Occupational burden of disease studies to identify priorities for regulatory interventions, and to estimate the impact of these interventions, are becoming more frequent. There are various ways to estimate burden of disease in a population, each method's appropriateness depends on available data and the research question to be answered. We review the available methods, and assess their usefulness for predicting future occupational disease burden and for testing population-level interventions.

There are several approaches to disease burden estimation: Population Attributable Fraction (PAF) applied to incident or prevalent disease cases, Lifetime Risk/Future Excess Fraction and Disease Projection (Age-Period-Cohort and structural model/'g' formula) approaches. The PAF takes into account past exposures, with intervention effects estimated from the point of intervention onwards. Lifetime risk estimates disease that workers, currently exposed to a disease-causing agent, will contract in their lifetimes; no latency assumptions are required, with interventions assumed to take effect immediately. Disease projection methods use current and past disease rates to predict rates into the future. The 'g-formula', a generalised regression model, is used to estimate the joint distribution of outcome and risk factors; Monte Carlo methods can then simulate disease risk following intervention, compared to no intervention. The methods are tested on examples of occupational disease/exposure pairings, including lung cancer from respirable crystalline silica exposure and COPD from vapour, gases, dust and fume exposure, and results are compared.

The results will provide critical information on the sensitivity of some examples of occupational burden of disease and health impact studies on the modelling approach.

Poster Presentation

Respiratory

0367 THE DIAGNOSIS OF PNEUMOCONIOSIS USING GAS CHROMATOGRAPHY/MASS SPECTROMETRY

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10.1136/oemed-2017-104636.302

Breath metabolites could reflect pathogenic events at the respiratory level and might be used to screen for the presence of occupational environmental lung diseases. The objective of this study was to estimate the accuracy of breath analysis for the diagnosis of pneumoconiosis using gas chromatography/mass spectrometry (GC/MS). A prospective study was design. We screened 200 subjects from a cohort of stone workers and their family members. Diagnosis of pneumoconiosis was made based on occupational history, the presence of abnormal pulmonary function, and parenchymal abnormalities consistent with pneumoconiosis on chest X-rays. After excluding subjects with asthma and those using steroids or taking nonsteroidal anti-inflammatory drugs on the examination day, we conducted a case-control study that

enrolled 25 cases of pneumoconiosis and 154 controls. Breath and environmental air samples were collected and analysed by GC/MS. After subtraction of environmental volatile organic compounds (VOCs), the concentrations of VOCs in breath were used to discriminate between pneumoconiosis and controls. The discrimination accuracy was validated by both leave-one-out cross-validation and 5-fold cross-validation. The results showed that 94.4% of subjects were accurately classified and the cross-validated accuracy was 88.8%. The area under curve (AUC) for the diagnosis of pneumoconiosis was 0.9 (95% CI=0.8–1.0). Mean AUC of 5-fold cross-validation was 0.9. Breath test might have potential in the screening for pneumoconiosis; however, a multi-centre study is warranted to establish a reliable model and all procedures must be standardised before clinical application.

Oral Presentation

Methodology

0368 IMPROVING INCIDENCE RATES OF WORK-RELATED ILL-HEALTH CALCULATED FROM GENERAL PRACTICE

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10.1136/oemed-2017-104636.303

Introduction The calculation of incidence rates of work-related ill-health (WRIH) is essential when assessing employment sectors at risk. The Health and Occupational Reporting network in General Practice (THOR-GP) collects information on WRIH from approximately 250 GPs. To calculate rates, GP numerator data has to be divided by a compatible denominator.

Aims To formulate the best methods of determining incidence rates from THOR-GP data

Methods The THOR-GP denominator is the registered population of all participating GPs' practices. Census data linked to practice postcodes were used to establish how the population was employed; practice list data were used to estimate the size of the population and adjusted for GP participation. Numerator data (incidence cases of WRIH) from 2006–2015 were adjusted for response rates and time sampling frequency. Numerator data were then divided by the denominator and rates calculated per 1 00 000 persons employed per annum

Results The incidence rate of WRIH (from 6491 numerator cases) was 1350 per 1 00 000 persons employed per annum. Musculoskeletal disorders had the highest rates (640) followed by mental ill-health (516). Rates for musculoskeletal disorders were highest in agriculture (2232) and construction (1048) and for mental ill-health, in financial services (1113) and public administration/defense (1124).

Conclusion All employed persons have access to a GP therefore calculating incidence rates from GP data allow identification of industries/occupations at higher risk of WRIH Using postcode-based census data to characterise the denominator (therefore specifically related to the numerator) enables rates to be calculated with greater accuracy compared with using national employment data.

