SINAN). Cumulative incidence coefficients of scorpionism were estimated specifically for the female population occupied in domestic services. Demographic, socioeconomic and clinical-epidemiological characteristics were also investigated, using descriptive analysis.

Results The cumulative incidence of scorpionism was 110.9 cases/100,000 homemakers, 2007–2019, in Brazil. This scorpionism incidence in homemakers increased 349.7% in this period (48.7/100,000 homemakers to 219.0/100,000 homemakers) and was higher in the Brazilian Northeast (195.6/100,000 homemakers) and in the states of Alagoas (851.4 cases/100,000 homemakers), followed by Rio Grande do Norte (488.4/100,000 homemakers). Considering sociodemographic characteristics, the average age was 41 years old and occurred predominantly among workers with low education up to a maximum of elementary school (46.8%), brown color (55.0%), who were injured in an

urban area (72.3%), in the upper limbs (51.2%) and who arrived early (<3 h) to the health service (83.1%) after the injury. Poisonings were predominantly mild (92.1%), and the relationship with work was not recognized by the service (95.7%).

Conclusions Homemakers constitute a scorpionism risk population in Brazil. It is necessary to give more visibility to this problem from the perspective of the workers health.

Exposure Assessment

RF-88 EVALUATING APPROACHES DESIGNED TO INCREASE SENSITIVITY OF CAPTURING WORK TASK INFORMATION IN A MULTI-CENTER HOSPITAL-BASED CASE-CONTROL STUDY IN ASIA STUDY IN ASIA

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Objective Case-control studies use job- and industry-specific modules to systematically obtain details about the subjects' work tasks. This reduces respondent burden over asking the same questions for every job but relies on accurate module assignment to ensure relevant questions are asked.

Methods In a multi-center hospital-based case-control study of lymphoid and myeloid malignancies in Asia, lifetime occupational histories were collected for every job held by a subject. It comprised open-ended job title, work tasks, employer and its product/services, and yes/no screening questions pertaining to paints/stains, solvents/glues/degreasing agents, and engineered woods. These responses were used in a keywordbased algorithm to automatically assign each job to one of 23 modules, including 'generic exposure' and 'work location' modules. We evaluated the proportion of jobs assigned the work location module that were redirected to more specific modules and the prevalence of 'yes' responses to solventexposed tasks in the generic exposure module as indirect measures of the sensitivity of capturing relevant work task information.

Results The work location (29%) and generic exposure (21%) modules were the most frequently assigned to the 31,398 jobs. Of those jobs assigned the work location module, 8% were redirected to the generic module based on location of 'construction' and 12% were redirected to other modules. In total, 7,359 (23%) jobs were assigned the generic module: 38% based on screening questions with no relevant keywords identified; 50% based on ambiguous keywords; and 11% based on work location module. For these three pathways, the prevalence of 'yes' responses to any of the module's task and bystander questions were 77%, 44%, and 23%, respectively.

Conclusions The screening and the work location questions were successful in identifying jobs involved in tasks of interest that would have been missed if we had solely used the algorithm keyword search for jobs, tasks, and industries of interest.

RF-170 MULTIFACTORIAL APPROACH FOR ASSESSING WORK ABILITY AMONG NURSING STAFF IN MONASTIR TEACHING HOSPITAL, TUNISIA

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Introduction Work ability is a multifactorial concept that represents the interaction between human resources and working conditions. It is a dynamic process widely changing during human work life.

Objectives To measure the work ability index among nurses and to assess its determinants and propose strategies to maintain good work ability among this category of workers.

Methods This is a cross-sectional study conducted among a teaching hospital nurses between October 2017 and December 2018. A stratified random sampling method was employed, according to work department and gender to ensure a representative sample of the nurses working in the hospital. Nurses' work ability was assessed using the work ability index questionnaire including subjective and objective assessments. The job content questionnaire was used to assess job stress and social functioning at work for each participant. Each participant, including physical exercise performed out of work, and homework, underwent a battery of physical functional tests.

Results The mean work ability index score was 41.5 ± 5.6 . Multiple linear regression analysis revealed a positive significant association between mean work ability index score and regular nightshift working schedule, higher decision latitude, stronger grip and a better score of sit-to-stand test. In contrast, male gender, higher body mass index and higher level of perceived stress were inversely associated to the mean work ability index score.

Conclusion Efficient preventive actions based on a higher autonomy in nurses, promoting healthy lifestyles and introducing changes regarding schedule distribution according to the work ability index score would be helpful to promote work ability among nurses. The grip strength test and sit-to-stand test measures, seems to be suitable for nurses' work ability evaluation by occupational physician.

RF-367 OCCUPATIONAL EXPOSURE TO AGENTS AND SUBSTANCES IN THE CARTAGENE COHORT

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Introduction Occupational exposures are related to occupational diseases burden and increased susceptibility to health issues. The joint assessment of occupational exposure and disease outcome is the key to accelerate breakthroughs in occupational health research.

Objectives Occupational data including coding of occupations and exposure assessment from a large population cohort such as CARTaGENE may help the research community in uncovering workplace-related health disparities. **Methods** CARTaGENE is the largest prospective cohort in Quebec with 43,000 participants recruited among the general population aged 40–69 years at baseline. Approximately 10,000 participants filled out an occupational history question-naire and data were then coded to create a job titles and industry types database. Then, the CANJEM matrix was applied to assign exposure to 258 chemical agents based on occupations (probability and median dose of exposure).

Results The 10,895 CARTaGENE participants reported a total of 21,612 jobs, 45% were held by men and 55% by women. For 1,253 jobs (5.8%) occupation code in the NOC 2011 system was impossible to assign because of lacking information. The majority of jobs were in white collar occupations (18.97%). Among the most prevalent exposures (>10% jobs having probability of exposure >25%) in the cohort were solvents, polycyclic aromatic hydrocarbons, cleaning agents, biocides, engine emissions and aliphatic alcohols. Overall, 18 agents have an overall prevalence greater than 5%, while a further 64 agents have a prevalence greater that 1%.

Conclusion Such data is relevant from a public health perspective that uses a population-based approach. CARTaGENE has the advantage to integrate a rich collection of data on each participant such as health questionnaires (diseases, lifestyle), physical measures (blood pressure, spirometry), biochemical data (triglyceride, creatinine), genetic data that could be combined to occupational history data. Ultimately, this public resource available to researchers worldwide allows to carry out further research on specific diseases or exposures conditions.

RF-421 KEYWORD SEARCHES OF O*NET JOB TASKS FOR EXPOSURE ASSESSMENT, UNITED STATES OF AMERICA

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Introduction Job exposure matrices are often used for exposure assessment in occupational exposure and epidemiology studies. However, general population job exposure matrices are difficult to find and access for workers in the United States of America (U.S.).

Objectives We aimed to use publicly available information to determine exposure to a wide range of occupational agents for use in U.S. general population studies.

Methods We used information from the U.S. Department of Labor's Occupation Information Network database (O*NET) for 19,636 job tasks and 974 civilian occupations. We used automated keyword searches of each job task to identify job tasks that involved exposure to 50 occupational agents. We had two reviewers determine whether each identified job task actually involved exposure to the 50 occupational agents. We calculated percent agreement to compare the reviewers' exposure determinations for each job task and exposure. We had a third reviewer, a certified industrial hygienist (CIH), assess any job task and exposure for which the two reviewers disagreed. The third reviewer also assessed a 10% sample of job tasks and exposures for which the two reviewers agreed. For each occupation, we used this information to derive three exposure variables for each occupational agent: ever exposure, number of job tasks of exposure, and frequency of exposure.

Results Our keyword searches identified a median of nine (interquartile range: 2.0, 40.5) job tasks for each occupational agent and the maximum was 308. The median percent agreement for the two reviewers' exposure determinations was 95% (interquartile range: 79%, 100%). The median percentage for ever exposure to the occupational agents was 0.41% (interquartile range: 0.10%, 1.08%) and the maximum was 14.48%.

Conclusion O*NET information can be used to determine exposure to a wide range of occupational agents. We intend to use O*NET information in epidemiological studies of the U.S. general population.

RF-449 THE RATE OF NOISE-INDUCED HEARING LOSS IN RELATION TO OCCUPATIONAL NOISE EXPOSURE AMONG WORKERS IN ISRAEL

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Introduction Annual audiometric screening is the default protocol for occupational settings. This frequency of testing is costly for the health system, employees and employers in terms of money, resources and time.

Objectives To investigate the annual rate of clinical deterioration of hearing of workers. Secondly, the study aimed to establish an effective, efficient, hearing screening frequency protocol for noise induced hearing loss (NIHL) screening in noise exposed workers in Israel.

Methods A historical cohort study was conducted. Audiometric surveillance data from the Jerusalem occupational medicine registry of employees in various industries across the district from 2006–2017 were used. Plants from Jerusalem district with noise levels, equal to or greater than a timeweighted average (TWA) sound level of 85dB(A) for 8-hour work day were considered hazardous. Joinpoint regression was used to assess significant changes in the trend of detected hearing loss for different time intervals between audiological check-ups.

Results 263 noise exposed workers and 93 reference workers were followed for 12 years producing 1913 audiograms for analyses. Threshold shifts among noise-exposed workers became significantly stable at approximately 1dB/year at three years (p=0.037) using frequencies 1–4 kHz. Noise- exposed workers, aged below 50 at entry, showed stabilized threshold shifts of 0.8dB annually on intervals of 3–8 years, compared to 0.35dB shift annually using the 0.5–2 kHz.

Conclusions The trend of mean hearing threshold shifts in noise-exposed workers becomes a nearly constant at 0.8dB shift annually at 3 years onwards. These small annual changes are within the measurement error of audiometers (± 5 dB). Therefore, intervals between subsequent tests should be considered so as to identify a significant and real deterioration in hearing and avoid unnecessary medical investigations. A triennial audiometric screening frequency would be a better surveillance method for noise exposed workers in the category of 85-90dB(A) without other known risk factors.

Psychosocial and Mental Health

RF-130 WORKPLACE PSYCHOSOCIAL HAZARDS ARE ASSOCIATED WITH EMOTIONAL DISTRESS AND BURNOUT IN CIVIL AVIATION PILOTS

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Introduction Pilots have been deemed as safety-sensitive personnel, and they face work patterns of long working hours and jet lag. Failure to properly recover from fatigue may cause adverse health effects, affecting flying public flying safety.

Objectives This study explores the distribution of national civil aviation pilots' work stress and its association with health impacts.

Methods In cooperation with the Taoyuan Union of Pilot, we had issued structured online questionnaires to member pilots as part of the survey. The questionnaire records the respondent's seniority, flight time, and flight characteristics. We assessed workplace psychosocial hazards with the Chinese version of the Job Content Questionnaire (C-JCQ). Mental health conditions were measured with the Brief Symptom Rating Scale (BSRS-5), sleep status with the Epworth Sleepiness Scale (ESS), and burnout with the Chinese version of the Copenhagen Burnout Inventory (C-CBI). Fatigue symptoms on duty were also recorded. The correlation between workplace psychosocial hazards and health effects were analyzed by the regression model.

Results 160 pilots had filled out the questionnaire, with an average age of 40, ten years of work experience, and an average flight time of 753.3 hours per year. The standardized scores for work demand and work control were 57.8 and 54.7, respectively, higher than the national norm. 28.76% of pilots had emotional distress. Daytime sleepiness was observed among 23.13% of pilots. 25.63% of pilots had work-related burnout with moderate or higher severity. High work demand, low work control, and numbers of red-eye flights were predictors of emotional distress and work-related burnout, and the average flight time is also significantly positively correlated with work-related burnout.

Conclusion Characteristics of active work with high work demand and high work control were observed in national civil aviation pilots. A considerable proportion of pilots experience emotional distress, daytime sleepiness, and burnout.

RF-232 THE POPULATION MAJOR DEPRESSIVE DISORDER IN THE YEARS AFTER SEVERE WILDFIRES IN PORTUGAL CENTRO REGION: THE ROLE OF PERCEIVED HEALTH STATUS, HEALTH VULNERABILITY, RESILIENCE AND SENSE OF COHERENCE

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Objective The aim of this study was to identify the effects of severe wildfires on the population's mental health in the long term and the role of perceived health status, health vulnerability, resiliency and sense of coherence.

Methods A longitudinal survey with 3 waves (9, 19 and 24 months after the wildfire) was carried out in a representative sample of the municipalities'population affected by the 2017 severe wildfires in the central region of Portugal with data collection by questionnaire on CAPI mode. PHQ 8 (major depressive disorder-MDD), sense of coherence (SOC) and resiliency (CD-RISC) scales were included along with 4 questions related to perceived health status and demographic variables. Statistical analysis was performed using generalized estimating equations approach.

Results 312 individuals (95% of the sample) participated in the set of the 3 waves. The prevalence of MDD was higher than the overall value of the country (9.1%) and of the region (9.75%) with higher values in the 1st and 3rd waves (21% and 20%, respectively) and a decrease in the 2nd wave (11.6%). No significant relation between resiliency and MDD over time was observed, but SOC, perceived health status and the expected health worsening showed a negative relation with MDD, except for individual disease vulnerability.

Conclusion The higher prevalence of MDD 24 months after wildfires exposure is a great concern. The influence over time of perceived health status and expected health worsening points to the need for a more integrated approach of mental and GP care. The SOC influence shows that participants still have personal resources to face adversity but personal disease vulnerability along with the lack of resiliency effect suggests a low adaptation ability in this population that should be enhanced.

RF-267 AGE AND GENDER DIFFERENCES IN PERCEIVED WORK-RELATED MENTAL HEALTH IN NEW ZEALAND

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10.1136/OEM-2021-EPI.378

Introduction Work-related mental health has increased considerably and become a major health and safety concern in New Zealand. It could affect work performance and productivity, and lead to a number of serious work-related injury and other illnesses. This study aims to explore impact of age and gender on self-reported work-related mental health among workers across all industries in New Zealand.

Methods Over 4,000 participants were recruited to the survey. Both online and telephone interviews were undertaken. A small number of face-to-face interviews were taken in high deprivation areas. Weighting age by gender within industry was applied to prevent bias and ensure the population representativeness.

Results Overall, 62% of workers mentioned experiencing at least one of work-related mental health issues (either depression or anxiety or stress) within 12 months prior the study time. The prevalence of work-related stress, anxiety and depression reported by workers was 59.8%, 31.2% and 19.7%, respectively. Work-related mental illnesses were reported statistically more prevalently in females compared to males (64.3% vs. 59.8%). Elderly workers aged 60 years and above were statistically less likely to report work-related mental health issues compared to other age groups. When stratified gender by age group, young female workers from 18 to 29 years of age were statistically more likely to report experiencing work-related mental health issues than any other groups of workers.

Conclusion Perceived work-related mental health is greatly affected by age and gender. Improving mentally healthy working environment could be more effective if workers' age and gender are taken into account. Future studies are needed to identify any difference of demographic characteristics between self-reported work-mental health issues by workers and diagnosed mental illness resulting from work by doctors for better workplace health and safety interventions.

RF-270 DOES THE TIMING AND DURATION OF MENTAL HEALTH PROBLEMS DURING CHILDHOOD AND ADOLESCENCE MATTER FOR LABOUR MARKET PARTICIPATION OF YOUNG ADULTS?

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Introduction Little is known about the effect of timing and duration of mental health problems (MHPs) on young adults' labour market participation (LMP).

Objective This life-course study aims to examine whether and how the timing and duration of MHPs between ages 11 to 22 are associated with LMP at age 26.

Methods Data was used from Tracking Adolescents' Individual Lives Survey (TRAILS), an ongoing Dutch prospective cohort study. Internalising and externalising problems were measured by the Youth/Adult Self-Report at ages 11, 13, 16, 19 and 22. LMP (having a paid job yes/no) was assessed at age 26. Logistic regression analyses were performed with 15-year follow-up data (N=874).

Results Internalising problems at all ages and externalising problems at ages 13, 19 and 22 were associated with an increased risk of not having a paid job (internalising problems odds ratios [ORs] ranged from 2.24, 95% confidence interval [CI] 1.02–4.90 at age 11 to OR 6.58, CI 3.14–13.80 at age 22; externalising problems ORs from 2.84, CI 1.11–7.27 at age 13 to OR 6.36, CI 2.30–17.56 at age 22). Especially young adults with a long duration of internalising problems had an increased risk of not having a paid job in young adulthood compared with participants without mental health problems (OR 3.20, CI 1.88–5.45).

Conclusion Regardless of the timing, experiencing MHPs during childhood or adolescence increases the risk of not having a paid job. In particular, those young adults with a long duration of internalising problems are at risk of not having a paid job. These findings emphasize the necessity of applying a lifecourse perspective when investigating the effect of MHPs on LMP. Early monitoring, mental health care, and timely provision of employment support may improve young adult's participation in the labour market.

RF-382 ASSOCIATION BETWEEN WORKPLACE BULLYING AND ACUTE AND CHRONIC LOW BACK PAIN IN CIVIL SERVANTS FROM A MIDDLE-INCOME COUNTRY

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Introduction Psychosocial factors at work are risk factors for several health outcomes, including musculoskeletal disorders such as low back pain (LBP). Few studies from high-income countries suggest a positive association between bullying at work and musculoskeletal pain, but the knowledge on this relationship is scarce. None studies on the theme are available from low- and middle-income countries.

Objectives Therefore, we aimed to investigate the association between workplace bullying and LBP in the last 7 days and chronic LBP in civil servants from a middle-income country.

Methods This is a cross-sectional study with 894 participants from judicial civil servants from a city in southern Brazil. Workplace Bullying was measured by the Negative Acts Questionnaire (NAQ-r) and Low Back Pain by the Nordic Questionnaire for Musculoskeletal Symptoms (NQMS). Logistic Regression was used to analyse data and test hypotheses, estimating prevalence odds ratios (POR).

