performed to determine differences between exposure variables (e.g. male versus female).

Results There were 36 640 workers meeting inclusion criteria (average 305 cases per month; mean rate per month of 11.6 per 1 00 000 working population). A total of 1,121,863 lost working weeks were compensated, with a median of 10 weeks. Thirty-two percent of cases did not have a record of attending hospital. The lowest median duration of time loss was among those involved in a train or tram crash (2.9 weeks) and the highest among those with quadriplegia (142.2 weeks). Duration of income support was significantly different within age, sex, injury type, severity, crash type, and compensation system groups.

Conclusions Results showed that RTC injuries of all severities caused considerable work absence. Measures of work absence can complement existing measures of RTC burden.

03B.2 OCCUPATIONAL EXPOSURES AND SICKNESS ABSENCE TRAJECTORIES AMONG FINNISH EMPLOYEES: A REGISTER LINKED NATIONALLY REPRESENTATIVE FOLLOW-UP STUDY

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10.1136/OEM-2019-EPI.63

Background Physical workload factors have been linked to the risk of sickness absence, however, some work exposures can also be protective of work ability. We aimed to first identify sickness absence trajectories in a nationally representative occupational cohort, and second to examine the associations between physical workload factors, potential protective factors and sickness absence trajectories.

Methods We examined a nationally representative cohort of working aged Finnish adults interviewed and medically examined at baseline in 2000–2001 (n=3814). Both potentially protective (sitting and keyboard use) and risk factors (e.g. handling of heavy loads and vibration) were included. All medically confirmed sickness absence periods 2002–2008 were included in the trajectory analyses to identify latent groups with similar sickness absence trends. These data were derived from the registers of the Social Insurance Institution of Finland. The models were adjusted for socio-demographic factors, health behaviors and physical and mental health.

Results We found a group with a very low level, a group with a stable low level, and a group with a high and increasing level of sickness absence. After full adjustments, prolonged sitting and use of keyboard emerged as protective factors that were associated with a lower risk of belonging to the trajectory with high and increasing sickness absence (HR 0.60; 95% CI 0.45–0.80). In turn, the risk increased with the number of physical workload factors reported, and was highest for those with four or more workload factors (HR 2.84; 95% 2.08–3.88).

Conclusions Physical work is associated with the risk of long-term sickness absence, with the highest risk found for those with several different physical workload factors. As the risk remained after controlling for various pertinent risk

factors, this highlights the need to find ways to better maintain work ability of those with the physically most strenuous work.

03B.3 ESTIMATING THE IMPACT OF CHANGES TO OCCUPATIONAL STANDARDS FOR SILICA EXPOSURE ON LUNG CANCER MORTALITY

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10.1136/OEM-2019-EPI.64

Background Respiratory exposure to silica is associated with the risk of death due to malignant and non-malignant disease. 2.3 million U.S. workers are exposed to silica. Occupational exposure limits for silica are derived from a number of lines of evidence, including observational studies. Observational studies may be subject to healthy worker survivor bias, which could result in underestimates of silica's impact on worker mortality and, in turn, bias risk estimates for occupational exposure limits.

Methods Using data on 65 999 workers pooled across multiple industries, we estimate the impacts of several hypothetical occupational exposure limits on silica exposure on lung cancer and all-cause mortality. We use the parametric g-formula, which can account for healthy worker survivor bias.

Results Assuming we could eliminate occupational exposure, we estimate that there would be 20.7 fewer deaths per 1000 workers in our pooled study by age 80 (95% confidence interval: 14.5, 26.8), including 3.91 fewer deaths due to lung cancer (95% CI: 1.53, 6.30). Less restrictive interventions demonstrated smaller, but still substantial risk reductions.

Conclusions Our results suggest that occupational exposure limits for silica can be further strengthened to reduce silica-associated mortality and illustrate how current risk analysis for occupational limits can be improved.

03B.5 THE MENTAL HEALTH OF POLICE, FIREFIGHTERS AND PARAMEDICS IN THE UK BIOBANK: A COMPARISON WITH THE GENERAL WORKING POPULATION

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10.1136/OEM-2019-EPI.65

It is our responsibility to protect and look after the health of members of the emergency services as this directly impacts on the country's readiness to respond to these disasters and is a critical part of our duty of care towards this important group of workers. This study examined the mental health outcomes and associations with individual and job characteristics among emergency services personnel compared to a random sample of working people, thereby using data from the UK Biobank. This data source contains data on over half a million adults in the UK, who were at the time of recruitment between 40–69 years. Over 2 80 000 reported being in work. Current emergency services personnel were identified based on Standard Occupational Classification (SOC) 2000 codes. A random sample of age and sex matched people working in other occupations were selected from the UK Biobank for comparative purposes. The prevalence of the outcomes of interest, based

on current and life time measures of depression, anxiety, alcohol misuse, post-traumatic stress disorder, suicide and trauma will be presented. The findings will be discussed in the light of current policies and strategies and recommendations for further practice will be outlined.