Oral Presentation

Chemicals

0370 SYSTEMATIC REVIEW AND META-ANALYSIS OF OCCUPATIONAL EXPOSURE TO STYRENE AND LUNG CANCER

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10.1136/oemed-2017-104636.304

Styrene is widely used in industrial settings, leading to important occupational exposure. Currently it is classified by IARC as “possibly carcinogenic to humans” based on limited evidence of an association with lymphohaematopoietic cancers. Several recent studies suggest increased risk of lung cancer may be associated with exposure to styrene. We conducted a systematic search and a meta-analysis of epidemiologic studies of exposure to styrene and incidence or mortality of lung cancer. Of 167 papers retrieved, 50 were found to provide pertinent data after screening the abstracts; 42 of these were occupational cohort studies conducted in 3 main work settings: chemical production, reinforced plastics manufacturing, and styrene-butadiene rubber production. There was significant overlap in the populations among published papers, which reported data from 7 separate cohorts and one pooled international cohort, some parts of which were also published separately. Meta-analysis showed an excess risk of lung cancer among workers ever exposed to styrene (RR 1.14, 95% CI 1.04–1.24, I²63%). The association was stronger when the analysis was limited to the reinforced plastics industry, where co-exposures are less important than in other industries (RR 1.20, 95% CI 1.10–1.31, I²72%). Meta-analysis of exposure-response relations in the subset of studies that reported quantitative or categorical exposure data are ongoing and will be reported.

Oral Presentation

Shift Work

0371 NIGHT SHIFT WORK AND PROSTATE CANCER RISK: RESULTS FROM THE EPICAP STUDY

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10.1136/oemed-2017-104636.305

Background In 2007, the International Agency for Research on Cancer classified “shift work leading to a disruption of circadian rhythm” as probably carcinogenic to humans based on sufficient evidence from experimental animal models but limited evidence from epidemiological studies in humans. In this

context, we investigated the role of night shift work in prostate cancer based on data from the EPICAP study.

Methods EPICAP is a French population-based case-control study including 819 incident prostate cancer cases and 879 frequency matched controls. Cases and controls were face-to-face interviewed on their lifetime occupational history with details on work schedules for each job held for ≥ 6 months. Night work was defined as having performed permanent or rotating night shifts for at least 270 hours/year or 3 nights/month during ≥ 1 year.

Results Permanent and rotating night work were not associated with prostate cancer (OR=0.99 [0.78–1.26], OR=0.89 [0.66–1.20], respectively). However, permanent night work was associated with aggressive prostate cancer (OR=1.40 [0.97–2.03]), especially for a duration greater than 25 years (1.89 [1.15–3.11]). Interestingly, an association between night work and prostate cancer risk was observed for men with an evening chronotype (OR=1.82 [1.01–3.28]), especially for rotating night work (OR=2.34 [1.02–5.35]).

Conclusion Our results suggest that night work may be associated with prostate cancer, particularly in men with aggressive prostate cancer or with an evening chronotype. Further investigations are needed to confirm our findings and to take into account a potential influence of an individual susceptibility to circadian genes in this association.

Oral Presentation

Cancer

0372 OCCUPATIONAL EXPOSURE TO PAH AND LUNG CANCER RISK IN THE SYNERGY PROJECT

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10.1136/oemed-2017-104636.306

Objective Using data from the SYNERGY project, we evaluated the association between occupational exposure to polycyclic aromatic hydrocarbons (PAH) and the risk of lung cancer, adjusted for tobacco smoking.

Methods For 16 901 lung cancer cases and 20 965 matched population or hospital controls, PAH exposure was estimated using a quantitative general population job-exposure matrix (“SYNJEM”) based on five-digit ISCO-68 codes (4639 cases, 4713 controls ever exposed). Odds ratios (ORs) and 95% confidence intervals (95% CI) were estimated using unconditional logistic regression models adjusted for age, sex, study centre, smoking behaviour, and ever employment in an occupation with known lung cancer risk.

Results We observed a modest increased risk of lung cancer associated with occupational exposure to PAHs according to various exposure metrics (ever/never, duration, cumulative dose, time since last exposure). The ORs for ever exposure to PAH were 1.09 (95%CI, 1.04–1.15) overall, 1.08 (95%CI, 1.02–1.15) in men, 1.20 (95%CI, 1.05–1.38) in women, and 1.04 (95%CI, 0.88–1.22) in never smokers. These results are further supported by significant exposure response-relationships (p-value for trend <0.05 for years of employment and cumulative exposure [(BaP) $\mu\text{g}/\text{m}^3\text{-years}$]). When stratified by