Results The prevalence of workplace bullying was 18.2%. The overall prevalence of LBP in the last 7 days was 50.1%, and of Chronic LBP was 19.3%. Psychosocial factors at work such as occupational stress were strongly associated with both outcomes. Workplace bullying was strongly associated with LBP, even after adjustment for several confounders. The risk of LBP in the last 7 days among bullied workers was 89.0% higher (POR=1.89; 95%CI: 1.31–2.71), compared to non-bullied employees. Bullying was also associated with chronic LBP after adjustment for sociodemographic, behavioural and some occupational factors (POR=1.60; 95% CI: 1.05–2.44).

Conclusions Psychosocial factors at work, particularly workplace bullying, were strong risk factors for LBP, in contrast to most individual factors. Dose-response patterns were showed. Positive associations between bullying and LBP raise hypotheses on causation, emphasising the role of bullying as an important psychosocial risk at work. Further longitudinal studies should address these hypotheses, investigating mechanisms, effect modification and possible mediation.

Respiratory

RF-112 ASBESTOS-RELATED DISEASE IN THE ONTARIO ASBESTOS WORKERS REGISTER

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Objectives Research on asbestos-related disease (ARD) has traditionally focused on groups with well-recognized, consistently high exposure. Contemporary exposure to asbestos occurs more intermittently, for example during maintenance of asbestos-containing materials (ACM). The Ontario Asbestos Workers Register (AWR) was established in 1986 to track asbestos exposure. This study reports on the risk of ARD among workers in the AWR.

Methods Overall 33,490 AWR registrants were included. Data were linked probabilistically with administrative health databases (1986–2018) to identify cases of ARD. Workers were followed until diagnosis, death, age 100, last contact with the health system, or end of study, whichever occurred first. Incidence rates were compared to the general population using standardized incidence ratios (SIRs). Associations between ACM exposure and ARD were estimated using Poisson regression.

Results Overall 26,401(79%) AWR registrants were linked to health data; 97% were male. The mean age at cohort entry was 36 years. The most common industries represented were construction (61%), manufacturing (20%) and education (10%). Among men and women rates were markedly increased for mesothelioma [M:SIR 6.55(95% CI=5.34-7.96); W:SIR 19.3 (3.87-56.3)] and pulmonary fibrosis [M:SIR 13.8(11.9-15.9); W:SIR 9.15(2.46-23.4)]. The risk of asbestosis was also elevated, but did not reach statistical significance among women [M:SIR 11.1(9.46-12.9); W:SIR 1.21(0.02-6.75)]. Among men and women, rates of COPD and lung cancer were elevated, but few cases were observed among women. Compared to workers with 238 hours had increased rates of lung cancer [RR 1.3(1.07-1.57)], mesothelioma [RR 3.13(1.94-5.06)], asbestosis [RR 3.31(2.33-4.71)], COPD [RR 1.34 (1.22-1.48)], and pulmonary fibrosis [RR 1.86(1.34-2.58)].

Conclusion Exposure to asbestos in construction and building maintenance continues to contribute to ARD incidence. Though a Canadian ban on asbestos use in new products is encouraging, it is likely to have minimal impact on ARD resulting from construction activities, where exposure to existing ACM will persist.

RF-274 CARDIORESPIRATORY FITNESS OF POLICE RECRUITS: NORM-REFERENCED VALUES AND 14-YEAR TEMPORAL TREND.

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Introduction Many have highlighted the increased risk of cardiovascular diseases (CVD) among police officers. Because a low cardiorespiratory fitness (CRF) in young adulthood is associated with a higher risk of CVD incidence, the identification of police officers exhibiting low CRF upon entry in the profession could allow the implementation of targeted strategies for the primary prevention of CVD. Unfortunately, reference values for the CRF of Canadian police recruits are not yet available.

Objectives This research aimed to provide reference standards for the CRF of police recruits in Québec (Canada) and to evaluate the trend in the CRF of recruits over a 14-year period.

Methods This cross-sectional study was divided into two research phases. First, fifty-one police cadets performed both an indirect calorimetry assessment of their maximal oxygen consumption (VO2max) and the Physical Abilities Test (PAT) used for the recruitment of police officers in the province of Québec. Using results from both tests, a model was developed to estimate VO₂max based on PAT results. The CRF of police recruits who completed the PAT from 2004 to 2017 was then retrospectively assessed using the previously developed model. Results Based on the analysis of 7234 PAT results, the average $\dot{V}O_2$ max was 53.33 ± 2.90 ml·kg⁻¹·min⁻¹ for male recruits and $43.78 \pm 2.89 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ for female recruits. Furthermore, bivariate correlation analyses suggested small but significant increases in the \dot{VO}_2 max of both male (r_s = .105, p < .001) and female recruits ($r_s = .125$, p < .001) over the 14year period studied.

Conclusion Our results suggest that the CRF of police recruits in Québec is considerably higher than their North American peers. Furthermore, although clear conclusions cannot be drawn from our temporal trend analyses, our data suggest that the CRF of police officers from this population did not decline over the last decades as previously suggested by others.

RF-408 WORK-RELATED RESPIRATORY SYMPTOMS AND ECZEMA AMONG SWEDISH EYELASH STYLISTS

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Introduction Eyelash extension is a beauty treatment established in recent years. The eyelash stylists apply eyelash extensions on natural lashes, using adhesives based on cyanoacrylates. Exposure to cyanoacrylates may cause asthma and eczema.

Objectives The main objective was to survey work-related respiratory symptoms and eczema among eyelash stylists in Sweden. Occupational exposure and use of personal protective equipment were also studied.

Methods Questionnaires with focus on work-related respiratory symptoms, eczema and occupational exposure conditions were sent to 656 eyelash stylists in the four largest cities of Sweden (Stockholm, Göteborg, Malmö and Uppsala). The participants were identified by an internet reservation site for eyelash extensions and by social media. The participation rate was 26% (169 respondents).

Results The main part of the respondents (74%) had been working as eyelash stylists for more than 2 years. 59% of them reported that they had respiratory symptoms and 15% that they had eczema (12-month prevalence). One third of the respondents had a colleague who had changed occupations due to respiratory symptoms or eczema. Almost 20% reported that they had customers who had had respiratory symptoms in association with lash extension and almost 10% stated that customers got eczema. Approximately 85% of the respondents reported that they used personal protective equipment, but more than 50% only used surgical masks that do not protect against acrylates. About 20% reported that they were using protective gloves at work.

Conclusion The survey shows that many eyelash stylists have respiratory symptoms and that some of them have eczema. The surgical masks most commonly used do not provide sufficient protection against acrylates present in the work environment of the eyelash stylists. In addition, the survey indicates that far too few eyelash stylists use protective gloves at work.

RF-417 OCCUPATIONAL RHINITIS AND ASTHMA CAUSED BY ISOCYANATES

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Introduction Isocyanates are strong respiratory sensitizers. Repeated and prolonged occupational exposure to these molecules is currently one of the leading causes of allergic asthma and rhinitis in the workplace.

Objectives Describe the socio-professional, clinical, functional and allergological characteristics of cases of asthma allergic to isocyanates, and assess their impact on medical fitness for work.

Methods Retrospective study covering all cases of occupational allergic asthma and rhinitis to isocyanates collected from the Department of Occupational Medicine of La Rabta hospital during the period from January 2000 to July 2020.

Result: This is a series of 26 patients with a mean age of 42.62 ± 9.01 years, including 19 women and 7 men. The majority belonged to the automotive sector (19 cases). They were mainly workers responsible for gluing and sheathing the steering wheels (16 cases). The average seniority in the post was 12.88 ± 6.01 years. The lack of personal respiratory protection was reported by the majority of patients (24 cases). The first functional manifestations appeared on average 8.15 \pm 5.13 years after exposure, dominated by nasal pruritus and rhinorrhea (16 cases) and wheezing dyspnea (5 cases).Rhythmicity with work was reported by all patients. The physical examination revealed a congestive mucosa (3 cases) with severe obstruction (1 case). Reversible obstructive or airway hyper reactivity was confirmed in 11 cases. Finally, we identified 15 cases of allergic rhinitis, 7 cases of allergic asthma and 4 cases of rhinitis associated with asthma. This morbidity justified an adaptation of the workstation in 12 patients and a mutation of the post in 12 cases. the majority of patients (23 cases) benefited from a declaration of this morbidity as occupational disease.

Conclusion Occupational exposure to isocyanates represents a significant allergic risk. This risk remains avoidable by putting in place appropriate individual and collective preventive measures.

RF-441 **RESPIRATORY AND ALLERGIC SYMPTOMS IN CANNABIS** CULTIVATION WORKERS, CALIFORNIA, USA.

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Introduction Cannabis (Cannabis sativa, marijuana) is the largest cash crop in California. While it is difficult to characterize the size of the industry, total production is estimated at 15 to 16 million pounds per year with total revenues exceeding \$10 billion per year. There are approximately 40,000 full-time equivalent cannabis jobs in the state. Despite the huge size and rapid growth of the industry, there has been little research on the health and safety of cannabis workers.

Objectives The goal of this pilot study was to explore the feasibility of collecting cannabis worker health data with a selfadministered survey and to analyze the first systematically collected data on occupational respiratory and allergic symptoms among California cannabis cultivation workers.

Methods We performed a cross-sectional survey of 29 workers at two cannabis farms in the Davis/Sacramento, California area. The questionnaire elicited information about the participants' personal and job characteristics and nasal, respiratory, dermal, and eye symptoms. **Results** All eligible workers chose to participate. Most participants were men age ≤ 30 years, with 48% of participants self-identifying as non-Hispanic white and 58% reporting at least some college education. The median tenure of all work in the cannabis industry was 26 months (IQR: 9, 78). All participants were current or past cannabis users. Five (17%) workers reported physician-diagnosed asthma; however, 11 workers (38%) reported symptoms suggestive of asthma. Work-related symptoms of any type were reported by 11 (38%) participants.

Conclusion The survey was a satisfactory data collection method. The participants had a demographic makeup distinct from traditional California agricultural workers, who are predominantly Latino, speak Spanish, and have less formal education. The high proportion of respondents with symptoms suggestive of asthma raises concern; sensitization to the cannabis plant has been reported among cannabis users and there are many well-documented agricultural exposures causing asthma and asthma-like syndrome.

RF-14 THE ASSOCIATION BETWEEN SHIFT WORK, MENTAL HEALTH AND CARDIOMETABOLIC HEALTH IN THE ATLANTIC PATH COHORT

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Introduction Contemporary work environments increasingly rely upon a 24-hour work cycle resulting in more employees exposed to shift work. Thirty percent of working age Canadians work evening, night and rotating shifts. Compared to regular daytime work, shift work has the potential for disturbing sleep patterns and disrupting circadian rhythms with adverse health effects.

Methods A population health study was conducted with 4,155 shift workers and 8,258 non-shift workers from the Atlantic PATH cohort. Linear and logistic regression models were used to assess the differences in i) self-reported mental health measures between shift workers and non-shift workers and ii) anthropometric measures (body adiposity) and self-reported cardiometabolic disease outcomes (obesity, diabetes, and cardiovascular disease).

Results Shift workers reported higher levels of each of the mental health domains. There was a significant increased risk of depression (OR=1.13, 95% CI, 1.00–1.27) and poor self-rated health (OR=1.13, 95% CI, 1.14–1.55) among shift workers compared to non-shift workers. There was a significant increased risk of cardiovascular disease, obesity, and diabetes among shift workers despite higher levels of physical activity and lower levels of sedentary behaviour compared to matched controls. Shift workers were 17% more likely to be obese (95% CI 7–27) and 27% more likely to have diabetes (95% CI 8–51).

Conclusions Shift work is associated with cardiometabolic health and mental health, as well as depression. The association between shift work and cardiometabolic health was independent of body mass index for cardiovascular disease and diabetes, and independent of fat mass index for diabetes. Subsequently, shift workers have an increased risk of developing other chronic disease.

RF-103 DETERMINANTS OF SLEEP PATTERNS IN HEALTH CARE PROFESSIONALS WORKING PERMANENT NIGHT SHIFTS OR ROTATING DAY SHIFTS: A MULTIVARIATE ANALYSIS BASED ON ONE-WEEK SLEEP DIARIES AND SENSOR DATA

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Introduction Night shift and rotating shift work schedules are associated with mismatch between sleep-wake cycle and circadian rhythms, leading to sleep disturbances and adverse health effects. The impact on health and sleep patterns of shift work schedules among health care professionals working in public hospitals in Paris has been a matter of concern.

Objectives To investigate the effect of shift work schedules on sleep patterns among healthcare professionals working either as permanent night shifters (NS) or as day shifters (DS) with rotating morning and afternoon shifts.

Methods Study participants included 95 NS and 105 DS who completed a questionnaire on work history, lifestyle, sleep disorders, and job strain. Sleep and work hours were extracted from self-completed sleep diaries during a full work week. Periods of rest or activity were determined from a chest-worn sensor (PICADO [®]) in 63 NS and 77 DS, using a hidden Markov model. Determinants of sleep patterns were investigated using linear mixed models.

Results According to sleep diaries, NS had both a shorter sleep duration during work days compared to DS (5.4 h \pm 1.5 vs 6.8 h \pm 1.2), and a greater sleep debt over the study week (3.2 h \pm 1.9 vs 1.4 h \pm 1.5). The total duration of rest periods determined from the sensor was greater than the total sleep duration, particularly among NS (8.3 h \pm 1.7). In addition to shift type, older age, chronotype with morning preference, high BMI and job strain were found to be independently associated with shorter duration of sleep and rest periods.

Conclusion Shift work schedules among health care professionals may lead to sleep deprivation, which may be mitigated by taking longer periods of rest bouts, particularly in permanent NS. Time slots allowing for rest periods during work hours are important to prevent health consequences of sleep disorders in these workers.

RF-104 DURATION OF NIGHT SHIFT WORK IS ASSOCIATED WITH AGE ACCELERATION IN HYPERSUSCEPTIBLE FEMALE NURSES

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Introduction Disruption of age-related processes seems to play a relevant role in health effects related to night shift (NS) work. We had observed a decrease between telomere length (a marker of aging) and number of years in NS in subjects employed in NS \geq 12 years.

Objectives We now investigate the association between NS work and biological age (BA) estimated through an epigenetic

signature based on methylation of five CpG sites in ELOVL2, C1orf132, TRIM59, KLF14 and FHL2 (Zbieć-Piekarska et al., 2017).

Methods Forty-six female nurses employed in NS for at least two years were matched by age (30–45 years) and length of service (≥ 1 year) with 51 female colleagues not working in NS. Each subject filled in a semi-structured questionnaire [including the Effort Reward Imbalance (ERI) index to assess job stress] and gave a blood sample. We applied linear regression models adjusted for BMI, ERI, and smoking habit and performed stratified analyses to investigate effect modifiers. We estimated age acceleration by regressing biological age on chronological age and taking the residuals.

Results Working in NS and number of years in NS were not associated with BA in the overall population. Overweight/ obese subjects showed an increase in age acceleration per each year in NS [0.46 (0.05; 0.87), p = 0.030, p for interaction = 0.097] as well as subjects exposed to occupational stress (ERI >1) [0.58 (0.10; 1.06), p = 0.018, p for interaction = 0.056]. Interestingly, we observed a higher age acceleration [0.66 (0.03; 1.29), p = 0.041] when considering both categories combined, even if no formal interaction was apparent.

Conclusion Although hampered by the small sample size, our findings suggest a relationship between age acceleration and number of years in NS in hypersusceptible workers, i.e. overweight/obese or exposed to occupational stress.

RF-142 NIGHT WORK CHARACTERISTICS AND INCIDENCE OF CORONARY HEART DISEASE: EXPOSURE-RESPONSE RELATIONS

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Introduction Increasing years of recent rotating night shift work has been associated with increasing risk of coronary heart disease among nurses.

Objective We examined the association between numbers of monthly night shifts, other quantitative night work characteristics and coronary heart disease among nurses, physicians and other health care workers with the aim to provide evidence based recommendations for night work schedules.

Methods In a register-based national cohort study with a 2007–2015 follow-up, we followed 100,593 night workers (80% women) and 158,084 day workers (78% women) employed at public hospitals in Denmark. We defined a night shift (\geq 3 hours between 12am and 5am) and different quantitative night work characteristics (i.e., number of monthly night shifts, cumulative night shifts, years with rotating night shifts, years with any night shift and consecutive night shifts) from day by day payroll information on work hours from the Danish Working Hour Database. Outcome was first time hospital admission for coronary heart disease. At end of follow-up a subgroup of 34,432 participants reported lifestyle factors i.e. tobacco smoking, alcohol consumption, body mass index and prior regular night work.

Results During follow-up, 1203 night workers (68% women) and 2219 day workers (66% women) were diagnosed with

coronary heart disease. Among night workers, we observed no consistent exposure-response relations for any quantitative night work characteristic. However, men, but not women night workers showed an overall increased incidence rate ratio of coronary heart disease of 1.22 (95% confidence interval 1.07–1.39) compared with dayworkers that could not be explained by medical or lifestyle factors.

Conclusion Our observation of no exposure-response relation between several quantitative night work characteristics and coronary heart disease does not provide support for an association between night work and coronary heart disease warranting specific night work schedules to prevent coronary heart disease.

RF-187 NIGHT SHIFT WORK INCREASES THE RISK OF DIABETES: A 17-YEAR FOLLOW-UP COHORT STUDY AMONG ASIAN HEALTHCARE WORKERS

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Introduction In East Asian countries with highly developed economies, the prevalence of diabetes is rapidly increasing. Long working hours and shift work are suspected to be important risk factors in East Asia. A long-term follow-up study is warranted to clarify the relationship between diabetes, working hours, and shift work.

Objectives To evaluate the association of night shift work and risk of diabetes among Asian healthcare workers, and to explore their dose-response relationship using actual hours of night shift work monthly rather than cumulative years with night shift work.

Methods A retrospective cohort study was conducted among employees in a tertiary medical centre in central Taiwan. From 2002–2019, there were 7767 participants with a mean (\pm SD) age of 27.9 (\pm 7.0) years, and 89.6% of them were women. We collected information related to annual health check-ups, medical charts, and annual working hours, including during day, evening, and night shifts. We divided working hours into three categories (less than 60 hours per month, 60 to 100 hours per month, more than 100 hours per month). We estimated hazard ratios and 95% confidence intervals (CIs) for incident diabetes using Cox proportional hazards models, adjusting for age, sex, and body mass index.