03B.6 THE ECONOMIC BURDEN OF WORK-RELATED ASBESTOS EXPOSURE

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10.1136/OEM-2019-EPI.66

The objective of this study was to estimate the economic burden of lung cancer and mesothelioma due to occupational and paraoccupational asbestos exposure in Canada.

We estimated the lifetime cost of newly diagnosed lung cancer and mesothelioma cases associated with occupational and para-occupational asbestos exposure for calendar year 2011 based on the societal perspective. The key cost components considered were healthcare costs, productivity and output costs, and quality of life costs.

There were 427 cases of newly diagnosed mesothelioma cases and 1904 lung cancer cases attributable to asbestos exposure in our reference year—calendar year 2011—for a total of 2331 cases. Our estimate of the economic burden is \$C831 million in direct and indirect costs for newly identified cases of mesothelioma and lung cancer and \$C1.5 billion in quality of life costs based on a value of \$C100,000 per quality-adjusted life year. This amounts to \$C356,429 and \$C652,369 per case, respectively.

The economic burden of lung cancer and mesothelioma associated with occupational and para-occupational asbestos exposure is substantial. The estimate identified is for 2331 newly diagnosed, occupational and para-occupational exposure cases in 2011, so it is only a portion of the burden of existing cases in that year. Our findings provide important information for policy decision makers for priority setting, in particular the merits of banning the mining of asbestos and use of products containing asbestos in countries where they are still allowed and also the merits of asbestos removal in older buildings with asbestos insulation.

Silica Exposure and Health Effects

03C.1 SILICA EXPOSURE IN SWEDISH IRON FOUNDRIES AND BIOLOGICAL MARKERS OF INFLAMMATION AND COAGULATION IN BLOOD

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10.1136/OEM-2019-EPI.67

Background Work-related exposure to silica is a health hazard worldwide causing i.e. silicosis. Inflammation is known to be a cause of cardiovascular diseases and some studies have presented elevated cardiovascular disease mortality in relation to

silica exposure. The aim of this study was to investigate the relationship between inhalation of exposure to silica in Swedish iron foundries and markers of inflammation and coagulation in blood.

Methods Personal sampling of respirable dust and silica was performed for 85 subjects in three Swedish iron foundries. Stationary measurements were used to study concentrations of respirable dust and silica, inhalable and total dust, PM10 and PM2.5, the particle surface area and the particle number concentrations. The markers of inflammation analyzed were, interleukins (IL-1 β , IL-6, IL-8, IL-10 and IL-12), C-reactive protein, serum amyloid A (SAA), and markers of coagulation fibrinogen, factor VIII (FVIII), von Willebrand factor, and d-dimer were measured in plasma or serum. The sampling was performed on the second or third day of a working week following a work free weekend, and additional sampling on the fourth or fifth day.

The personal and stationary measurement data were categorized into three classes to introduce high contrast with a minimum of 10 workers in each group. A mixed model analysis adjusted for sex, age, smoking, infections, blood group, sampling day and BMI was used.

Results For personal sampling the average 8 hour time-weighted average air concentration of respirable dust were 0.85 mg/m³ and respirable silica 0.052 mg/m³. For the high exposure group, statistically significant increased levels of SAA, fibrinogen and FVIII were determined for some exposure measures.

Conclusions This study may indicate an increased risk of cardiovascular disease when observing relations between particle exposure and inflammatory markers.

03C.2 A 30-YEAR IMPACT ANALYSIS OF BEST PRACTICES FOR SILICA DUST EXPOSURE REDUCTION IN CONSTRUCTION: COSTS, BENEFITS AND HRQL

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10.1136/OEM-2019-EPI.68

Crystalline silica dust exposure is common in the construction sector. In fact, it is the industry with the largest number of people exposed in Canada. Inhalation of silica dust is known to cause lung cancer, silicosis, chronic obstructive pulmonary diseases, rheumatoid arthritis, and tuberculosis. The hierarchy of controls provide a range of prevention options for reducing or eliminating exposure. In this study we undertake an impact analysis of the implementation of two exposure reduction approaches—use of personal protective equipment by all exposed individuals and use of engineering controls wherever and whenever feasible.

We estimated the intervention costs over a 30 year time period (2020–2050) of each exposure reduction approach implemented across the entire sector in Ontario, Canada, and considered equipment, maintenance, training, and productivity costs of each approach over the time period. The economic impacts from lung cancer cases averted due to exposure reduction included three broad categories of impacts—direct, indirect and intangible. We took a societal-