Poster Presentation

Respiratory

0376 IF THE MASK FITS: AN ASSESSMENT OF FACIAL DIMENSIONS AND MASK EFFECTIVENESS

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Certain respiratory protective equipment (RPE) must fit tightly to the face of the wearer to provide effective protection, yet it is still unclear to what extent facial features affect mask performance. This study aimed to assess how facial dimensions affect the efficacy of a given RPE.

We tested a single RPE (3M 8835+) on participants (n=262) who consistently wear RPE at work. Three facial dimensions were measured to limit the demands placed on test participants: face length, face width, and jaw width. Mask test and facial measurements were conducted by the same researcher using the HSE standardised face fit testing protocol. The participants represented 22 different industries, the majority (90%) of whom were male. Fit factor (FF), representing the ratio of the exposure concentration outside to inside a mask, used to assess mask fit, with FF >100 constituting a successful fit.

Although 94.7% (n=248) of the study population achieved a successful fit, there was considerable variation among test results: FF median=415; Interquartile Range (IQR)=294–604. FF was log-transformed for regression analyses, which identified FF increases of 11.9% (p<0.05) and 18.3% (p<0.005) per 10% increase in the ratio of face length to jaw width and face width to jaw width, respectively.

These results help understand the impact face shape can have on the effective seal achieved by RPE and could help inform mask design to maximise impacts for respiratory health. Further analysis of the data may expand on the impact of face shape on RPE seal during the specific face fit test exercises.

Poster Presentation

Methodology

0378 OCCUPATIONAL PM_{2.5} EXPOSURES AND PULMONARY FUNCTION DECLINE: AN APPLICATION OF THE PARAMETRIC G-FORMULA IN A US ALUMINIUM INDUSTRY COHORT

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Workers in the aluminium industry are widely exposed to particulate matter (PM) during several stages in the manufacturing process at exposure concentrations several orders of magnitude higher than environmental standards. In this study we investigate the

relationship between occupational exposures to fine particulate matter (with an aerodynamic diameter less than 2.5 µm PM_{2.5}) in a cohort of aluminium workers, while adjusting for the time varying confounding by underlying health status, characteristic of the healthy worker survivor effect. To address this time-varying confounding, we applied the parametric g-formula to longitudinal pulmonary function data from 5271 actively employed aluminium workers in the United States followed between 1996 and 2013. We adjusted for time-varying health status using a composite risk score based on health insurance claims. We simulated values for forced expiratory volume in one second (FEV₁) between ages 18 and 63, under hypothetical interventions on exposures to PM_{2.5}; we then compared the trajectory of FEV₁ decline with age under each intervention to the observed natural course (that was actually observed). Under a hypothetical intervention limit for annual average daily exposures to PM_{2.5} of 175 µg/m³ (corresponding to the 25th percentile of observed exposures), the average FEV₁ at age 63 was 37.1 mL higher (95% confidence interval (CI): 1.8, 72.4) than that actually observed, corresponding to 1.2% of the average predicted FEV₁. Our results suggest that occupational PM_{2.5} exposure in the aluminium industry accelerates FEV₁ decline. Regulatory measures may mitigate loss of pulmonary function over time in the industry.

Oral Presentation

Cancer

0379 CALCULATING THE CURRENT BURDEN OF OCCUPATIONAL CANCERS IN CANADIAN WOMEN

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Objective To estimate the attributable fraction (AF) and number of annual incident cancers among women due to occupational exposures, as part of the Canadian Burden of Occupational Cancer study.

Methods Attributable fractions, calculated with Levin's equation, used estimates of proportions of workers ever exposed (PrE) 10–50 years before diagnosis, and point/range estimates of the exposure-cancer association from the epidemiologic literature. Numbers of attributable cancers were calculated by applying AFs to 2011 Canadian Cancer Registry data. Historical exposure was derived from CAREX Canada estimates of prevalence and level of exposure. PrE was estimated from the Canadian census, labour force survey and survival probabilities. Analyses focused on 12 carcinogens with ≥5000 exposed women.