Results 309 (3.98%) incident cases of diabetes occurred during 56,799 person-years at the 17-year follow-up. In the age- and sex-adjusted model, the HR (95% CI) for those who worked night shifts for more than 100 hours per month was 2.062 (1.179 to 3.608) compared with those who worked fewer than 60 hours. In the stratified analysis, the association between night shift work and diabetes was significant among those aged <40 years, females, and obese participants.

Conclusions Among Asian healthcare workers, night shift work is associated with the incidence of diabetes in a dose-dependent manner. This finding could identify workers at high risk of diabetes to provide preventive strategies.

Work organization and Return to Work

RF-37 ASSOCIATION BETWEEN MENTAL HEALTH SYMPTOMS AND SHIFTWORK AMONG FILIPINO WOMEN FACTORY WORKERS

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10.1136/OEM-2021-EPI.391

Introduction This study aimed to look at the association between working at night and mental health symptoms, and mediating factors to this association.

Methods This study looked at a database of 500 factory workers, about 90% of which were females. It originally investigated hazard exposures and occupational health of workers in export processing zones in the Philippines. The database included variables relating to work schedule such as night shift, overtime, and extended work, as well as mental and psychological health indices through a survey questionnaire.

Results The study showed that work schedule, work load and occurrence of mental health symptoms are associated with night schedule. The crude odds ratio for the association between shift schedule and frequency of occurrence of mental health symptoms is 2.13 (0.77–5.81). This means that without adjusting for confounders, those who work in the evening are 2.13 times more likely to have frequent occurrence of mental health symptoms as compared to those who work in the morning. Specifically, among females, those who work at night are 2.97 times more likely to have frequent occurrences of mental health symptoms compared to those who work in the morning. Those who are frequently exposed to occupational hazards are 5.78 (1.17–28.71) times more likely to have frequent occurrence of mental health symptoms as compared to those who are not. The evidence for this association is strong.

Conclusion The study has shown that among Filipino women factory workers, nightshift work is associated with mental health symptoms.

RF-182 ADOLESCENT TRAINEES WITH LEARNING DISABILITIES ON OCCUPATIONAL HEALTH AND SAFETY: PERCEPTION OF RISKS AND GENDER DIFFERENCES

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Introduction Adolescents with learning disabilities are vulnerable in terms of occupational health and safety (OHS). The Quebec Work-Oriented Training Path (WOTP) prepares them for the job market by offering pre-employment internships. Those are often typically feminine or masculine, and attract students according to their gender stereotypes. This segregation implies different OHS risks for women or men, who have chosen different environments. Considering this complex context, a research team is developing digital tools to improve the OHS management in the WOTP.

Objectives The first step is to identify what students currently understand about OHS, the risks present in their internships, and how gender influence these elements. Methods A short answer questionnaire addressing these topics was completed by 131 WOTP students (38 girls and 93 boys).

Results The three most popular work environments were garages (tire installer, 17 boys), retail stores (stock handler, 21 boys, 9 girls) and restaurants (fast-food counter attendant and cook's helper, 17 boys, 6 girls). More than 40% of the girls are in typically female occupations: hair salon assistant (7), assistant childcare educator (5), grooming assistant (3) and recreation assistant (1). When asked if they perceived risks in their internships, 50% of girls and 80% of boys say yes. All girls say they consider OHS important or very important, while 13% of boys are indifferent or consider it not very important. Concerning the OHS training received at the work-place, 38% of the girls and 50% of the boys stated that they had received some.

Conclusion These preliminary results suggest that girls and boys are not exposed to the same environments nor the same risks. The situation seems inequitable in terms of prevention and suboptimal for all, since a large proportion reported not having an OHS training. These shortcomings should be considered in the development of new tools.

RF-322 RATES OF RETURN TO WORK AND WORK ABILITY FOLLOWING KNEE REPLACEMENT

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Introduction There is limited evidence on the ability to sustain employment following knee replacement.

Objective To describe occupational status before and after unicompartmental (UKR) and total knee replacement (TKR) and to explore work ability after both types of knee arthroplasty.

Methods This study was set within the longitudinal Clinical Outcomes in Arthroplasty study. Eligible participants were those who were aged 18–64 years at the time of their primary arthroplasty and had at least 5 years' duration followup since. All eligible participants were mailed a questionnaire which enquired about: pre- and post-operative occupations and occupational exposures; time to reach best function; and leisure-time physical activities performed postoperation. We used Cox regression to estimate crude and adjusted hazard ratios with 95% confidence intervals to explore the role of work factors in determining post-operative work ability (CI).

Results 251 useable responses were received (61% response) amongst whom 158 (63%) returned to any work postoperatively. Most of these, 146 (92%) had been working pre-operatively. Detailed occupational exposure information was available for 145 (94 UKRs, 51 TKRs) of the 158 who RTW. The mean follow-up post-operation was 6.4 years (SD±1). Adjusted models showed that workers were at increased risk of leaving their job post-operation if an average working day involved: lifting/carrying \geq 10 kg (HR: 4.57 95%CI 1.52,13.79) or climbing 30 flights of stairs/day (HR:3.52 95%CI 1.29,9.59), as compared with workers not doing these activities. Mutually adjusted models showed that it was the lifting/carrying weights in excess of 10 kg that was most important (HR:3.6 95%CI 1.1,11.3). **Conclusion** Many people effectively return to work post kneereplacement. However, job retention is poorer in occupations that entail lifting weights and climbing flights of stairs. Subject to replication, these findings could imply a particular role for post-UKR/TKR rehabilitation amongst people needing to RTW in physically-demanding jobs.

RF-326 DOES PARTICIPATION IN MODIFIED RETURN TO WORK DIFFER FOR IMMIGRANT COMPARED TO CANADIAN-BORN WORKERS IN BRITISH COLUMBIA, CANADA?

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Introduction The longer workers are off work, the less likely they are to successfully return to work. Modified return-towork (MRTW) provides earlier work reintegration after an injury with the goal of full recovery and shorter work disability durations.

Objective This study examined differences in MRTW participation for immigrant compared to Canadian-born workers with a work-related injury in British Columbia.

Methods Workers' compensation claims data linked with immigration records were used to identify immigrant (economic, family or refugees/other classifications) and Canadian-born workers with an accepted short-term disability claim between 2009–2015 for acute (fracture and concussion) and chronic injuries (back strain and connective tissue). Injury cohorts were restricted to 30 days on claim for a common disability window to measure MRTW participation. The outcome of MRTW was measured as never offered MRTW or an offer of MRTW within the first 30 days on benefits. Individuals with an offer beyond 30 days were excluded.

Results In adjusted logistic regression models, immigrant classification was associated with a decreased odds ratio (OR) of receiving an offer of MRTW within 30 days across injury cohorts. For example, for workers with back strain injuries: OR=0.97 [95%CI 0.88, 1.07] for economic immigrants, OR=0.72 [95%CI 0.66, 0.79] for family class immigrants, and OR=0.74 [95% CI 0.64, 0.86] for refugee/other classifications. Similarly, for workers with a fracture injury: OR=0.94 [95%CI 0.72, 1.22] for economic immigrants, OR=0.84 [95%CI 0.64, 1.11] for family class immigrants, and OR=0.42 [95%CI 0.24, 0.76] for refugee/other classifications.

Conclusion Understanding why immigrant workers are less likely to be offered MRTW compared to Canadian-born workers for the same injuries is worthy of further investigation, and in particular for workers who arrived to Canada as refugees. A focus on increasing earlier provision of MRTW for longer term claims has the potential to reduce work disability duration among immigrant workers.

RF-298 OCCUPATIONAL RISK OF SALMONELLOSIS AND CAMPYLOBACTERIOSIS: A NATIONWIDE POPULATION-BASED REGISTRY STUDY

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10.1136/OEM-2021-EPI.395
Introduction Occupational exposure to animals and food of animal origin is a poorly characterized risk factor for salmonellosis and campylobacteriosis, the main causes of bacterial gastroenteritis in the Western world.

Objectives We performed a population-based registry study in The Netherlands to assess whether differences exist in the incidence of reported salmonellosis and campylobacteriosis cases among occupational groups, and whether these differences are reflected in the magnitude of exposure to these pathogens using serological data.

Methods Person-level occupational data for all Dutch residents during 1999–2016 were linked to lab-confirmed salmonellosis and campylobacteriosis data and to serological data from a national sero-survey. Standardized incidence ratios (SIRs) for salmonellosis and campylobacteriosis among occupational sectors and specific high-risk occupations were calculated based on the total employed population. Moreover, Salmonella and Campylobacter sero-incidence rates were compared among sectors and high-risk occupations.

Results Occupational exposure to live animals or manure and working in the sale of animal-derived food products were associated with significantly increased risks of salmonellosis (SIR 1.55 to 1.82) and campylobacteriosis (SIR 1.36 to 1.65). Moreover, incidences were significantly higher in specific industrial sectors, as well as healthcare and social work sectors. Mean sero-incidence rates ranged from 1.28 to 2.30 infections/person-year for Campylobacter, and 0.36 to 0.99 for Salmonella; with only slightly higher rates for people in high-risk occupations.

Conclusion Significant differences in reported salmonellosis and campylobacteriosis incidence exist among occupational sectors, with the highest incidence in those persons occupationally exposed to live animals. These differences are only partially reflected in the serology.

RF-149 MUSIC PROFESSORS: PROMOTION AGENTS REGARDING PREVENTION OF HEARING LOSS IN MUSICIANS

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Introduction Several studies document the occurrence of hearing problems in musicians due to the constant exposure of loud sounds during activities such as group rehearsals, music performances and individual practices. Most of them reveal that many musicians are unaware of the risks faced in making music and are resistant to preventive actions. However, it seems reasonable to reverse this context based on the development of preventive actions during the graduation time of this public.

Objectives To suggest a protocol of educational actions regarding hearing health with professors from higher education institutions in music.

Methods The elaboration of the protocol of educational actions in hearing health was based on active learning and problematizing methodologies, to happen through activities developed in the academic environment.

Results The protocol was developed to be applied in six modules, with of 1 h 30 min each, and contemplates the following topics (1) notions of anatomy-physiology of hearing, effects of high sound intensity, control measures and means of prevention of hearing loss; (2) acoustic characteristics of the work environment and workload in practical music classes and/or supervising internships (3) workshops towards the use of sound pressure level measurement apps and hearing screening apps; (4) composition and recording of jingles and podcasts related to the risks of exposure to high intensity music to play for music students.

Conclusion The development of the activities planned in the protocol can lead professors to incorporate the concepts and attitudes related to hearing health, to act as promotion agents to positively influence new generations of musicians with regard to that matter. The results must be continuously evaluated to identify the weaknesses and potential of the protocol.

Symposia

Symposia

S-55 NOVEL MECHANISMS UNDERLYING THE CARCINOGENICITY OF NIGHT SHIFT WORK

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Objectives Understanding the mechanisms by which an exposure causes cancer can be critical to establishing causality and to developing successful prevention/intervention strategies. Multiple mechanisms underlying the carcinogenicity of night shift work have been proposed, including several novel ones in recent years, though specific mechanistic links remain uncertain.

Methods Novel mechanisms for the carcinogenicity of night shift work will be reviewed. In the context of these mechanisms, the methodologic limitations that continue to plague human mechanistic studies of night shift work will also be discussed.

Results Multiple animal studies and some human mechanistic studies have pointed to suppressed DNA damage repair, epigenetic impacts and gut dysbiosis as novel mechanisms by which night shift work may cause cancer. Human mechanistic studies continue to suffer from multiple limitations such as small sample sizes, poorly defined shift schedules, inappropriate timing of biospecimen collection relative to conduct of night shift work and inadequate consideration of diurnal variation in biomarker measures.

Conclusions While there is compelling evidence for multiple novel mechanisms underlying the potential carcinogenicity of night shift work, additional high quality human mechanistic studies are needed to establish the relevance of these mechanisms.

S-58 MIXED EXPOSURES TO CLEANING AND DISINFECTING CHEMICALS IN HEALTHCARE OCCUPATIONS

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10.1136/OEM-2021-EPI.398

Introduction Certain cleaning and disinfecting products are used extensively in healthcare and associated with asthma and

respiratory symptoms. However, quantitative exposures to these products are not well-characterized. The objective of this study was to characterize exposures to cleaning and disinfecting chemicals in healthcare occupations.

Methods Exposure assessments were conducted at five hospitals targeted 14 healthcare occupations. Mobile-area and personal real-time and time-integrated air monitoring was conducted for volatile organic compounds (VOCs), and 14 specific VOCs were quantified, including total VOCs (TVOCs). Quaternary ammonium compounds (QACs) were quantified at one hospital. Exposure data were summarized by occupation and geometric means (GMs) and geometric standard deviations (GSDs) were calculated. GM exposure estimates for product-application tasks were obtained from linear regression models.

Results The GMs for TVOCs were highest among nursing assistants, licensed practical nurses, and medical equipment preparers (range: 4367-2142 ppb), followed by respiratory therapists, pharmacy technicians, registered nurses, housekeepers, floor strippers/waxers, and dental assistants (range: 2120-1565 ppb); GSDs varied from 1.06 to 9.01. GMs for selected VOCs were: ethanol (1.54-2594 ppb), acetone (18.5-70.6 ppb), chloroform (0.09–0.57 ppb), α-pinene (0.04–0.19 ppb), and d-limonene (0.12-4.23 ppb). Real-time TVOC GMs were the highest for the product-application tasks of using skin wipes containing QACs, using enzymatic cleaners, using glasscleaning products, cleaning instruments with high-level disinfectants, and using detergents to clean surfaces (2091-1049 ppb). Specific VOC levels were strongly associated with product-application tasks; using products containing bleach or QACs predicted levels of chloroform and d-limonene, respectively. Concentrations of QACs were low in short-duration $(0.23-1.5 \ \mu g/m^3)$ and full-shift $(0.006-0.028 \ \mu g/m^3)$ area air samples.

Conclusions Exposure levels of total and specific VOCs varied by occupations and tasks. These estimates can be used to generate a job-task exposure matrix for use in epidemiologic studies.

S-66

COVID-19 AND THE WORKPLACE

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The SARS-CoV-2 virus pandemics has raised several challenges at the workplace. Within the omega-net COVID-19 taskforce, we developed standardized COVID-19 questionnaires for occupational research, a multi-country COVID-19 Job Exposure Matrix, and research on COVID-19 as an occupational disease. The compiled questionnaire resource covers all key aspects of the COVID-19 pandemic, including: COVID-19 diagnosis & amp; prevention, Health and demographic, Use of personal protective equipment, Health effects, Work-related effects, Financial effects, Work-based risk factors, Psychosocial risk factors, Lifestyle risk factors, and Personal evaluation of the impact of COVID-19. For each of the domains additional questions are available. A second questionnaire (in a short and along version) focusses on occupational risk factors for SARS-CoV-2 infection and COVID-19 disease. The questionnaires are available online

https://omeganetcohorts.eu/news/covid19-questionnairesat omeganet/. The JEM was developed by experts from three European countries (Denmark, the Netherlands, UK), who defined the relevant exposure and workplace characteristics with regard to the possible exposure to SARS-COV 2 infection. The C19-JEM contains four determinants of transmission risk (number of people, type of people, indirect contact and location), two mitigation measures (social distance and face covering), and two social factors (income insecurity and migrant workers). Finally, we developed and piloted a questionnaire on COVID-19 as occupational disease, which provide data on 1) COVID-19 as occupational disease or injury, 2) criteria for recognition and compensation regarding exposure, disease, role of use of PPE and of competing non-occupational exposure; and 3) what can be compensated. Results are available from 36 largely European countries. Through the development and implementation of tools we not only provide instruments, but also insights on the occupational risks and diseases in relation to SARS-COV 2.

S-73 ARE EARLY WORKING LIFE PATTERNS RELATED TO THE COURSE OF FUTURE SICKNESS ABSENCE DUE TO COMMON MENTAL DISORDERS?

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Introduction In recent decades, the labour market has evolved into temporary employment, part-time work, and long-term unemployment, especially affecting young population and women. Transitions between states during working life could affect mental health.

Objectives To assess the relationship between early working life (EWL) patterns and the future course of sickness absence (SA) due to mental disorders.

Methods Cohort study of a working sample between 18 and 28 years of age, residents in Catalonia, with at least one episode of SA due to a mental disorder between 2012 and 2014. Reconstruction of individual working life trajectories previous to the SA were carried out by sequence analysis based on four work-related states (permanent, temporary contract, unemployment and without social security coverage). By optimal matching, patterns were identified out of clustering similar working trajectories. Identification of SA trajectories were made by latent class growth modelling analysis. Adjusted multinomial logistic regression models were applied to assess the relationship between early working life patterns and SA trajectories.

Results Among men, fluctuating (aOR 1.25[95% CI: 0.57-2.74]) or delayed (aOR 1.79 [95% CI: 0.59-5.41]) entry into the labour market showed a trend towards a middle stable accumulation of SA days. In women, an increasing permanent and fluctuating employment pattern (aOR 2.41 [95% CI: 1.01-5.75]) at the beginning of their EWL was related to a decreased accumulation of future days on SA due to mental disorders (aOR 2.08 [95% CI: 1.18-3.66]) rather than to a low stable trajectory.

Conclusions An unstable early working life built on a high number of transitions between temporary contracts, unemployment and lack of social security coverage states is related to a future worse SA course due to mental diagnosis.

S-78 INCIDENCE OF COVID-19 BY SECTOR

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10.1136/OEM-2021-EPI.401

Introduction The workplace is among the main activities for a large proportion of the population, and consequently a source of potential Sars-Cov2 infection. In this study we investigated longitudinally the incidence of COVID-19 by sector

Methods The 14-day incidence of confirmed COVID-19 cases per NACE-BEL code is calculated cross-sectionally in periods immediately preceding the Belgian soft lock-down of October 19, 2020, and is evaluated longitudinally by a Gaussian-Gaussian modelling two-stage approach. Additionally, we are analysing contact tracing data for companies affiliated with occupational health service IDEWE.

