Poster Presentation

Exposure Assessment

0309 REAL-TIME FINE AEROSOL EXPOSURES IN TACONITE MINING OPERATIONS

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Recent studies have shown that taconite workers may be at increased risk for mortality from lung cancer, mesothelioma, and cardiovascular diseases (CVD). The relationship between CVD and occupational dust exposures at these mines has not been well-studied. We conducted an air monitoring campaign to characterise fine aerosol concentrations at 91 locations across six taconite mines using direct-reading instruments to obtain measurements of mass concentrations (PM_{2.5} or particles with aerodynamic diameter less than 2.5 µm, and respirable particulate matters or RPM), surface area (SA), particle number (PN), and particle size distributions. We fit a Bayesian model with an AR (1) (autoregressive order 1) correlation structure to estimate exposure while accounting for temporal correlation. The highest estimated geometric means (GMs) were observed in the pelletizing and concentrating departments (pelletizing maintenance, balling drum operator, and concentrator operator) for PM_{2.5} and RPM. SA and PN generally had highest GMs in the pelletizing department that processed powder-like particles into iron pellets. Between-location variability estimates were generally higher than within-location, indicating larger differences in exposure levels at different locations between mines. Ranking between PM_{2.5} and RPM generally agree with each other, whereas SA and PN were more consistent with each other, with some overlap with PM_{2.5} and RPM. Differences in ranking these groups may have potential implication for occupational epidemiological studies that rely on exposure information to detect an exposure-response relationship. Future occupational epidemiological studies investigating fine aerosols exposures and health risk are encouraged to consider multiple metrics to see how they influence health outcomes risk.

Poster Presentation

Policy/Impact

0310 MEDICAL REHABILITATION BEFORE THE OCCURRENCE OF EARLY RETIREMENT IN GERMANY - PREVALENCE AND SOCIODEMOGRAPHIC DETERMINANTS OF NON-UTILISATION.

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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. The underlying principle called "rehabilitation over

retirement" is the concept to avoid early retirement due to health problems by rehabilitation.

Purpose To describe the utilisation of medical rehabilitation before the occurrence of early retirement in Germany from 2003 to 2014 and to investigate potential sociodemographic determinants.

Methods Analysis based on 20% random samples of administrative pension records from the Research Data Centre of the German Federal Pension Insurance. We used logistic regression models to investigate the risk for non-utilisation of medical rehabilitation during five years before the occurrence of early retirement. Age, sex, non-German citizenship, marital status, school and vocational education, annual income and diagnoses were considered as potential risk factors. Analyses were run with SAS software for statistical analyses (version 9.4).

Results Among all early-retired patients 47.9% (153.990 out of 321.275) did not utilised medical rehabilitation. Risk factors for non-utilisation were to be unmarried or widowed (vs. married, adjusted OR: 1.27; 95% CI: 1.25–1.29), non-German citizenship (vs. German citizenship, 1.28 [1.25–1.32]), unknown or low educational level (vs. median educational level, 1.51 [1.48–1.54]), as well as low annual income (1 st quartile vs. 4th quartile; 3.90 [3.81–3.99]). Also, risk was higher among men compared to women (1.35; 95% CI: 1.33–1.37).

Conclusions Among all early-retired patients almost 50% obtained no medical rehabilitation. Worst affected were deprived persons.

Poster Presentation

Shift Work

0311 CAN SMOKING RESEARCH FROM THE 1950S INFORM TODAY'S SHIFTWORK RESEARCH? APPROACHES TO ASSESS HYPOTHESISED CIRCADIAN DISRUPTION AT AND OFF WORK

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Background In 1950, landmark epidemiology contributed to identifying smoking as a key carcinogen [Wynder and Graham; Doll and Hill]. In 2007, IARC classified shiftwork involving circadian disruption [CD] as probably carcinogenic; however, epidemiological evidence in regards to the carcinogenicity of shift-work that involves nightwork is conflicting.

Objective To compare smoking research from the 1950's to shiftwork research for exploring the hypothesis that today's shiftwork epidemiology is lacking chronobiological and methodological rigour and to develop metrics to facilitate improvement.

Methods Comparing smoking and chronobiological insights and deriving CD metrics.