Results The highest AF among women was for mesothelioma (AF=40%); 1.6% of lung and 2.6% of ovarian cancers were also attributed to asbestos. The largest number of attributable cancers was due to shift work, a probable cause of breast

cancer (AF=2.0%–5.2%, 460–1180 cases), followed by solar radiation, with 415 skin cancers (AF=1.3%). Workplace exposure to environmental tobacco smoke (ETS) was associated with 5.8% (~60 cases) of lung cancers among never-smoking women, and radon exposure in buildings resulted in almost 80 lung cancers (AF=0.7%). AFs were overall higher for men, but similar between men and women for radon and ETS among never smokers.

Conclusion In burden studies, assessing the impact of uncertainty in exposure and risk estimates is a challenge. The impact is, however, amplified among women because estimates are derived from studies primarily on male workers.

Oral Presentation

Dusts and Fibres

0380 MESOTHELIOMA MORTALITY IN GREAT BRITAIN: AN UPDATED ANALYSIS OF TRENDS BY GEOGRAPHICAL AREA AND OCCUPATION 1981–2014

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Background mesothelioma mortality rates in GB have increased tenfold over the last four decades and are currently the highest of any country worldwide. The mesothelioma register contains all deaths mentioning mesothelioma and includes area of residence and occupation of the deceased.

Aim to update descriptive analyses of mortality trends by geographical area and last occupation of the deceased to provide evidence about past sources of mesothelioma risk in the GB population.

Methods Standardised Mortality Ratios (SMRs) were calculated for local and unitary authority areas; Proportional Mortality Ratios (PMRs) were calculated for categories derived from Standard Occupation Classification coding of job titles from death certificates. Temporal trends in SMRs and PMRs over the period 1981–2014 were examined using Generalised Additive Models (GAMs).

Results the influence of geographically-specific sources of past asbestos exposure is still seen in recent mesothelioma mortality rates; areas with the highest SMRs in males tend to be those known to contain large industrial sites that used asbestos such as shipyards. However, the strong effect of asbestos exposures in jobs associated with construction work – which would have been geographically less heterogeneous – is seen in analyses by occupation, and temporal trends suggest that such exposures continued for longer than those associated with specific locations.

Conclusions these results reflect the legacy of widespread industrial asbestos use in GB and particularly emphasise the effect of exposures within the building industry which are likely to have continued after those in specific industries such as shipbuilding and manufacturing were substantially reduced.

Oral Presentation

Working Conditions

0381 THE POTENTIAL IMPACT OF THREE WORKPLACE ACTIONS ON RETURN TO WORK AFTER A WORK-RELATED MUSCULOSKELETAL OR PSYCHOLOGICAL INJURY

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The objective of this study was to examine the impact of three workplace actions on return to work (RTW) following a musculoskeletal (MSK) or psychological injury. The three workplace actions were: a positive supervisor or co-worker response at the time of injury; a low stress interaction with the workplace RTW coordinator; and an offer of modified duties. We used a longitudinal cohort of 869 Victorian workers' compensation claimants. Respondents were interviewed at baseline (approximately 4 months after injury), and again 6 and 12 months later. Our analytical sample was 703 respondents who had complete information on all workplace factors and potential covariates. Of our sample, 40% of respondents reported all three positive workplace actions and 12% reported none of the positive actions. Using a potential outcomes modelling approach, we estimated difference in RTW rates at baseline, 6 months and 12 months if all respondents received all positive actions, versus all respondents received no positive actions. Inverse probability weights were used to balance the sample in relation to covariates including respondent age, sex, injury time, time since injury, workplace size, pre-injury job autonomy and pre-injury physical demands at work. At baseline, if all respondents received all three workplace actions, 51% of respondents would have sustained RTW compared to 22% if all respondents received none of the actions. At 6 months the comparable rates were 73% versus 46%, and 67% versus 50% at 12 months. Our study demonstrates the importance of the workplace actions on RTW rates at multiple points following injury.

Oral Presentation

Injuries

0382 INCREASING MALE/FEMALE INEQUALITIES IN RATES OF WORKPLACE VIOLENCE IN ONTARIO BETWEEN 2002 AND 2014: A COMPARISON OF TWO DATA SOURCES

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