Results The peak of COVID-19 14-day incidence was reached in the period October 20-November 2, 2020 and was considerably higher than average in human health activities, residential care activities, fitness facilities, human resource provision, hairdressing and other beauty treatment and some public service activities. During the course of the study, we observed large outbreaks in processing, production and preserving of meat, poultry. Similarly, higher incidences was shown in some manufacturing sectors that are not able to telework (manufacturing of metals and textile). Employees in wholesale and retail daily confronted with multiple close contacts, resulting in higher incidences of COVID-19. Finally, the incidence of COVID-19 in the non-medical contact professions remained in general above the working population incidence. Finally, it is encouraging that 3 to 4 weeks after vaccination that the 14day incidences in health care workers, in- and out-hospital, and residential care in elderly employees are the lowest of all sectors.

Conclusion This analysis can help us to better understand causes of increased infection rates and it can offer us ways to reduce infections without jeopardizing the continuity of these sectors/companies for the benefit of all. These data can also support the epidemiological evidence for the recognition of COVID-19 as occupational disease.

S-80 OUTBREAK OF INVASIVE PNEUMOCOCCAL DISEASE AMONG WORKERS AT A NORWEGIAN SHIPYARD.

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10.1136/OEM-2021-EPI.402

Introduction/Objective Although exposure to metal fumes is known to increase the risk of pneumococcal disease, published outbreaks has been quite rare. However, during nine weeks in 2019, 20 confirmed and probable cases of disease were identified among 1.900 shipyard workers at one shipyard in Norway.

Method/Results The local hospitals initially detected the outbreak. The affected workers were of different European nationalities, most of them employed by different subcontractors. Sixteen were hospitalized. Isolates were available for serotyping for 17 cases, all isolates belonged to serotype 4. The same strain was found in a similar outbreak in Northern Ireland in 2015. Onsite inspection found a crowded shipyard in the process of finishing a new cruise ship. Many tasks were carried out in the same workspace; like welding, cutting, painting, and finishing on surfaces. The labour inspectorate ordered immediate occupational hygiene measures with short notification. Regulations on tobacco smoking, air quality improvements, and the use of personal protective equipment were all implemented. There were also given advice on measures for improving general hygiene at the yard. The National Institute of Public Health recommended vaccination for the involved workers. Around 1.500 of the 1.900 workers present at the shipyard were vaccinated by the shipyard's occupational health services. After onsite occupational hygiene measures and vaccination, no new cases were identified. There are published information on a similar outbreak in Finland later the same year, and also in France early in 2020.

Conclusion This outbreak indicates that the occupational risk of severe pneumococcal disease is multifactorial, and that metal fume exposure not only is limited to the occupational category welders. In Norway, vaccination with the pneumococcal is recommended for welders after risk assessment. Recommendation of pneumococcal vaccination to broader occupational groups exposed to metal fumes should be considered, and the working and living conditions.

S-81 INFECTIOUS DISEASE RISKS ASSOCIATED WITH OCCUPATIONAL EXPOSURE AMONG NON-HEALTHCARE WORKERS : A SYSTEMATIC REVIEW OF THE LITERATURE

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10.1136/OEM-2021-EPI.403

Objective The purpose of this systematic review is to provide an overview of the published evidence on the role of infectious diseases in occupational health, focusing on occupations other than health care workers. We started from a key systematic review from 2009, extending it up to November 2019.

Methods The subqueries of the review were translated into Embase/Medline/Cochrane queries, and the adequacy of these translations was checked. Studies were screened in two rounds. In the first, title and abstract were compared to the inclusion criteria. These were based on the previous review, adding 'Immune-related and respiratory conditions after exposure to bioaerosols' . In the second round, title, abstract and full text were assessed. Quality assessment was applied using published guidelines: SIGN for case-control and cohort studies, STROBE for cross-sectional studies, ORION for outbreak reports and CARE for case series.

Results 3353 unique results were yielded; 214 eligible studies were included. 44 occupations with in total 89 infectious disease exposures were found, some of which were overlapping between occupations. The occupations most frequently reported were armed forces (n=32 pathogens), garbage/recycling collectors (n=13), livestock/dairy producers (n=12), female sex workers (n=9); and forestry and wastewater workers (n=8). Exposure to bioaerosols was mentioned in various occupations: wastewater/garbage workers, biotechnology workers, poultry/abattoir workers, construction workers, public transport workers, greenhouse workers, hotel workers, firefighters, services for homeless, cash collectors, television crew, compost/greenhouse workers, grain and animal feed production.

Discussion Two general classes of biological agents could be recognized. The first comprised infectious diseases, including but not limited to zoonotic infections. The second class comprised organisms resulting in the production of bioaerosols, thus increasing the occupational risk of immune-related and respiratory conditions. Some occupations (e.g. mine work and welding) might increase susceptibility of workers to infection, without increasing the exposure to this pathogen.

S-85 SEX AND GENDER INEQUALITIES: SEGREGATION OF OHS EXPOSURES AND PREVENTIVE AVENUES FOR A POPULATION OF LOW-EDUCATED TEENAGERS ENTERING THE LABOUR FORCE

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As men and women hold different jobs, have different social roles and different power influence in societal strata, they are exposed to different physical and psychosocial hazards at work. Adolescents with lower levels of education who start working are particularly vulnerable to sex/gender segregation of tasks and exposure to different work hazards.

In Quebec, adolescents who have experienced significant academic delays are referred to the Work-Oriented Training Program (WOTP). In this program, they learn semi-skilled trades by doing practicums, through Co-operative Education. These placements involve many occupational health and safety risks. For example, students may be exposed to various toxic substances in cleaning jobs, to wood or metal dust in processing plants or garages, to allergens in pet care businesses, hair salons, or child care centers. As jobs are segregated by gender, prevention approaches must take this into account. Occupational health and safety (OHS) risk factors may differ by sex and/or gender (e.g. when a small girl uses tools designed for tall men; or when manual handling training only considers 'boxes' as potential loads rather than a variety of situations, such as angry children or objects). Accordingly, occupational safety and health programs and prevention strategies should consider sex and gender-related factors. Our team is developing educational tools and resources to help these students improve and maintain their health as they enter the workforce, through an equity perspective. This presentation will discuss the differentiated hazards faced by low-educated male and female adolescents, as well as promising prevention avenues, including specific consideration for 'invisible risks' often encountered by young women. The WOTP examples that will be given can be applicable to other contexts of vocational training and work integration in low-skilled jobs for young workers.

S-89 RESPIRATORY HEALTH IMPACTS OF CLEANING AND DISINFECTING EXPOSURES: DOES EVIDENCE SUPPORT A LINK WITH COPD?

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10.1136/OEM-2021-EPI.405

Introduction Concerns regarding the respiratory health effects of disinfectants and cleaning products (DCP) have been growing in the last two decades. Studies have shown associations between exposure to DCP and asthma. The irritant properties of many chemicals contained in DCP have prompted research on respiratory effects beyond asthma.

Objective to review the current evidence for an association between exposure to DCP and Chronic Obstructive Pulmonary Disease (COPD).

Methods We will present an overview of the recent epidemiological literature on the association between exposure to DCP at the workplace or at home and COPD. We will discuss challenges and opportunities for future research on this question.

Results Increased risk of chronic bronchitis or COPD have been reported among workers regularly exposed to DCP, such as cleaners or healthcare workers in both European and US populations. In a large cohort study of US female nurses, occupational exposure to DCP was significantly associated with an increased risk of developing COPD, independent of asthma. High-level exposure, evaluated by a job-task exposure matrix, to several specific disinfectants (e.g., glutaraldehyde, bleach, hydrogen peroxide) was associated with COPD incidence. An impact of exposure to DCP on lung function outcomes has also been reported in a European populationbased study. Exposure to cleaning activities either at work or at home was associated with accelerated FEV1 and FVC decline.

Conclusion Despite accumulating evidence for adverse effects of DCP on COPD, specific tasks and substances at risk still need to be elucidated. Exposure assessment methods need to be improved in epidemiological studies. Novel statistical approaches, such as the ones developed in the context of exposome research, may help disentangling the mutual effect of the numerous chemicals contained in DCP, as well as their mixture. The mechanisms underlying the association between DCP and respiratory health outcomes need to be clarified.

S-92 GENDER/SEX DIFFERENCES IN WORKERS' COMPENSATION FOR HEARING LOSS, CONCUSSIONS AND ACTIVITY-RELATED SOFT TISSUE DISORDER (ASTDS) IN BRITISH COLUMBIA, CANADA

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Introduction Novel access to workers' compensation claims data, in particular disallowed claims and claim eligibility status decisions, was used to inform an evidence need on sex/gender differences in experiences of the workers' compensation process in British Columbia, Canada.

Objectives To conduct a sex/gender stratified analyses of the risk of work-related acute injuries and cumulative disorders, and of the adjudication of the work-relatedness of these injuries and disorders.

Methods Compensation claims for ASTDs, concussions and noise-induced hearing loss (2003–17) were analysed for differences between women and men by age-adjusted rates of accepted claims within occupations (ASTDs and concussions only), for ratios of disallowed to accepted claims (ASTDS and hearing loss only), and for time to final claim eligibility decision (ASTDs, concussions and hearing loss).

Results We observed higher rates and rates of increase for women compared to men in the same occupations for ASTDs (e.g. 65 versus 43 claims per 1,000 workers for women and men respectively in labourer occupations in processing/manufacturing), and for concussions (e.g. increase from 13 to 25 claims versus from 12 to 16 claims per 1,000 workers for women and men respectively in transportation/equipment operation occupations over the study period). We observed higher ratios of disallowed to accepted claims for women compared to men for ASTDs (1.4 versus 0.5) and hearing loss (4.1 versus 0.4). We observed longer durations to final accepted claim eligibility decisions for women compared to men for ASTDs (e.g. 49 versus 43 days at the 50th percentile) and hearing loss (238 versus 204 days), but not concussions (7 days each).

Conclusion The findings warrant further investigation to understand the increased risks of ASTDs and concussions among women compared to men, especially in occupations that have been traditionally male-dominated; and for potential gender/sex biases in the adjudication and recognition of workrelated cumulative injuries and disorders among women.

S-95 CHANGES IN RESPIRATORY SYMPTOMS, SPIROMETRY, AND EXHALED NITRIC OXIDE AMONG HOME CARE AIDES PERFORMING CLEANING AND DISINFECTING USING DIFFERENT PRODUCTS: A LONGITUDINAL REPEATED MEASURES STUDY

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10.1136/OEM-2021-EPI.407

Objectives Occupational and population-based studies show that cleaning and disinfecting (C&D) tasks can increase the risk of adverse respiratory symptoms. However, quantitative evaluation of specific C&D products and practices and their impacts on respiratory health are limited. Previously, we found that 80% of home care (HC) aide visits to clients' homes involve C&D. Increasingly, C&D ingredients are combined in single products that often contain bleach, quaternary ammonium compounds (QACs) or other respiratory irritants. Socalled 'green' C&D products might be better alternatives but have not been evaluated for respiratory health. This study evaluated the relationship between the use of conventional and 'green' C&D products on respiratory outcomes.

Methods A longitudinal repeated measures study design was used. Twenty HC aides each participated in four sessions in an environmental assessment laboratory where a simulated bathroom with fixtures (toilet, tub/shower, sink) was built according to residential construction specifications. During each 40-minute session, aides performed typical C&D tasks. Three multi-purpose spray C&D products - one bleach-based (1-5% by weight sodium hypochlorite), one QACs-based (including benzyldimethyldodecylammonium chloride, benzyldimethyltetradecylammonium chloride, and benzyldimethylhexadecylammonium chloride) and one 'green' (plant-based thymol, active disinfecting ingredient) - and distilled water in a spray bottle were randomized among the aides' sessions. Respiratory symptoms, spirometry, and exhaled nitric oxide (eNO, a biomarker of airway response) were measured pre-and postsession.

Results Aides reported more respiratory symptoms following use of the bleach-based product (eye, nose, throat irritation, cough, and difficulty breathing) and experienced a reduction in FEV1 (-4.3%, 95%CI: -7.4 to -1.1), compared to the other products and to distilled water. Mean eNO decreased by 10 ppb (95% CI: -8 to -13ppb) following bleach-based product use compared to the other products and to distilled water.

Conclusions Bleach-based C&D products may cause acute adverse respiratory changes after a relatively short exposure representative of C&D in HC.

S-106 RISK OF EXPOSURE TO A SARS-COV-2 INFECTION AT WORK: DEVELOPMENT OF A JOB EXPOSURE MATRIX (COVID-19-JEM) FOR DENMARK, THE NETHERLANDS AND THE UNITED KINGDOM

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Introduction As workplaces may be one of the key settings in the spread of SARS-COV-2 infections, among both essential and non-essential workers, it is important to assess the occupations at increased risk of exposure to SARS-COV-2 in large study populations.

Objectives This study aimed to construct a job-exposure matrix (JEM) for the risk of becoming infected with SARS-COV-2 in an occupational setting.

Methods Experts in occupational epidemiology from three European countries (Denmark, the Netherlands and United Kingdom) defined relevant exposure and workplace characteristics with regard to possible exposure to SARS-COV-2. Within an iterative qualitative process, experts rated the different dimensions of the COVID-19-JEM for each job title within the International Standard Classification of Occupations 2008 (ISCO-08). The agreement scores including confidence intervals, weighted kappas, and explained variances were estimated.

Results The COVID-19-JEM contains four determinants of transmission risk (number of people, type of contacts, indirect contact and location), two mitigation measures (social distancing and face covering), and two social factors (income insecurity and migrant workers). Agreement scores ranged from 0.58 (95%CI 0.55;0.61) for 'number of people' to 0.76 (95%CI 0.74;0.78) for 'type of contacts'. Agreement scores ranged from 0.58 (95%CI 0.55;0.61) for 'number of people' to 0.76 (95%CI 0.74;0.78) for 'type of contacts. Weighted kappas ranged from 0.60 for 'face covering' to 0.80 for 'indirect contact'. Due to some between-country differences, COVID-19-JEMs are separately presented for Denmark, the Netherlands and the United Kingdom.

Conclusions The COVID-19-JEM provides risk estimates at population level of the eight dimensions related to a SARS-COV-2 infection at the workplace, and is a valuable tool for epidemiological studies. Additionally, the eight dimensions of the COVID-19-JEM could also be used for other communicable diseases at worksites.

S-107 UNION BURYING GROUND: MORTALITY, MORTALITY INEQUITIES, AND SINKING LABOR-UNION MEMBERSHIP IN THE UNITED STATES

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Introduction Over the last several decades in the U.S., socioeconomic life-expectancy inequities have increased 1–2 years. Declining labor-union density has fueled growing income inequities across classes and exacerbated racial income inequities. However, the relationship between declining labor-union density and mortality inequities remains understudied.

Objectives Using Panel Study of Income Dynamics (PSID) data, we examined the longitudinal union-mortality relationship and estimated whether declining union density has exacerbated racial and educational mortality inequities.

Methods Our sample included respondents ages 25–66 to the 1979–2015 PSID with mortality follow-up through age 68 and year 2017. To address healthy-worker bias, we used the parametric g-formula. First, we estimated how a scenario setting all (versus none) of respondents' employed-person-years to union-member employed-person-years would have affected mortality incidence. Next, we examined gender, racial, and educational effect modification. Finally, we estimated how racial and educational mortality inequities would have changed if union-membership prevalence had remained at 1979 (versus 2015) levels throughout follow-up.

Results In the full sample (respondents=23,022, observations=146,681), the union scenario was associated with lower mortality incidence than the non-union scenario (RR: 0.90, 95% CI: 0.80, 0.99; RD per 1,000: -18.7, 95% CI: -36.5, -0.9). This protective association generally held across subgroups, although it was stronger among the more-educated. However, we found little evidence mortality inequities would have lessened if union membership had remained at 1979 levels.

Conclusion To our knowledge, this is the first individual-level U.S.-based study with repeated union-membership measurements to analyze the union-mortality relationship. We estimated a protective union-mortality association, but found little evidence declining union density has exacerbated mortality inequities, although we did not incorporate contextual-level effects.

S-109 IDENTIFICATION OF CHEMICAL AND DISINFECTANTS PRODUCTS FOR EXPOSURE AND EPIDEMIOLOGICAL STUDIES

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Objective There is a large number of household cleaning chemical products available in the market for consumers and domestic cleaners. Online catalogs of major US retailers showed that there are over 450 different household cleaning products for sale. The objective of this study was to identify the household chemical products available for domestic cleaners and consumers as part of a study aimed at studying exposure to cleaning chemicals in Latinx domestic cleaners in New York City.

Methods We organized focus groups and interviews to develop a survey for Latinx cleaners in NYC. The survey was used to collect detailed information about the most common household cleaning tasks and cleaning product use in 400 Latinx domestic cleaners. In addition, we visited 95 retail stores in Latinx dense neighborhood in NYC to identify the types of household cleaning products available for sale. Finally, we created an inventory of household cleaning products available in the market for consumers and domestic cleaners and reviewed Safety Data Sheets to identify common chemical ingredients reported by manufacturers.

Results Despite a large number of cleaning chemicals available in the US market, Latinx domestic cleaners use less than 50 products for household cleaning during their jobs. In visits to retail stores we found that over 25% of the household cleaning products available for sale contain disinfectants such as Quaternary Ammonium Compounds and that over 80% of the products contain a scent.

Conclusion A combination of quantitative and qualitative methods allowed us to determine the most common products domestic Latinx cleaners use and can be exposed while at work. This information will be used in a study to measure inhalation and dermal exposures in domestic cleaning.

S-135 APPLYING THE EXPOSOME CONCEPT TO WORKING-LIFE HEALTH: THE EU EPHOR PROJECT

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Introduction Exposures at work have a major impact on noncommunicable diseases (NCDs). Current risk reduction policies and strategies are informed by existing scientific evidence, which is limited due to the challenges of studying the complex relationship between exposure in the work place and outside work, and health. We define the working-life exposome as all occupational and related non-occupational (i.e. urban, lifestyle, behavioural and socio economic status) exposures.