Results If doses had been limited to number of cigarettes smoked at work rather than over 24 hours, smoking insights could have been delayed or disallowed. Similarly, restricting exposures to, let alone doses of, CD from work at night may prove insufficient to elucidate effects of cumulative CD. CD doses may be obtained by comparing how activities overlap with individuals' biological nights (BNs: predicted by

chronotype), yielding CD_{BN} hours. Total CDhours may be obtained by summing up CD_{BN} hours due to activities at and off work. As a more easily applicable metric, how much sleep overlaps with the individual biological day (BD) may yield CD_{BD} hours.

Conclusions Epistemologically, shiftwork epidemiology is lacking chronobiological and methodological rigour. CD - like smoking - must be assessed at and off work to consider cumulative doses in studies of carcinogenicity. Epidemiological research before and after IARC 2007, based on (night)shifts alone, may have delayed or disallowed detection/measurement of the existence/magnitude of possibly carcinogenic effects of cumulative CD.

Oral Presentation

Cardiovascular Disease

0313 MORTALITY AMONG NORWEGIAN SMELTER INDUSTRY WORKERS – A 55 YEAR FOLLOW-UP

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Ambient air pollution is associated with increased incidence and mortality of cardiovascular disease. Time-series studies have shown that a $10 \mu\text{g}/\text{m}^3$ increase in mean 24 hour PM₂ concentration increases the relative risk for daily cardiovascular mortality by 0.4% to 1.0%. In recent years, increasing concerns have been levelled at the ultrafine component of PM. Ultrafine particles are formed during combustion of materials, and are therefore abundant in the furnace area of metal smelter plants.

In connexion with an ongoing project concerning occupational exposure to fine and ultrafine particles and risk of cardiovascular disease, an update of two large smelter worker cohorts has been performed. Mortality data were received from the Norwegian Causes of Death register for the period 1960–2014. The combined cohort consisted of 19 660 men, with nearly 650 000 person-years of follow-up. Preliminary analyses showed that both total mortality (SMR 1.09, 95% CI 1.07–1.11) and mortality from all cardiovascular diseases (SMR 1.03, 95% CI 1.00–1.06) were significantly increased compared to the Norwegian general male population. Workers with employment in furnace work had total mortality SMR 1.18 (95% CI 1.15–1.21) and cardiovascular mortality SMR 1.09 (95% CI 1.04–1.14). Smelter workers with no furnace work had total mortality SMR 1.01 (95% CI 0.99–1.04) and cardiovascular SMR 0.99 (95% CI 0.95–1.02). The further data analyses are currently in progress.

Oral Presentation

Musculoskeletal

0315 EFFECT OF MULTISITE MUSCULOSKELETAL PAIN ON HEALTH RELATED JOB LOSS: FINDINGS FROM THE HEALTH AND EMPLOYMENT AFTER FIFTY (HEAF) STUDY

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Background Musculoskeletal pain (MSP) at multiple anatomical sites differs from single site pain both in its risk factors and prognosis. Multisite MSP is more likely to cause sickness absence from work, but knowledge about its effect on health-related job loss (HRJL) is limited. To explore this association we analysed longitudinal data from participants aged 50–64 recruited to the Health and Employment After Fifty (HEAF) study.

Method Baseline information collected by postal questionnaire from 4333 employed participants included questions about MSP in the past year at three anatomical sites (spine, upper, and lower limb). Subsequent HRJL was ascertained through a follow-up questionnaire after one year. Associations between multisite MSP (pain at ≥ 2 anatomical sites) and HRJL were explored using Poisson regression with robust variance and summarised by prevalence rate ratios (PRRs).

Results Among 437 participants with multisite MSP at baseline, 7% left their job due to ill health, compared to 3% in 547 with single-site pain and 2% in 3349 without MSP. After accounting for potential confounders, the risk of HRJL was higher among those with multisite MSP than in those with single-site MSP (fully-adjusted PRRs 1.9 (95%CI 1.1–3.2) and 1.6 (95%CI 0.9–2.7) compared with no MSP). The population attributable fraction for single-site pain was 7%, while that of multi-site pain was 15%.

Conclusions This analysis suggests that multisite MSP carries a higher risk of HRJL than single-site pain. To develop future preventive strategies, efforts should focus on understanding the drivers of multisite MSP rather than concentrating on site-specific risk factors.

Poster Presentation

Injuries

0316 OBSTRUCTIVE SLEEP APNEA SYNDROME (OSAS) IN ROAD TRAFFIC ACCIDENTS OF COMMERCIAL BUS AND TRUCK DRIVERS IN CENTRAL IRAN

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