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