Objective By taking an exposome approach, the Exposome Project for Health and Occupational Research (2020–2024) aims to advance knowledge on the complex working life exposures in relation to disease beyond the single high exposure-single health outcome paradigm, mapping and relating interrelated exposures to inherent biological pathways, key body functions and health.

Methods This will be achieved by combining 1) large-scale harmonisation and pooling of existing cohorts systematically looking at multiple exposures and diseases, with 2) the collection of new high-resolution (in time or agents/markers) external and internal exposure data in two case studies. Methods and tools to characterize the working-life exposome will be developed and applied, including sensors, wearables, a harmonised job exposure matrix (EuroJEM), non-invasive biomonitoring, omics, data mining, and (bio)statistics.

Results&Conclusion

The toolbox of developed methods and knowledge will be made available to policy makers, occupational health practitioners and scientists. Advanced knowledge on working life exposures in relation to NCDs will serve as a basis for evidence-based and cost-effective preventive policies and actions, ultimately contributing to reducing the burden of NCDs. This presentation will present the EPHOR design and approach as well as some developments so far.

S-136 OMEGA-NET INVENTORY OF OCCUPATIONAL COHORTS

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10.1136/OEM-2021-EPI.412

Introduction Existing cohort studies in Europe capturing some type of occupational information enrol tens of millions of persons. There are few large-scale analyses systematically combining cohorts from this extraordinary resource, and a systematic approach to facilitate the use of cohorts across research groups and countries is needed.

Objectives As part of the ongoing OMEGA-NET COST Action, we created an online inventory of cohorts (https:// occupationalcohorts.net/) with occupational information in Europe and worldwide and implemented an interactive search tool with detailed information on these cohorts. The inventory aims to collect information that facilitates collaboration across cohorts to explore occupation, work related exposures and health relationships.

Methods The inventory includes prospective or retrospective cohorts, case-control studies nested within cohorts and intervention studies that: (i) are active or can substantiate that their data are potentially accessible; (ii) collect data on occupation and/or industry or at least one occupational exposure; and (iii) have at least one follow-up either already conducted or planned. The inventory only incorporates cohort meta-data. Researchers enter information regarding their cohort using a web-based OMEGA-NET inventory questionnaire. The published version of the inventory is stored in a searchable web database.

Results To-date the inventory includes information on > 130 cohorts in more than 20 countries. Information is collected on: (i) Identification and basic description; (ii) Follow-up; (iii) Occupational exposures (dusts and fibres, solvents, pesticides, metals and metal oxides, other chemicals, engineered nanoparticles, biological factors, physical agents, ergonomics, physical workload and injury, psychosocial domains, organisation of work and working time); (iv) Outcomes evaluated; (v) Biological samples and analysis; (vi) Other information e.g. sociodemographic.

Conclusion The OMEGA-NET inventory will continue to identify and invite cohorts and seeks to capture the majority of available active cohorts with information on occupational exposures, many of them being non-occupational in their primary aim.

S-141 OCCUPATION AND COVID-19 MORTALITY IN ENGLAND: A NATIONAL LINKED DATA STUDY OF 14.3 MILLION ADULTS

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Introduction The coronavirus pandemic has been particularly severe in the UK, with high infection and death rates, including among working age population.

Objective To estimate occupational differences in COVID-19 mortality, taking into account confounding factors, such as regional differences, ethnicity, education, deprivation and prepandemic health.

Methods We used data on 14,295,900 individuals who completed the UK Census in 2011, who were alive on 24 January 2020, were employed and aged 31–55 years in 2011. Data were linked to death and other health records. We examined differences between occupational groups in the risk of COVID-19 death from 24 January to 28 December 2020. We estimated age-standardised mortality rates per 100,000 personyears at risk stratified by sex and occupations. To estimate the effect of occupation due to work-related exposures, we used Cox proportional hazard models to adjust for confounding factors.

Results There is wide variation between occupations in COVID-19 mortality. Several occupations, particularly those involving contact with patients or the public, show three- or four-fold risks. These elevated risks were greatly attenuated after adjustment for confounding and mediating factors. For example, the hazard ratio (HR) for men working as taxi and cab drivers or chauffeurs changed from 4.60 [95%CI 3.62–5.84] to 1.47 [1.14–1.89] after adjustment. The overall HR for men working in essential occupations compared with men in non-essential occupations changed from 1.45 [1.34 - 1.56] to 1.22 [1.13 - 1.32] after adjustment. For most occupations, confounding and other mediating factors explained about 70% to 80% of the age-adjusted hazard ratios.

Conclusions Working conditions are likely to play a role in COVID-19 mortality, particularly in occupations involving contact with COVID-19 patients or the public. However, there is also a substantial contribution from non-workplace factors, including regional factors, socio-demographic factors, and prepandemic health.

S-143 RISK OF ASTHMA AMONG PROFESSIONAL CLEANERS IN DENMARK – RESULTS FROM A MATCHED REGISTER-BASED COHORT STUDY

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Introduction Epidemiological studies indicate an increased asthma prevalence among cleaning professionals compared to other jobs.

Objectives In a multi-disciplinary project in Denmark on spray cleaning products we investigated the risk of asthma among professional cleaners in a nationwide population-based register study.

Methods In a register-based matched cohort study, 16-50 year-old professional cleaners were identified according to yearly assigned job and industrial codes for cleaning. The references was workers with other manual jobs/service workers. Asthma was defined from national registers on hospitalisation and prescribed asthma medication (person years: cleaners = 1,014,893; references = 2,777,052). The associations between recent (previous year) and preceding cumulated

cleaning years and incidences of asthma were estimated using Poisson regression analysis. The analyses were repeated in an inception cohort among workers aged 16–20 years at start of follow-up (person years: cleaners = 153,549; references = 423,506).

Results The risk of asthma was not increased for recent cleaning compared to references (adjusted incidence rate ratio [aIRR]=1.02 [95% confidence interval (CI) 0.99–1.04]). Similar results were seen for recent cleaning in the inception cohort. Cumulated cleaning years (up to 10 years) showed decreased risk of asthma (aIRR = 0.74 [95% CI 0.63–0.88] for 10 compared to 1 year of cleaning). However, in the inception cohort (up to 6 years) cumulated cleaning years were associated with increased asthma risk (aIRR=2.53 [95% CI: 1.38–4.64] for 6 compared to 1 cleaning year).

Conclusion In this study, asthma risk increased with cumulated years of cleaning in the inception cohort. This indicates a strong healthy worker selection and suggests that long-term professional cleaning may be associated with increased risk of asthma. However, in the full population we could not confirm that recent work within cleaning was associated with increased risk of asthma; furthermore, cumulated years of cleaning was inversed associated with asthma.

S-145 USE OF MECHANISTIC EVIDENCE FROM OCCUPATIONAL STUDIES IN CANCER HAZARD IDENTIFICATION: THE EXPERIENCE OF THE IARC MONOGRAPHS PROGRAMME

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Over the past 50 years, the Monographs Programme of the International Agency for Research on Cancer (IARC) has evaluated the potential carcinogenic hazard of more than 1000 agents. Through 129 volumes, 121 agents have been classified as 'carcinogenic' (Group 1), 89 as 'probably carcinogenic' (Group 2A), 318 as 'possibly carcinogenic' (Group 2B), and 499 as 'not classifiable as to carcinogenicity' (Group 3). Many Group 1 agents derived their 'sufficient evidence of cancer in humans' from studies of exposed workers. Since 1991, it has been possible to classify an agent in Group 1 based on strong mechanistic evidence in exposed humans and sufficient evidence from cancer bioassays when human cancer evidence was less-than-sufficient. In the recently revised Preamble for the IARC Monographs, mechanistic evidence has gained increased prominence as an individual evidence stream, reflecting advances in mechanistic toxicology and molecular epidemiology. The Preamble revision introduces new possibilities for carcinogen identification from robust mechanistic studies in exposed humans. Specifically, strong evidence that an agent exhibits 'key characteristics' (KCs) of carcinogens in exposed humans can lead explicitly to a Group 2A evaluation when evidence of cancer in humans is limited. Further, classification in Group 2B can be based on strong evidence of KCs in exposed humans alone. Thus, especially for agents for which cancer studies in experimental systems are impracticable (e.g., work as a firefighter), mechanistic studies in exposed humans can increasingly play a crucial role in cancer hazard identification. We will address critical aspects of study design, exposure assessment, and KC-related endpoints anticipated to be influential in future Monographs evaluations of mechanistic studies.

We will draw examples from mechanistic studies in workers that contributed substantively to previous Monographs evaluations, and from ongoing occupational studies of agents accorded high priority for future evaluation by the IARC Monographs (e.g., carbon nanotubes).

S-153 NIGHT SHIFT WORK INTERVENTIONS – WHAT DO WE NEED TO KNOW TO MAKE A DIFFERENCE?

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In a modern society, night shift work is inevitable in many sectors including healthcare, industry and transport, and it is important to reduce the potential harm by preventing negative effects for health and safety from night shift work.

This presentation is part of the symposium 'Night shift work research: what we need to know to make a difference?'. The aim of the symposium is to present evidence on night work and chronic disease risk and to identify and discuss how to move forward in etiological and prevention research to provide conclusive evidence for action.

Night shift work interventions can be defined as change strategies with the purpose to reduce health and safety risks associated with night shift work. They may be directed towards the organization or towards the individual and may address different possible mechanisms linking night shift work to health and safety risks.

An example of an intervention directed towards the organization is changes in scheduling of night shift work e. g. changes in number of consecutive night shifts; duration of shift intervals; or shift duration, which are all known to be associated with possible mechanisms linking night shift work to disease and accidents. Examples of interventions directed towards the individual are light interventions, which are related to experience of fatigue and diurnal disruption, and sleep hygiene interventions aimed at reducing the negative impact of night shift work on sleep duration and quality.

This presentation contributes to the following panel discussion on what do we need to know in order to implement such prevention measures by presenting relevant examples of possible interventions. Particular focus will be on what is known about success and barriers for implementation of interventions based on our own and others research.

S-176 SOCCER 2.0 AND SOCCER IN THE FIELD: MOVING FROM CODING OCCUPATION AFTER DATA COLLECTION TO CODING IN REAL TIME BY STUDY SUBJECTS

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Objective Free-text job descriptions from lifetime occupational history questionnaires are the starting point for nearly all occupational exposure assessment activities in epidemiologic studies. This information is used to code job descriptions into standardized occupation classification (SOC) systems. We describe updates to SOCcer, an algorithm that incorporates

natural language processing to automatically code job descriptions to SOC-2010.

Methods We recently released SOCcer 2.0. It improved on the original algorithm by 1) expanding the training data set to include job descriptions from population-based epidemiologic studies and 2) revising the scoring algorithm to account for nonlinearity in the classifiers. However, perfect prediction is not possible because of the lack of gold standard approach on which to train the algorithm and the brevity of the job descriptions provided by participants, which may fit multiple codes. We have adapted SOCcer to be used in the data collection process to allow the study participant to serve as their own coder when completing a web-based occupational questionnaire. SOCcer reads the participants open-ended job title and tasks responses in real time and proposes a short list of best-fitting SOC-2010 codes for each job. The study participant reviews the list and selects the code that best fits their job.

Results In a validation set of 11,943 jobs, SOCcer' highest scoring code had 50% and 63% agreement with a consensus expert-assigned code at the 6- and 3-digit level, respectively. Agreement increased linearly with algorithm score. The expert's code was in the top 3 scoring codes from SOCcer for >70% of the jobs, lending support for providing a short list of codes for the study participants to review. Pilot testing is underway.

Conclusion Automated coding, especially in real time, has the potential to substantially reduce the efforts needed to code jobs in large epidemiologic studies and improve the codes accuracy.

S-186 THE IMPACT OF JOB LOSS ON SELF-INJURY MORTALITY IN A COHORT OF AUTOWORKERS: APPLICATION OF A NOVEL CAUSAL APPROACH

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Introduction Recent increases in national rates of suicide and fatal overdose have been linked to a deterioration of economic and social stability. The American auto industry experienced these same pressures beginning in the 1980s with the emergence of a competitive global market.

Objectives Using the United Autoworkers – General Motors cohort as a case study, we examine the impact of employment loss on these self-injury mortality events.

Methods For 29,764 autoworkers employed on or after January 1, 1970, we apply incremental propensity score (IPS) interventions, a novel causal inference approach, to examine how proportional shifts in the odds of leaving active GM employment affect the cumulative incidence of self-injury mortality.

Results Cumulative incidence of self-injury mortality was 0.87% (258 cases) at the observed odds of leaving active GM employment ($\delta = 1$) over a 45-year period. A 10% decrease in the odds of leaving active GM employment ($\delta = 0.9$) results in an estimated 7% drop in self-injury mortality (239 cases) while a 10% increase ($\delta = 1.1$) results in a 19% increase in self-injury mortality (306 cases). We reject the null hypothesis of no incremental effect over the range of effects considered (δ in [0.75, 1.25]; P = 0.02).

Conclusion These results suggest that leaving active employment increases the risk of death due to suicide or drug overdose.

S-197 OCCUPATIONAL BURNOUT: DEFINITION, MEASURE AND PREDICTORS

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Introduction Despite more than half a century of research on occupational burnout (OB), little is known about its prevalence, etiology, treatment, or prevention. The lack of consensus on its definition and measurement has led to the use of various arbitrary definitions and measures of OB.

Objectives Within the Network on the Coordination and Harmonisation of European Occupational Cohorts (OMEGA-NET), we aimed at 1-assessing the state of the art on OB recognition in the 37 OMEGA-NET-participating countries, 2-elaborating a harmonized consensual definition of OB as a health outcome, 3-assessing the psychometric validity of the most used OB inventories, and 4-identifying the OB risk and protective factors.

Methods The first study was an on-line survey among occupational health specialists. The harmonized consensual definition resulted from the systematic review and semantic analysis of available OB definitions and a Delphi study. The two other studies were systematic reviews.

Results The survey showed that in 14 (38%) countries OB is acknowledged as an occupational disease. The results showed a high variability in OB diagnosis, in assessment of its workrelatedness, and in conditions allowing compensation of patients. The harmonized definition of OB was formulated in accordance with the Systematized Nomenclature of Medicine Clinical Terms and consensually approved by 50 experts from 29 countries. Among five most used tools for OB measurements, only two have a moderate evidence of their psychometric validity, the CBI and OLBI. Regarding the 261 OB predictors examined, we found a moderate evidence for the harmful effects of Job demands predictors n=6) and Negative job attitudes and for the protective effect of Adaptive coping (small effect sizes) and Leisure (small to medium effect sizes). Conclusions These results will help harmonizing the future research, through the use of the harmonized definition and the most valid measurement tools, and facilitate decision-making and interventions regarding OB.

S-207 MULTIDIMENSIONAL EMPLOYMENT QUALITY, RETIREMENT TRAJECTORIES AND CARDIOMETABOLIC HEALTH IN LATER LIFE IN THE US

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Introduction The working lives of Americans have become less stable over the past several decades and older adults may be particularly vulnerable to these changes in employment quality (EQ).

Objective We examined later-life multidimensional EQ and retirement trajectories of older Americans and the potential

consequences worsening $\mathrm{E}\mathrm{Q}$ may have for cardiometabolic health and health inequities in this population.

Methods Using longitudinal data on employment stability, material rewards, workers' rights, working-time arrangements, unionization, and interpersonal power relations from the Health and Retirement Study, we used principal component analysis to construct an EQ score. Then, we used sequence analysis to identify late-career EQ trajectories (age 50–70 years; N=11,958 respondents), overall and by race, gender, educational attainment, marital status. Finally, we estimated the association between trajectory-membership and post-sequence-analysis-period prevalence of poor cardiometabolic health.

Results We identified ten EQ trajectories; the most prevalent trajectories were Minimally Attached and Wealthy (13.9%) and Good EQ to Good Retirement (13.7%), however, 42% of respondents were classified into suboptimal trajectories. Those in suboptimal trajectories were disproportionately women, Hispanic and/or Black, Indigenous and People of Color, and those with lower educational attainment. Moreover, those in suboptimal trajectories tended to report the worse cardiometabolic health. For example, the prevalence of hypertension was lowest for those in the Wealthy Business Owners trajectory and highest for Workers with Premature Mortality, followed by workers with Fair EQ and Good but Diminishing Wealth in Retirement.

Conclusion EQ is inequitably distributed and may play a role in cardiometabolic health inequities in later life.

S-214 THE WORKING LIVES OF GENERATION Y: APPROACH AND CHALLENGES

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Objective Generation Y has to earn a living in a new world of work in changing labor markets. To date, little is known about the working lives of todays' young adults and how early life factors impact their working lives. The aim of this study is to examine how educational and work factors cluster in young workers and to assess the impact of mental health problems from childhood to young adulthood on the worklife clusters.

Methods Longitudinal data of N=1235 participants of the Tracking Adolescents Individual Life Study (TRAILS), a prospective cohort study from age 11 to 26, was used. To examine the participants' clusters regarding educational attainment, employment status, social benefits, type of contract, and working hours at age 26, latent class analysis was performed. Trajectories of mental health problems measured at ages 11, 13.5, 16, 19 and 26 were identified with latent class growth models. Multinomial logistic regression analyses were used to examine the associations between mental health and work-life clusters.

Results Five clusters were identified: 1) high educated fulltime workers (30.6%), 2) medium educated part-time and fulltime workers (21.6%), 3) students and medium educated workers with small jobs (26.0%), 4) fulltime students (15.7%), and 5) social benefit recipients (6.0%). Participants with high-stable trajectories of internalizing and externalizing problems had an increased risk of receiving social benefits (OR 9.80, 95%CI 4.26–22.5 and OR 13.9, 95%CI 4.15–46.9, respectively).

Conclusion At age 26, five work-life clusters were identified, showing the diversity of the working lives of today's young adults. The results of this study also show the long-term consequences of early mental health problems on the working lives of young adults. During the presentation, conceptual and analytical challenges will be discussed, for example: 'When does employment begin' and 'How can we best capture the new world of work?'

S-215 WORKING LIFE, HEALTH AND WELL-BEING OF PARENTS: A JOINT EFFORT TO UNCOVER HIDDEN TREASURES IN BIRTH COHORTS

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Introduction Birth cohorts collect information on employment and health of parents (especially mothers) before and during pregnancy, at birth, and often after birth. These valuable and under-utilized data are typically collected for measuring their effects on the health of the children but have the potential to address specific domains difficult to assess in traditional occupational epidemiology studies, such as working life in relation to reproductive life and work-family conflicts.

Objectives We examine how birth cohort data could be exploited to study the bidirectional relationship and interactions between parenthood, work, and health in parents themselves, taking a life-course approach.

Methods Using a web-based database of birth cohorts, we summarize information on maternal employment and health conditions and other potentially related variables in cohorts spread throughout Europe. This provides information on what data are available and could be used in future studies, and what is missing if specific questions need to be addressed, exploiting the opportunity to explore work-health associations across heterogenous geographical and social contexts.

Results We highlight the many potentialities provided by birth cohorts and identify gaps that need to be addressed to adopt a life-course approach and investigate topics specific to the peripregnancy period, such as psychosocial aspects. We address the technical difficulties implied by data harmonisation and the ethical challenges related to the repurposing of data, and provide scientific, ecological and economic arguments in favour of improving the value of data already available as a result of a serious investment in human and material resources.

Conclusions There is a hidden treasure in birth cohorts that deserves to be brought out to study the relationships between employment and health among working parents in a time when the boundaries between work and life are getting stretched more than ever before.

S-229 MECHANISTIC EVIDENCE IN POPULATION STUDIES ON NIGHT SHIFT AND CANCER

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Introduction In 2007 IARC classified night-shift work as probably carcinogenic to humans (2A). A new evaluation in 2019, 12 years later, resulted in a similar conclusion. It was problematic that numerous cohort studies had poor exposure assessment and population studies examining key characteristics (KCs) of carcinogens were scarce and frequently small.

Objectives I will first summarise molecular epidemiology studies and identify problems that have hampered the interpretation of KC regarding night shift and cancer. I will then discuss strategies for future studies and focus on a new exposome protocol in night shift workers in Europe (EPHOR study).

Methods/Results In the EPHOR study, we will collect individual data and repeated biological samples in 800 night and day shift workers (Spain, Sweden, Denmark, The Netherlands). Exposures of interest measured mostly with personal sensors include light and light spectrum, physical activity, sleep, body temperature, noise, the timing of activities, and some chemical exposures. We will evaluate biomarkers related to immune response, inflammation, disruption of sex-steroid hormones, melatonin and cortisol, cardiometabolic status, markers of aging e.g. telomere attrition together with untargeted omics analyses. Other outcomes of interest include obesity, diabetes, and cognitive and mental outcomes.

Conclusions Some of the endpoints examined are KCs of carcinogens, others define the circadian pattern (e.g. melatonin) and others are important for non-cancer endpoints. The circadian patterns of several markers complicate interpretation since differences between day and night working hours may reflect normal variation. Interpretation of changes in time of peak of a marker (e.g. testosterone) is also complex since on some occasions this may affect functions while in others may just indicate adaptation to a changed schedule. With its large size, standardized procedures, and multiple endpoints examined including several KCs of carcinogens, we expect that the EPHOR study should provide new knowledge on the health effects related.

S-234 STRATEGIES FOR MONITORING OF THE INTERNAL EXPOSOME USING SELF-SAMPLING METHODS IN THE CONTEXT OF EU EPHOR PROJECT

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Introduction Working life exposures contribute significantly to non-communicable disease development. However, the challenge remains on how to map occupational exposures during the entire career and link exposures with health outcomes. In this context, the EU EPHOR project aims to characterize the internal exposome, by characterizing exposure biomarkers and biological pathways to link external exposure and health effects. While there is a range of strategies available to monitor the internal exposome, these conventional methods often require invasive collection of biological samples and/or high volumes. However, the ongoing COVID-19 pandemic forces us to look also at other approaches to obtain biological samples.

Objective We aimed to explore the use of self-sampling techniques in an occupational exposome context.

Methods We have conducted a semi-systematic literature review to identify self-sampling techniques used to generate high quality data on several biomarkers of exposure and effect. We are exploring the possibility of using these self-sampling techniques through a pilot study. A tiered analytical approach along with a biological sequence will be followed to efficiently analyze the samples (i.e. blood, urine, saliva, exhaled breath, exhaled breath aerosols and exhaled breath condensate) for a broad spectrum of biomarkers and omics. Additionally, non-invasive targeted and non-targeted exposome markers of acute lung function decline and inflammation will be developed through proteomic analysis of exhaled breath condensate (EBC), and exhaled breath VOCs using the ReCIVA Breath Sampler. These data will be integrated to generate signatures or 'fingerprints' of exposomes, at individual and group levels.

Results and Conclusion The developed methodology will be applied in 2 cohorts within the EPHOR project: shift-workers and workers with asthma or allergic rhinitis to assess the internal exposure and elucidate biological pathways in disease development.

S-236 SUICIDE AND JOB LOSS IN THE DIESEL EXHAUST IN MINERS STUDY II (DEMS II)

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Introduction The highest suicide rates in the U.S. have been found among males in construction, mining, and extraction occupations. In recent years, the rate has increased dramatically, which may reflect the lack of economic opportunities for miners.

Objectives We examined the impact of job loss, both permanent and temporary, on risk of suicide and overdose among a cohort of 11,817 male miners from the Diesel Exhaust in Miners Study II.

Methods We calculated directly standardized age-adjusted incidence rates per 100,000 person-years from 1947 through 2015 by calendar period. We fit Cox models to estimate hazard ratios (HRs) for suicide and overdose in relation to leaving work, age at leaving work, and intermittent time-off work. Separate models were fit for job loss pre- and post-1980 to examine effect modification by time period as the industry curtailed its workforce in the early 1980s.

Results The age-adjusted incidence suicide/overdose death rate was 64.7 (95% CI: 56.4, 73.9) per 100,000. Suicide deaths peaked between 1980 and 1989 at 67.2 before declining. Based on 248 suicides and overdoses, miners who left work were more likely to die by suicide/overdose compared to those remained at work (HR 1.59 (95% CI: 1.10, 2.29)). Effect modification by decade was present as the HRs for suicide/ overdose and age at leaving work differed significantly between the stratified analyses (job loss pre-1980 vs. post-1980). Among miners who left work prior to 1980, HRs for

age at leaving work and suicide/overdose were null. Yet, among miners with post-1980 job loss, leaving work before age 30 and between ages 30–40 increased the risk of suicide/ overdose compared with leaving work after age 55 (1.94 (1.05, 3.58) and 1.46 (0.78, 2.72), respectively).

Conclusions Our results suggest an elevated risk of suicide among male miners in the 1980s, and that the risk increases after leaving work.

S-243 DEATH BY ROBOTS? AUTOMATION AND WORKING-AGE MORTALITY IN THE UNITED STATES

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The decline of manufacturing employment is frequently invoked as a key cause of worsening U.S. population health trends, including increased mortality due to rising 'deaths of despair'. Increasing automation-the use of industrial robots to perform tasks previously done by human workers-is one major structural force driving the decline of manufacturing jobs and wages. In this study we examine the impact of automation on age-sex specific mortality. Using exogenous variation in automation to support causal inference, we find that increases in automation over the period 1993-2007 led to substantive increases in all-cause mortality for both men and women aged 45-54. Disaggregating by cause, we find evidence automation is associated with increases in drug overdose deaths, suicide, homicide and cardiovascular mortality although patterns differ across age-sex groups. We go on to examine heterogeneity in effects by safety net program generosity, labor market policies, and the supply of prescription opioids.

S-263 OMEGA-NET INVENTORY OF OCCUPATIONAL EXPOSURE ASSESSMENT TOOLS

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Introduction The Network on the Coordination and Harmonisation of European Occupational Cohorts (OMEGA-NET) was set up to enable optimization of using industrial and general population cohorts across Europe to advance aetiological research. High quality harmonised exposure assessment is crucial for such international occupational health research.

Objective To facilitate an integrated research strategy, a concerted effort is needed to catalogue occupational exposure information. This study aims to provide a comprehensive overview of exposure assessment tools that could be used for occupational epidemiological studies.

Methods An online inventory was set-up to collect meta data on exposure assessment tools (https://occupationalexposuretools.net/). Occupational health researchers were invited via newsletters, editorials and individual mails to provide details on job-exposure matrices (JEMs), exposure databases, and occupational coding systems and crosswalks, with a focus on Europe.

Results Meta data on 38 JEMs and 9 national exposure databases had been collected up to May 2021. Most JEMs on which these data were entered were developed in the Netherlands and the Nordic countries. A wide variety of exposures was covered, with dusts and fibres (in 15 JEMs) being the most common types. Just a few JEMs covered biological factors (5) and employment conditions (1). Dusts and fibres were also the most common exposures in the databases (6 out of 9), followed by solvents and pesticides (both in 4 databases). Furthermore, information was collected on 24 occupational coding systems from more than 10 countries, indicating related systems as well as the availability of crosswalks or automated coding from free-text.

Conclusion This inventory forms the basis for a searchable web-based database of meta-data on existing occupational exposure information, so that researchers can find the available tools for assessing occupational exposures in their cohorts. This inventory remains open for further additions, to enlarge its coverage and include newly developed tools

S-264 TAKING A WORKING LIFE EXPOSOME APPROACH: WHY DO WE NEED IT AND WHICH CHALLENGES ARE WE FACING?

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The exposome concept was conceived in 2005 as a way to represent non-genetic drivers of health and disease. The exposome encompasses all non-genetic risk factors experienced during a person's life (the external exposome) and its relation to biological responses inside the human body (the internal exposome). This concept was born out of the recognition that – while there was a revolution in our understanding on the genetic drivers of disease – our understanding on environmental drivers was much more limited. About 70–80% of the disease burden could probably be explained by the exposome.

Fifteen years after the exposome concept was introduced, several advances have been made in the quantification of the exposome by using combinations of different technologies (sensors, bioassays), large exposure and health datasets, and advanced statistical methods. These advances enable moving away from the 'one exposure-one disease' approach.

Although occupational risk factors are known to have an important impact on non-communicable diseases, the application of the exposome approach to occupational health has been limited. This is surprising as i) our working life covers a significant proportion of our total lifespan; ii) occupational exposures occur often in complex settings; iii) working-life encompasses important vulnerable life stages including the reproductive period; and iv) occupational exposures are closely related to lifestyle/behaviour (e.g. diet, physical activity, smoking and alcohol consumption) and socioeconomic status.

Given the varying exposures and interrelations with other factors across the life course a (holistic) network approach is needed to fully understand the impact of the working life exposome on health. The exposome approach and associated tools start to allow building a (partial) picture of the occupational exposome, which may lead to new insights on how the occupational exposome affects health and provide new leads for prevention.

S-275 USING METABOLOMICS TO TRACK BIOLOGICAL CLOCKS IN SHIFT WORK

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Introduction Being able to monitor the timing of biological clocks in shift workers and assess the degree of circadian misalignment between these tissue clocks, the external environment and the mistimed behaviour (e.g. sleep and feeding) remains one of the challenges in shift work research. The circadian timing system compromises the light-entrainable central oscillator, located in the hypothalamic suprachiasmatic nuclei (SCN), and peripheral clocks in almost all body tissues. Different shift work schedules result in changing light/dark; sleep/ wake; and feeding/fasting patterns that differentially affect the timing of these biological clocks.

Methods Using metabolic profiling (metabolomics) we have characterised time of day variation and the effect of sleep deprivation on the human metabolome1,2 providing a baseline for future metabolomics studies in shift workers.

Results Following simulated shift work, we found profound misalignment (12 h) of many plasma metabolite rhythms3. For >90% of the metabolites, their 24-h rhythmicity was not locked to the central SCN circadian clock, rather, their rhythms aligned with the behavioural timing of the prior 3-day simulated shift schedule.

Conclusions These findings provide a window onto metabolic pathways potentially involved in the elevated risk of metabolic disorders in shift work. Metabolic profiling provides a novel way to assess the effects of mistimed sleep/wake and feeding/ fasting schedules on metabolic pathways and investigate the underlying mechanisms linking metabolic disease, circadian misalignment and sleep deprivation.

1. Davies SK et al., Effect of sleep deprivation on the human metabolome. Proc Natl Acad Sci USA (2014) 111, 10761–10766; 2. Honma A et al., Effect of acute total sleep deprivation on plasma melatonin, cortisol and metabolite rhythms in females. Eur J Neurosci (2020) 51, 366–378; 3. Skene DJ et al., Separation of circadian- and behavior-driven metabolite rhythms in humans provides a window on peripheral oscillators and metabolism. Proc Natl Acad Sci USA (2018) 115, 7825–7830.

S-278 INTRODUCTION TO THE CHALLENGES OF OCCUPATIONAL CODING

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Objective The objective of this presentation is to provide an introduction to the symposium entitled: 'A road map for artificial intelligence and occupational health in the 21st century.' Methods There are many important applications for industry and occupation codes in occupational hygiene and epidemiology. Many health studies collect job-related information in the form of free text (regarding a job title or tasks normally performed by a worker) which needs to be classified into a code in order to group similar workers together for analysis. Additionally, one of the standard tools for assigning exposure metrics to individuals in large studies is a job-exposure matrix (JEM) which is also linked to an industry code, an occupation code, and often both.

Results For the question of coding free-text into an appropriate code, for most of the history of occupational epidemiology, this has been done manually (and ideally by an expert coder(s)). This can be extremely time-consuming and has its own issues of reliability. For the question of JEMs, if they are created in one coding system, it can be difficult and subjective to re-code them to a system for use in a different country or year, for example (many coding systems are refined over time). There are many new and promising AI and/or machine learning applications and tools being developed around the world.

Conclusions This introductory talk will set the stage for the symposium, providing a background on the issues with occupational coding systems and code assignment in general, and how automatic coding systems could improve occupational epidemiology.

S-301 SENSING AND SAMPLING FOR THE EXTERNAL EXPOSOME IN OCCUPATIONAL STUDIES

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10.1136/OEM-2021-EPI.431

Introduction Characterizing the external exposome requires a combination of different measurement methods for multiple exposures.

Objectives We describe the development of an external exposome assessment system for the EPHOR study, which focuses on cohorts for assessing working life exposures, particularly one case study on shift work and one on respiratory health. The system will be implemented in a weeklong intensive nested study.

Methods A system of measurement using low-cost sensors, passive sampling methods, and a mobile phone app was developed and trialed. The low-cost sensor measures light, UV, noise, particulate matter, temperature and humidity in a high temporal resolution. Additionally, separate activity and heart rate monitors are added to the data stream. Passive sampling is used for a wide spectrum of chemical and biological agents. The phone app is used for asking a set of questions related to health and exposure factors on a daily basis. The low-cost sensor performance was compared to reference monitors in both a controlled laboratory setting (static) and in a free living setting (personal).

Results Initial tests of the low-cost sensor system indicates that correlations with reference monitors are high for controlled laboratory tests but more variable when used in personal monitoring. Additional calibration may be necessary throughout the project, especially for particulate matter, with the possibility of using the raw sensor data (particle numbers of various sizes) calculating mass concentration.

Conclusion A comprehensive protocol to measure the external exposome has been developed. Next steps include the development of external exposome profiles based on the collected data for use in exposure response analysis for various outcomes. It can be challenging to develop a one-size-fits-all external exposome system for exposome studies with different objectives. A flexible platform that can incorporate different sensors or measurement methods is an important feature of external exposome measurement systems.

S-306 THE ROLE OF ENVIRONMENTAL ASSESSMENT IN WORKPLACE COVID-19 OUTBREAK INVESTIGATION TO UNDERSTAND SARS-COV-2 TRANSMISSION

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Introduction SARS-CoV-2 is a highly transmissible novel virus that has caused the COVID-19 pandemic. Evidence is required to support effective mitigation strategies. Existing evidence has shown that the virus can be transmitted mainly through three routes: close-range airborne (droplets and aerosols), longer range inhalation of aerosol, contact with contaminated surfaces. However, their relative importance is not well understood. It is also unclear how environmental conditions can alter the dynamics of the virus transmission.

Objectives The COVID-OUT (COVID-19 Outbreak investigation to Understand Transmission) study aims to understand SARS-CoV-2 transmission routes, transmission risk factors, and the role they play in COVID-19 outbreak in workplaces.

Methods This study is part of the UK COVID-19 National Core Study (NCS) on Transmission and the Environment. The study has a series of field studies to investigate outbreaks in a range of workplaces. Each field study has serial measurements of workers and measurements in the work environments. Environmental assessment is an essential component of the study. Its data can be combined with epidemiological and laboratory data to generate hypotheses of the causes of an outbreak and can also be used to support simulation models to characterize the relative contribution of transmission routes.

Results So far three outbreak workplaces have been investigated. Preliminary findings and lessons learnt will be presented.

Conclusion The field study data collection is led by a team of occupational hygienists from the Health and Safety Executive (HSE) who work closely with epidemiologists, public health investigators, microbiologists, environmental exposure specialists to ensure critical data are collected and findings are interpreted appropriately. Occupational hygienists are skilled in assessing physical, chemical and biological hazards in workplace settings. They are equipped with established tools and frameworks for assessing risks of various hazards which can be adapted and applied in COVID-19 outbreak investigations.

S-310 CANCER INCIDENCE IN AGRICULTURAL WORKERS: AN INTERNATIONAL CONSORTIUM OF AGRICULTURAL COHORT STUDIES (AGRICOH)

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Introduction Agricultural work can expose workers to potentially hazardous agents including known and suspected carcinogens.

Objectives We aimed to evaluate the cancer incidence in agricultural cohorts in an international consortium, AGRICOH, relative to the respective general populations.

Methods For 24 cancer sites/types and all cancers combined, we estimated standardized incidence ratios (SIRs) and 95%

confidence intervals (CIs) in eight cohorts that were linked to respective cancer registries: France (AGRICAN: n=128,101), the United States (AHS: n=51,165, MESA: n=2,177), Norway (CNAP: n=43,834), Australia (2 cohorts combined, Australian Pesticide Exposed Workers and Victorian Grain Farmers: n=13,134), Republic of Korea (KMCC: n=8,432), and Denmark (SUS: n=1,899). We then combined the SIR estimates across cohorts by random-effects meta-analysis.

Results During nearly 2,800,000 person-years, 23,188 cancers were diagnosed. We observed an elevated risk for melanoma of the skin (number of cohorts included=3, meta-SIR=1.18, 95% CI: 1.01–1.38) and multiple myeloma in women (n=4, meta-SIR=1.27, 95% CI: 1.04–1.54) and prostate cancer (n=6, meta-SIR=1.06, 95% CI: 1.01–1.12) compared to the general population. For several cancer sites, including bladder, breast (female), colorectum, esophagus, larynx, lung, and pancreas and all cancers combined, the risk was lower in the agricultural cohorts than in the general population (n=7, sexadjusted meta-SIR for all cancers combined=0.83, 95% CI: 0.77–0.90). The direction of risk was mostly consistent across cohorts while for some cancer sites, such as liver and lung in men and women, and stomach, colorectum, and skin in men, the SIR varied greatly across cohorts.

Conclusion Our findings suggest that agricultural workers have a lower risk of various cancers and an elevated risk for prostate cancer, multiple myeloma (female), and melanoma of skin (female) compared to the general population. The observed excesses and deficits of cancer incidence in agricultural workers may be largely due to underlying differences in risk factors and warrant further investigation of specific agricultural exposures.

S-318 SHIFT WORK AND THE INDIVIDUAL

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Introduction Working in shifts and/or at night requires, among other things, adjusting sleep times, meal times and time for socializing. These bio-psycho-socio adaptations, when combined with wakefulness (i.e., work and exposure to environmental stimuli) during usual sleep and rest periods, have been linked to a number of negative health, wellbeing and performance outcomes. While the understanding of these negative consequences is primarily based on inductive inferences, deductive inferences for a successful identification of vulnerable or tolerant people are currently rather inconclusive.

Objectives Determination of tolerance factors for shift and night work to reduce or avoid negative consequences for health, well-being, and performance

Methods Quantitative research studies

Results One challenge to mitigate or avoid the negative consequences of shift and night work is the disparity between the individuality of shift work regulations and the inter-individual differences between employees on a biological, psychological and sociological level.

Conclusion The understanding of shift work tolerance is preliminary. The studies available on this topic differ in many aspects of study methods such as definitions of exposure and outcome variables and confounders considered. Future studies need to specify the exact shift work schedule that is investigated, and there needs to be a concerted effort to come to a consensus on what 'tolerance' to shift work means. Prospective studies would increase our understanding of which individual factors are associated with the development of tolerance over time, especially if they collect participants' complete occupational histories. Taking a paucity of evidence on these issues into account, the presentation will identify areas for future research with the goal of increasing evidence-based harm mitigation strategies for shift workers.

S-319 NIGHT SHIFT WORK AND CANCER RISK: WHERE DO WE STAND, WHERE SHOULD WE GO?

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Introduction Night shift work was re-reclassified in 2019 by IARC/WHO as a probable human carcinogen (Group 2A) for humans, with limited epidemiological evidence for breast, prostate and colorectal cancer.

Objectives The objective of this talk is to provide an overview of the evidence on night shift work and cancer in epidemiological studies with a focus on breast cancer, to discuss strengths and limitations of existing studies and summarize areas for future research studies and policy actions.

Methods Among others, results from a pooled analysis of 5 population-based case-control studies of breast cancer using a common definition of night work (at least 3 h between midnight and 5 a.m.) will be presented. Results from a systematic Cochrane review on the effect of years of night shift work on cancer incidence will be summarized.

Results Women who ever worked at night had higher odds for breast cancer compared to never night workers (OR 1.12 95% CI 1.00–1.25) in the pooled analysis. The risk was higher among pre-menopausal women (1.26; 1.06–1.51), high shift-work intensity and ER+ tumors. Our systematic review included 20 studies on breast cancer (12 case-control and 8 cohort studies). In preliminary meta-analysis, a non-linear dose-response relationship was found, with a 7% risk increase in breast cancer after 20 years of night work (95% CI: 1.01–1.15). This finding was stronger in studies that reported lifetime occupational history and case-control studies.

Conclusions Night shift work of high intensity and long duration tends to increase the risk of breast cancer. Findings are stronger in studies with lifetime occupational history, among pre-menopausal women and positive hormone receptor subtypes. Other shift work research domains that need to be considered in future studies include 1) patterns of night work schedules 2) susceptible groups e.g. chronotype 3) critical exposure windows 4) co-exposures with occupational carcinogens.

S-325 GENDERED OCCUPATIONAL INEQUALITIES AND HEALTH OVER LIFETIME: HOW CAN WE WORK THEM IN?

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Introduction Major economic and social changes occurred over the last 50 years, such as the increased participation of women in the labour market and the development of nonstandard forms of employment. These trends question the importance of work/employment conditions in the shaping of social inequalities in health over the life course. We thus hypothesize that (1) precarious occupational trajectories may contribute to ill health in adulthood, and that (2) they may affect genders differently.

Methods We used the French SIP (Santé Itinéraire Professionnel) national survey that collected information on occupational career and major health events of people aged 40–74 in 2006. We described poor employment conditions in terms of job instability, career discontinuity, qualification trends and versatility. We then applied multiple correspondence analysis and hierarchical ascending classification to identify patterns reflecting the accumulation of precarious employment conditions over job histories. Finally, we quantified the association between the type of occupational trajectory and self-reported health (Mini European Health Module) through multivariate logistic regression.

Results We included more than 9500 participants of workingage or < 5-years retirees at the time of the survey. The classification showed that women were over-represented among most precarious trajectories. We also found that people with precarious trajectories more often reported less than good selfperceived health, currently experiencing longstanding illness or health problem, and activity limitation due to health problems. The trend of increasing ill health across work trajectories (stable/qualified/continuous trajectories serving as a reference) was similar among men and women, although adjusted ORs were slightly higher among women.

Conclusion We bring evidence that women experienced more precarious employment trajectories in France over the last decades than did men, with similar health outcomes among men and women. We now seek to expand our gendered perspective by taking into account hazardous working conditions as a potential mediating pathway.

S-337 EXPOSURE TO PESTICIDES AND CANCER OF THE LYMPHOHEMATOPOIETIC SYSTEM IN THE AGRICOH COHORT CONSORTIUM

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Objective Pesticide exposure has been associated with certain cancer outcomes among farmers and applicators spraying pesticides. In the AGRICOH consortium of agricultural populations, we have evaluated cancer risk and pesticide exposure in three large cohort studies: The French Agriculture and Cancer Study - AGRICAN (FR), Agricultural Health Study (US), and Cancer in the Norwegian Agricultural Population (NO) studies.

Methods Estimates of lymphohaematologic cancers from the three cohorts (FR, US and NO) were analysed individually and then meta-analysed to yield more robust estimates of associations. Ever-never exposure to 33 chemical active ingredients from 14 chemical groups of agrochemicals was assessed using questionnaire information (US) and Crop Exposure Matrices (FR and NO), in approximately 316 000 persons representing 3.6 million person-years of follow up. '

Results Results for Non-Hodgkin lymphomas (NHL) were recently published, based on 2430 cases. Most meta-HRs suggested no association. Moderately elevated meta-HRs were seen for NHL and ever use of terbufos (meta-HR=1.18, 95%) CI: 1.00-1.39), based on 300 exposed cases; chronic lymphocytic leukaemia/small lymphocytic lymphoma and deltamethrin (1.48, 1.06-2.07), 148 cases; and diffuse large B-cell lymphoma and glyphosate (1.36, 1.00-1.85), 221 cases; although the latter was driven exclusively by results in the Norwegian cohort. Inverse associations of NHL with the broader groups of organochlorine insecticides (0.86, 0.74-0.99) and phenoxy herbicides (0.81, 0.67-0.98) were observed, but individual active ingredients within these groups were not associated after adjusting for exposure to other pesticides. Preliminary results based on data from the US and NO for myeloid cancers indicate moderate associations with dichlorvos and aldicarb.

Conclusion Individual studies are often underpowered regarding their ability to demonstrate associations of disease, particularly for more rare exposures or for rare cancers or subtypes. Analyses within the AGRICOH consortium provide an opportunity to overcome the low power to detect.

S-344 NEUROLOGICAL DISEASES IN FARMERS: OPPORTUNITIES WITHIN THE AGRICOH CONSORTIUM

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10.1136/OEM-2021-EPI.438

Objectives In most countries, the burden of neurological disorders is shown to increase. One explanation is the increase in life expectancy, especially for neurodegenerative ones. Environmental factors, including chemicals such as pesticides may also explain this Public Health issue. Several epidemiological studies have shown pesticide exposure in farmers was associated with neurodegenerative diseases. The strongest evidence concerns Parkinson's disease, but there are also data for Alzheimer's disease and amyotrophic lateral sclerosis. In addition, several studies have suggested that farmers had higher depression and suicide rates than the general population, which could be explained by several factors like remote residence, long working days, time pressure, economic stressors. Pesticides are also suspected as some of them disturb neurotransmitters implicated in mood, like serotonin and dopamine.

Methods In AGRICOH, there are opportunities to further study the occurrence of neurological diseases in relation with agricultural exposures. A first step has been taken by describing mortality from neurodegenerative diseases and suicide in the 4 cohorts who collected this type of data: the Agricultural Health Study in US (N= 51,502, 1999-2015), the AGRICAN cohort in France (N=181,842, 2005-2015), the Prospective Investigation of Pesticide Applicators' Health Study in UK (N=4,944 participants, 2013-2016) and the Korean Multicenter Cancer Cohort study (N=8,428 participants; 1993-2013). Standardized mortality ratios were calculated according to gender and countries.

Results In these first analyses, no excess in neurodegenerative mortality in males and females was observed in the four

cohorts. However, suicide mortality was significantly increased in French, British and Korean females (SMR=1.46; 23; 1.66, respectively) and in French males (SMR=1.13, 1.03-1.25) compared to the general population.

Conclusion Possibilities to go further on neurological diseases in AGRICOH, exploring possibilities to get incidence data, to combine data from additional cohorts, to include metrics for pesticide exposures in the analysis will be discussed during this symposium.

S-388 EXPOSURE ASSESSMENT FOR POOLING PROJECTS WITHIN THE AGRICOH CONSORTIUM

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Objectives Pooling epidemiological studies can be beneficial when studying rare outcomes and subtypes of diseases. However, pooling of exposure information is a challenge since standard approaches are not employed. The objective of this undertaking was to enable pooling of agricultural cohort studies at level of exposure to active ingredients.

Methods Initial efforts in AGRICOH focused on cancer outcomes in three large cohort studies, the Agricultural Health Study (AHS-USA), Agriculture and cancer (AGRICAN-France) and Cancer in the Norwegian Agricultural Population (CNAP-Norway) with data from >300000 individuals. Each study employed different methods, including Crop-Exposure Matrices (CEM), (AGRICAN and CNAP), and self-report (AHS), which were compared.

Results The CEM approach led to much higher prevalence of exposures. The CEM approach as expected generated false positive exposures. Lack of specificity is less of an issue for pesticides applied relatively frequently, but will lead to more exposure misclassification when prevalence of use is low. Given that assignment of exposure will be independent of disease status, misclassification is non-differential and will result in bias towards the null, especially when strength of association is modest, as for most agricultural exposures and health effects. Within AGRICOH our ability to detect associations are for now at best limited without further improvement of exposure assessment and assignment.

Conclusion Clear differences in farming systems, crops and animals, climate and agricultural inputs do exist and may result in large qualitative and quantitative differences in exposure when accurately assessed and assigned. Consequently, it may provide opportunities to evaluate exposure contrasts.To enable pooling in more informative ways, further thought is given within AGRICOH to collect agricultural occupational histories in more detail and to harmonize exposure assessment and assignment. Standardization of exposure assessment approaches within AGRICOH and future studies is a necessity and will make pooling easier and may result in more informative studies.

S-419 LONG TERM EFFECTS OF COVID-19 IN HEALTH WORKERS AND THE ASSESSMENT OF THE FATIGUE SYNDROME IN COMPENSATION CLAIMS

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Introduction In Germany more than 45,000 cases of COVID-19 are already recognized as Occupational Disease (OD) for workers in the health and welfare sector. Different long term effects of COVID-19 are described in literature, fatigue being one of the most common symptoms observed after the infection.

Objectives We assessed long term effects of COVID-19 three months and more after the SARS-CoV-2 infection in health and social workers (HSW).

Methods A self-administered questionnaire was sent to 3,800 HSW with COVID-19 recognized as OD in January 2021. The questionnaire was self-developed and assessed biographical data, symptoms at time of infection, quality of life (QoL) and workability as well as COVID-19 associated symptoms three months or more after infection. The study was approved by the Medical Ethic Committee in Hamburg, Germany.

Results A total of 2,018 HSW returned the questionnaire. Response rate was 53%. 82% were female and 52% were older than 50 years. 42% worked in hospitals and 30% in nursing homes, 9% were doctors and 56% nurses. Compared to the time before the infection, QoL was reduced by 72% and work ability was reduced by 83%. Severe fatigue was reported by 20%, sever concentration and memory problems by 14% and severe breathlessness by 9%. 4.5% had already taken part in a rehabilitation and 37% wished to take part in a rehabilitation.

Conclusion Long term fatigue symptoms are common in HSW more than three months after COVID-19. The need for rehabilitation in HSW with COVID-19 as OD is high. The further cause and the treatment options for long term effects and especially for fatigue need to be studied.

S-452 CHALLENGES OF INTEGRATING GENDER THEORETICAL CONCEPTS INTO EPIDEMIOLOGICAL HEALTH RESEARCH

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In recent years awareness of the need to integrate sex/gender more comprehensively into epidemiological health research has increased. However, a discrepancy between gender theoretical concepts on one hand and epidemiological practice on the other hand still remains. A conceptualization of a static, individual characteristic sex/gender (often only dichotomous as male/female) does not capture variability, multidimensionality and contextuality of sex/gender. Moreover, interactions between sex-linked biology and gender relations, processes of embodiment as well as intersectionality in terms of power relations and processes of privilege or discrimination are hardly considered. This is especially true for environmental health research.

The presentation will draw on experiences gathered in two ongoing research projects: INGER and AdvanceDataAnalysis. The collaborative research project INGER (Integrating gender into environmental health research) developed a multidimensional sex/gender concept from an intersectionality perspective. This concept guided operationalizations for sex/gender-related data collection in a population-based study. Decision tree methods are currently applied to assess the relevance of several sex/gender dimensions when identifying subgroups with especially high environmental exposures. The subproject AdvanceDataAnalysis as part of the collaborative research project AdvanceGender focuses on the more in-depth analysis of already existing data to support gender-sensitive health reporting. One approach is to define 'solution-linked' variables that indicate modifiable societal and contextual factors and help to explain heterogeneity across social dimensions.

With INGER and AdvancDatAnalysis as examples, challenges in operationalization of sex/gender based on gender theoretical concepts, and in statistical analysis of the impact of multiple sex/gender dimensions on exposure variation and effect modification will be discussed.

Improvements in the integration of theoretically sound sex/ gender concepts in epidemiological health research will enhance its validity and significance and, in perspective, contribute to more health equity.

S-464 AUTOMATED OCCUPATIONAL ENCODING TO THE CANADIAN NATIONAL OCCUPATION CLASSIFICATION USING AN ENSEMBLE CLASSIFIER FROM TF-IDF AND DOC2VEC EMBEDDINGS

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Introduction Occupational encoding is a technique that allows job titles provided by study participants to be categorized according to their role in the labor force. Encoding has primarily been a slow error-prone manual process which is ripe for automation.

Objectives Our goals was to design and test an automated coding prototype using machine learning techniques.

Methods The prototype classification system ENENOC (the ENsemble Encoder for the National Occupational Classification) is comprised of series of steps involving data cleaning, exact match search, multi classifier ensembling, hierarchical classification, and multiple output selection. In the absence of exact matching between job title input and NOC category descriptions, the input data is embedded using the TF-IDF algorithm and Doc2Vec. The embeddings are fed into a hierarchical, ensemble classifier that uses classical machine learning techniques: Random Forests, Support Vector Machine and K-Nearest Neighbour. Ensemble encoding is achieved using a majority-voting system. The hierarchical two tier classification methodology first predicts the first digit of the NOC code followed while the second tier predicts the second third and fourth digit of the NOC code for the input data. The combined approach produces a single, 4-digit code as a top choice, as well as four alternate NOC codes, that serve as additional ranked choice based on the Doc2Vec model.

Results The prototype was benchmarked on a manually annotated data set comprising of 64,000 records. It produced a top-1 Per-Digit Macro F1-Score of 0.65 and a top-5 Per-Digit Macro F1-Score of 0.76, both of which are highly within published accuracy ranges for manual coding (44% to 89% inter-annotator agreement). ENENOC coded 30,000 job titles in 3 hours.

Conclusion The ENENOC prototype is a sophisticated ENsemble Encoder for the National Occupational Classification which has state of the art performance accuracy with significant speed improvements over manual coding.

S-469 AN INTEGRATED DATABASE OF OCCUPATIONAL INFORMATION FROM O*NET-SOC AND THE CANADIAN CAREER HANDBOOK

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Introduction Information about occupations and job attributes is available in siloed databases. The lack of integrated data precludes ad-hoc querying and research investigating occupational determinants of health e.g. COVID-19 or stress. Core to integration of occupation data is taxonomic representation of job categories. In North America the official occupational taxonomies are the Canadian National Occupational Classification (NOC) and the United States Standard Occupational Classification (SOC).

Objectives This study aimed to integrate job attribute data from the Canadian Career Handbook (CH) and O*NET database to facilitate cross-classification query capabilities and to prototype the creation of metrics for comparing occupations based on job attributes.

Methods

The integrated database was completed hierarchical structures of both occupational taxonomies were represented; job attributes were selected from the CH and O*NET-SOC; the database was populated with occupational descriptions; occupational codes from the CH and O*NET-SOC were linked using the Brookfield Institute NOC to O*NET-SOC crosswalk.

Results The database consists of 1679 rows with unique occupations and 181 columns with occupational attributes. Rows contain a unique combination of hierarchical structures from the CH and O*NET-SOC. Rows also contain detailed occupational descriptions from CH and O*NET-SOC. We queried the integrated data checking O*NET-SOC to CH equivalence and cross-taxonomy selection of job attributes, e.g. Retrieve all or selected attributes for an occupation by CH code or equivalent code in O*NET-SOC. We ran queries for targeted scenarios to retrieve occupations: i) where work is done in physical proximity to others, ii) where incumbents are exposed to disease or infections, iii) at risk of back pain due to physical work factors, iv) where incumbents experience high work-related stressors.

Conclusion We report a database combining selected information from the CH and O*NET-SOC that facilitates complex occupational health queries. Further we investigated workrelated stressors on low back pain risk by occupation.

S-487 YOUNG PEOPLE'S DEPRESSIVE SYMPTOM TRAJECTORIES AND THEIR EDUCATION AND EMPLOYMENT. COMPARING CANADA AND THE UNITED STATES

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Objective This study examines how trajectories of depressive symptoms from the age of 16–25 are related to early adult education and employment outcomes in Canada and the United States.

Methods Data came from the Canadian National Longitudinal Survey of Children and Youth (n=2348) and the American

National Longitudinal Survey of Youth 1979 Child/Young Adult Survey (n=3961). Depressive symptom trajectories from the age of 16–25 were identified separately for each country using growth-mixture modeling, and linked to respondents' education and employment status (working with a post-secondary degree; working with no degree; working with a high school degree; in school; and, not in employment, education, or training i.e., NEET), and part/full-time employment (less than 30 hours/week, 30–40 hours/week, more than 40 hours/week). We assessed the association of depressive symptom trajectories with these outcomes using multivariable multinomial logistic regressions, calculating the adjusted predicted probability of each outcome using marginal standardization.

Results In both countries four similar depressive symptom trajectories were identified: low-stable, increasing, decreasing, and first increasing then decreasing symptoms (i.e., mid-peak). In both countries, increasing, decreasing, and mid-peak trajectories were associated with higher odds of working with low educational credentials, and/or NEET relative to low-stable trajectories. In Canada, however, all trajectories had a higher predicted probability of either being in school or working with a post-secondary degree than the other outcomes; in the USA, all trajectory groups were most likely to be working with a high school degree. In the USA but not in Canada, increasing and decreasing trajectories were associated with higher odds of part-time work than full-time work.

Conclusions Higher levels of depressive symptoms during the transition to adulthood are associated with working with no or low credentials, NEET, and working part-time in young adulthood. Country-level differences may modify the influence of depressive symptoms.

S-490 EXPOSOME METHODS IN OCCUPATIONAL EPIDEMIOLOGY: USE OF TEXT MINING FOR DEVELOPING JOB EXPOSURE MATRICES

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Within the EXPOSOME PROJECT FOR HEALTH AND OCCUPATIONAL RESEARCH (EPHOR) project we aim to develop a protocol to enable efficient update of job exposure matrices so that they can include the latest available information of highest quality possible. The protocol will include methods for searching and collecting new data from literature (assisted by text mining WP4), exposure databases (e.g. ECHA REACH database, reports) and (Bayesian) decision criteria to determine if and how to revise exposure estimates in the JEM. As part of this work we have started to develop a framework of semi- and fully-automated approaches for identification of relevant literature and extraction of occupational exposure measurements, which in turn may be used in creating and updating JEMs. Currently both content-level and document-level approaches are being explored. The contentlevel approach utilizes text-mining and machine learning to interpret, analyse, and return relevant information from a text corpus (e.g. manuscripts in the PubMed Central (PMC) archive). In addition to retrieval of user-specified information (e.g. 'literature with occupational benzene measurements in

PMC form 2018–2020'), the software will also have the potential to identify new patterns and relationships within the corpus (e.g. 'the most sampled industry/occupation in literature with benzene measurements in PMC from 2018–2020'). The document-level method uses automated keyword searches with optional filters to highlight documents with potential relevant information. Once highlighted by the search algorithm, the documents may be screen manually or with other automatic software to extract relevant information and data. We are currently focusing on exposure to diesel engine exhaust but plan to expand to other substances. The protocol will form part of the EPHOR toolbox being developed as part of the project.

S-492 A RESEARCH PROGRAM TO PROVIDE A COMPARATIVE CONTEXTUALIZED ANALYSIS OF OCCUPATIONAL COVID-19 AMONG HEALTH WORKERS: PRELIMINARY INSIGHTS FROM A SOUTH AFRICAN-CANADIAN COLLABORATION

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A research program to provide a comparative contextualized analysis of occupational COVID-19 among health workers: Preliminary insights from a South African-Canadian Collaboration.

Objective The COVID-19 pandemic has demonstrated that healthcare workers (HCWs) in many settings are at high risk of occupational exposure to infectious diseases, especially where attention to occupational protection was lacking. In July 2020 our World Health Organization (WHO) collaborating centres in Canada and South Africa launched a joint Rapid Response Research program in partnership with local government health service delivery agencies in both countries to better understand how local contexts affect policies and practice; scrutinize their respective scientific and contextual rationales as well as outcome; grasp why and how these change over time; and understand organizational factors that enhance implementing resilient policies.

Methods The collaboration includes cohort studies, in the Vancouver Coastal Health (VCH) region in Canada, and Gauteng province in South Africa respectively, to assess risk factors for SARS-CoV-2 infection among HCWs as well as evaluate the effectiveness of SARS-CoV-2 infection prevention and control measures. It also includes a cross-sectional study in Gauteng to explore mental health of HCWs during the pandemic and identify areas for intervention; a quasi-experimental study of the role of information systems in strengthening occupational health services for healthcare workers; and global policy analyses including an analysis of a global survey of HCWs from 161 countries.

Results The global survey revealed considerable variations in the degree to which prevention and control measures were deemed adequate; the South African baseline audit of 42 hospitals also revealed considerable variations in implementing occupational health protection. We demonstrated the utility of information systems to assess risk by occupation and setting in VCH; preliminary results of the VCH case-control study demonstrated the feasibility of this design; and, importantly, we identified challenges in leveraging operational research to inform policy, practice and world-knowledge in both VCH and South Africa.

Conclusion Our research activities showed the impact of vaccine roll-out and new variants on rates of COVID-19 among HCWs within different healthcare settings and occupational groups and how policies to protect HCWs have evolved (e.g., masking policies and vaccine protocols for HCWs). We conclude that lessons regarding procedural barriers to data acquisition and sharing must be addressed with an ethical framework in mind.

S-493 ARTIFICIAL INTELLIGENCE AND OCCUPATIONAL HEALTH

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The multitude and complexity of data in health sciences has given rise to the increasing use of artificial intelligence (AI). AI technologies of importance include machine (ML) and deep (DL) learning, natural language processing (NLP) and rule-based expert systems (RBES). These AI technologies have also found their way into occupational health in the analyses of structured and unstructured data varying from application in job-codings (e.g. NLP). exposure assessment (e.g. NLP and RBES), data analyses (e.g. ML, DL and Neural networks), and risk assessment (RBES). Examples of AI technologies in Occupational Health will be presented including efforts on job-codings, job-exposure-matrix construction from the EPHOR project, high-dimensional (ML) data analyses within UK-Biobank and the Synergy project, and the application of RBES in risk assessment of benzene. Ethical issues in the application of AI in occupational health will also be discussed.

S-494 MECHANISTIC EVIDENCE FROM POPULATION STUDIES OF WELDING FUME EXPOSURE AND CANCER RISK

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Objectives to describe evidence from human studies of welding fume associated responses predisposing to cancer.

Methods The process of evaluating potential carcinogenicity of occupational exposures entails comprehensive evaluation of in vitro and in vivo studies of cells, animals and human populations. With advancements in our ability to assess exposure-related health affects in humans, we can use molecular epidemiologic methods to study pre-clinical disruptions in homeostasis that can lead to cancer. Welding fumes were evaluated recently in IARC Monograph #118 (2017).

Results With respect to the key characteristics of human carcinogens, adequate data from in vitro and in vivo studies were available to evaluate if welding fumes: induce chronic inflammation; are immunosuppressive; are genotoxic; induce oxidative stress; alter cell proliferation, cell death, and nutrient supply; and modulate receptor-mediated effects. There is

strong evidence that mild steel welding fumes, in addition to stainless steel, induce chronic inflammation and are immunosuppressive, and this was confirmed in molecular epidemiology studies of workers. We continued studies using metabolomic approaches in a repeated measures design and found welding fume exposure-related changes in blood in pathways related to disturbances in unsaturated fat metabolism, as in the signaling lipids Sphingosine 1-phosphate (S1P) and sphingasine 1-phosphate (SA1P). Global metabolomic profiling also revealed several metabolic changes after welding fume exposure, mainly involved in the lipid pathway [glucocorticoid class (cortisol, corticosterone, and cortisone), acylcarnitine class, and DiHOME species (9,10-DiHOME and 12,13-DiHOME)], amino acid utilization (isoleucine, proline and phenylalanine), and S-(3-hydroxypropyl) mercapturic acid (3-HPMA): compounds are all associated with inflammation.

Conclusion There is strong mechanistic evidence in humans for inflammatory and metabolic changes that promote carcinogenicity of welding fumes in humans.

S-495 INTRODUCTION TO THE KEY CHARACTERISTICS APPROACH TO INTERPRETING MECHANISTIC DATA

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The key characteristics (KCs) of human carcinogens were recently introduced as the basis of a uniform approach for searching, organizing, and evaluating mechanistic evidence to support cancer hazard identification (PMID:30521319). The KCs comprise the properties of known human carcinogens, including their ability to, be genotoxic; be immunosuppressive; or modulate receptor-mediated effects (PMID: 26600562). Established human carcinogens commonly exhibit one or more of these characteristics, and therefore, data on these characteristics can provide independent evidence of carcinogenicity when human data are lacking (PMID: 29562322). Such data can also help in interpreting the relevance and importance of findings of cancer in animals and in humans. In its 2017 report on 'Using 21st Century Science to Improve Risk-Related Evaluations', the NRC opined that the KCs approach 'avoids a narrow focus on specific pathways and hypotheses and provides for a broad, holistic consideration of the mechanistic evidence.' They further suggested that key characteristics be developed for other endpoints, such as endocrine disruption and reproductive toxicity. These have recently been published (PMID: 31719706; 31322437; 31199676) and KCs for hepato-, immuno-, neuro- and cardiovascular toxicants are in the final stages of development. We have also recently published the findings of two expert committees who described approaches to studying carcinogenicity of chemical mixtures using the KCs (PMID: 33784186) and identified biomarkers that can be used to measure the KCs of carcinogens in humans, animals and cell culture (PMID: 32152214). A uniform approach to applying these biomarkers in occupational studies of different epidemiologic design needs to be developed so that the most relevant biomarkers of each KC are measured in exposed human populations, thereby improving hazard identification and risk assessment.

S-496 RESPIRATORY DISEASE IN THE AGRICOH CONSORTIUM FROM SIX CONTINENTS

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Objectives Farming is filled with respiratory hazards: pesticide vapors, dusty fields, dangerous hydrogen sulfide accumulations in manure pits and pump sumps, nitrogen dioxide in conventional silos, and many others. Despite the recognition of respiratory hazards, this problem has not been fully investigated at the world level after harmonization of data. We used data from the AGRICOH consortium, a collective of prospective cohorts of agricultural workers, to assess respiratory disease prevalence among adults in 18 cohorts representing over 200,000 (118,520 men, 92,712 women) farmers, farmworkers, and their spouses from six continents.

Methods Cohorts collected data between 1992–2016 and ranged in size from 200 to >128,000 individuals; 44% of participants were female. Farming practices varied from subsistence farming to large scale industrial agriculture. All cohorts provided respiratory outcome information for their cohort based on their study definitions. The majority of outcomes were based on self-report using standard respiratory questionnaires; the greatest variability in assessment methods was associated with chronic obstructive pulmonary disease (COPD).

Results The median prevalence was 18.6% for cough, 13.3% for phlegm, and 15.0% for wheeze and was higher in men than in women, with the greatest difference for phlegm (17% vs. 10%). For asthma, the median prevalence was 7.2% and was higher in women (7.8% vs. 6.5%). The relative proportion of allergic asthma varied among cohorts. In two of eight cohorts for women and two of seven cohorts for men, allergic asthma was more common than non-allergic asthma. The median prevalence of COPD was 4.5%. Men suffered more than women from COPD (5.5% vs. 4.0%).

Conclusion These findings indicate that respiratory outcomes are common among farmers around the world despite the differences in agricultural production. Both allergic and non-allergic asthma exist among farmers.

S-497 COMPARISON OF REPORTED RELATIVE RISKS FOR HEALTH CARE, TRANSPORT, AND FOOD PROCESSING WORKERS

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Background Risk of SARS-CV-2 infection has been strongly linked to occupation, with specific occupational sectors such as health care, food production, and transport, particularly affected. To better understand the potential risks by occupational sector we investigated the reported risks of COVID-19 infection and mortality for employees in the three sectors.

Methods We performed a rapid review of observational studies reporting COVID-19 risk for employees in health care, food manufacturing, and transport sectors. All studies published in the peer-review and pre-print literature between March 2020 and June 2021 were considered. The primary outcome measure was COVID-19 infection, with COVID-19 related mortality and hospitalisation considered as secondary measures. We extracted odds ratios/relative risks (and standard errors) comparing workers in each sector to within study reference category. To avoid complications due to study heterogeneity, we simply produced descriptive forest plots where possible utilising the odds ratios that have been adjusted for demographics. **Results** Eight studies were identified from Norway (one), and California (one), and the UK (five). Three studies at time of writing were peer reviewed, and five of the eight were cohort studies. Food production was the least well investigated with limited evidence of increased infection, severe infection or mortality compared to the 'other' groups. Healthcare and transport show wide variation in the odds ratios reported. Public facing roles did indicate greater infection risk, specifically in the first wave.

Conclusions Considerable study heterogeneity is present, particularly with respect to the chosen reference groups, meaning objective comparisons are limited here. However, as would be expected public facing roles, especially in the first wave, did appear to experience increased infection. Further prospective work with subject level data is needed to better understand the occupational risks.

S-498 METHODOLOGICAL ISSUES IN STUDYING OCCUPATIONAL DIFFERENCES IN RISK OF COVID-19

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It is well-established that certain occupations that have frequent contact with patients (e.g. health care workers) or the public (e.g. bus drivers), may have increased risks of COVID-19. However, estimating these risks involves a number of important methodological problems. Not everyone who has a SARS-CoV-2 infection gets symptoms; not everyone with symptoms gets tested; not all tests yield valid results. Therefore, even just estimating the incidence or prevalence of COVID-19 in particular occupational groups is difficult. Moreover, these selection pressures may be different for different occupational groups (e.g. health care workers may be more likely to be tested than some other occupations). In addition, unlike most other occupational exposures, you can get infected at work, or get the same infection at home, potentially yielding quite severe confounding by lifestyle and living conditions. These methodological issues are not insurmountable, but require careful study design and data analysis. In particular: (i) when not everyone is being tested, then comparisons between and within occupations can be biased, but this bias can be minimised using the test-negative design; and (ii) comparisons between occupations require careful and rigorous adjustment for work-related 'living conditions', i.e. the fact that workers in insecure low-paid jobs may also have a high risk of contracting SARS-CoV-2 infections outside of the workplace.

S-499 THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN THE CODING OF OCCUPATIONAL INFORMATION

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Many research studies seek to identify the social determinants of health and occupation is an important predictor, both at the level of the individual as well as for populations. Whereas job titles are usually solicited during interviews or by questionnaire, before being able to use this information the responses need to be categorized using a coding system, such as the Canadian National Occupational Classification (NOC).

Manual coding is the usual method, which is a time-consuming and error-prone activity with variable or inconsistent outcomes from teams of coders. In recent work the ACA-NOC algorithm¹ was developed to perform automated coding based on matching job title text with the NOC's job titles and textual descriptions. This algorithm was benchmarked on a small sample manually coded data set with subject matter experts subsequent review of coding discrepancies to facilitate functional improvements to the algorithm. Performance levels achieved illustrated the viability of the approach albeit larger benchmarking data sets were required.

CanPATH²has collected data from approximately 330,000 volunteer Canadians, including information about health, lifestyle, occupation, environment and behavior. We report on the further benchmarking and further development of this algorithm in CanPATH funded project using over 60,000 manually coded job titles from the constituent Alberta Tomorrow Project. The algorithm was also applied to over 100,000 un-coded job titles from Atlantic PATH, including the Core questionnaire and occupational history data.

The core outcome of the project identified that auto-coding results are comparable to manual coding in accuracy and superior in speed e.g. 2 years of manual coding (64,000 records) can be auto coded in 72 hours. The algorithm was considered ready for deployment in operational settings: point of care, decision support for manual coders.

Additional insights gained during the project revealed that (i) NOC and ATP data sets have a distribution bias where some NOC categories were over or under-represented and numerous non-standard lexical features were found in job titles and NOC job descriptions, (ii) benchmarking datasets from ATP included coding errors that were corrected by expert coders leading to the creation of gold standard test sets for further algorithm improvement studies, (iii) a study on 17 categories of occupations initially difficult to code, identified some job categories with near 90% coding accuracy.

Automated coding of job titles to the NOC has been shown to be both practicable to good levels of accuracy and shown to significantly accelerate manual coding efforts from years to autocoding in a matter of hours without decrease in accuracy. Autocoding can replace costly, error prone manual labor with accurate point-of-care auto-coding such that patient occupation information during healthcare encounters could now supplement existing administrative data sets in electronic health record systems. This data can be used better to understand the socioeconomic consequences of health conditions, advise patients about returning to work with a health condition, recognizing occupations at risk of disease e.g. as in the COVID-19 pandemic.

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