

Oral Presentation

Cancer

0323 OCCUPATIONAL EXPOSURE TO BENZENE, TOLUENE, XYLENE AND STYRENE, AND RISK OF PROSTATE CANCER

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Little data exist on prostate cancer (PCa) risk associated with exposure to monocyclic aromatic hydrocarbons (MAHs), although several of them are classified as definite or possible carcinogens to humans. We examined PCa risk in relation to lifetime occupational exposure to benzene, toluene, xylene and styrene in a population-based case-control study in Montreal, Canada.

Incident cases diagnosed with PCa between 2005 and 2009 (n=1902, aged ≤ 75 years) and population controls frequency-matched on age (n=1958) provided detailed work histories during in-person interviews. Chemists evaluated the certainty, frequency and concentration of exposure to chemical agents in each job held using semi-quantitative indicators. Logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) for PCa risk, adjusting for several potential confounders.

Applying a 5 year lag, the proportions of subjects ever exposed to MAHs (any), benzene, toluene, xylene and styrene were 31%, 11%, 12%, 10% and 2%, respectively. The risk of aggressive PCa (Gleason score >7 or $[4+3]$) was not increased with greater duration of exposure or with cumulative exposure to any of the MAHs. However, the risk of non-aggressive PCa was increased with ≥ 25 years of exposure to any (OR=1.59, 95% CI:1.09–2.34) or substantial (OR=2.34, 95% CI:1.22–4.50) level of benzene, to substantial level of styrene (OR=2.44, 95% CI:1.16–5.13), and with high cumulative exposure to benzene (OR=1.68, 95% CI:1.16–2.44) or xylene (OR=1.51, 95% CI:1.01–2.25). Similar results were observed in the subset of subjects recently screened for PCa.

Our results suggest that high duration and level of exposure to benzene, xylene or styrene may increase the risk of non-aggressive PCa.

Poster Presentation

Injuries

0324 MISCLASSIFICATION OF ANIMAL HANDLING INJURIES TO SWINE WORKERS

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Background Injuries resulting from animal handling are the most frequent, serious, and costly injuries to swine workers. Characterising injury burden related to animal handling and developing and evaluating appropriate prevention measures

requires correct identification of injury cause. We examined the occurrence and consequences of animal handling injury misclassification in two large swine production companies in the U.S.

Methods Records for all potential animal related injuries and the injury event narratives were reviewed and independently coded based on the Occupational Injury and Illness Classification System (OIICS) coding tree. The original and re-coded data were evaluated for agreement in source and injury event for all injuries caused by animals. The resulting frequency of misclassified injuries and the potential cost burden were summarised based on medical and indemnity payments.

Results From a total of 1573 reported injuries, 331 were reported to be caused by animals. The re-coded data increased the number to 435. Re-coded data from companies accounted for an additional 104 injuries. It was more common for companies to under-ascertain animals as the source of injury (26%, 114/435) than it was to incorrectly assign animals as the source of injury (2%, 8/435). Costs related to the originally reported animal handling injuries totaled \$1,537,163, and an additional \$1 82 580 (12%) was added to the total with the re-classified injuries.

Conclusion Misclassification of cause of injury may result in an underestimate of total injury burden from animal related injuries and would hamper evaluation of the evaluation of strategies to prevent animal handling injuries.

Oral Presentation

Neurological Effects

0325 FUTURE DIRECTIONS FOR OCCUPATIONAL EPIDEMIOLOGICAL RESEARCH ON NEURODEGENERATIVE DISORDERS

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Associations between occupational exposures and neurodegenerative disorders (including amyotrophic lateral sclerosis (ALS), Parkinson's and Alzheimer's diseases) have not been studied as extensively as cancer and respiratory diseases and their causes remain largely unknown.

Due to complicated clinical diagnosis and lack of registries, case ascertainment is a limiting factor when studying neurodegenerative disorders. Case-control studies are best suited for inclusion of incident cases, but prone to recall bias. Studies on neurodegenerative disorders may additionally suffer from lack of recall because of disease characteristics. Cohort studies are free from recall bias and offer opportunities to study associations with occupational exposures. Moreover, baseline blood may be informative about exposures (e.g. lead) well before disease onset. Although occupational information collected in most cohorts is limited, successful studies in cancer and respiratory epidemiology have shown that occupational studies in general populations can be informative.

For ALS, several efforts are being conducted to tackle the aforementioned challenges. Examples are: an ongoing nationwide case-control study in the Netherlands (PAN:

currently ~2300 cases and ~4200 controls), to study risk factors and possible gene-environment interactions; international pooling of case-control studies; using existing cohorts (e.g. EPIC) ; and aiming to register all Dutch ALS cases. Consistent positive associations between smoking and ALS were observed within PAN and EPIC, indicating that a similar approach for occupational risk factors would be informative.

Because each study design has its advantages and disadvantages, neurodegenerative disorders should be looked at more in a range of (occupational) studies to gain better understanding of the aetiology.

Oral Presentation

Exposure Assessment

0326 A SWEDISH JOB EXPOSURE MATRIX FOR PHYSICAL WORKLOAD

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Background To study associations between physical workload and health outcomes, valid and feasible exposure assessment methods are needed. Physical workload can be assessed by technical measurements, observations and questionnaires. Measurements and observations are often too costly in large epidemiological studies. Response rates to surveys are decreasing. Also, self-reported exposure is prone to bias since it may be influenced by e.g. health. Alternatives are to use job exposure matrices (JEM) where each job is attributed exposure measures. This enables large epidemiological studies to be conducted on registers and cohorts that include job titles. The aim was to construct a Swedish JEM for physical workload.

Methods Data from the Swedish Work Environment Surveys conducted every second year 1997–2013, including 90 077 working Swedes, were used. The JEM was based on eight questions concerning heavy lifting, strenuous work postures, repetitive work and physical strenuous work. The response scales specify the proportion of working time with the exposure. Occupational titles were coded on 4-digit level according to the 1996 version of the Swedish Standard Classification of Occupations.

Results The JEM provides information on physical exposures in 355 occupations, divided into men and women. Each occupation has been assigned mean values for specific exposures, e.g. heavy lifting, and overall physical exposure, as well as the proportion of workers exposed. Analyses will be presented on the predictive validity of JEM estimates on musculoskeletal disorders in a Swedish cohort.

Conclusions If the JEM is considered valid it will be a valuable tool in epidemiological studies of physical workload.

Oral Presentation

Exposure Assessment

0327 EXPOSURE ASSESSMENT FOR U.S. CASE-CONTROL STUDY ON OCCUPATIONAL LIFTING AND RETINAL DETACHMENT: A COMPARISON OF METHODS. (TO BE PRESENTED IN AN ACCEPTED MINI-SYMPOSIUM)

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Objectives To support a case-control study investigating the association between occupational lifting and retinal detachment (RD) in Massachusetts, we estimated and compared self-reported lifting exposures to those documented in O*NET, a government database that characterises physical exposures such as manual material handling and vibration for hundreds of U. S. job titles.

Methods Cases of RD were identified based on recent surgical treatment and controls based on a recent routine eye exam. All recruited participants were mailed a questionnaire including questions on the magnitude and frequency of lifting, pushing and pulling in all previous jobs. To help patients recall physical exertion across their lives, photos of lifting common objects were included. Participant responses were used to estimate occupational lifting exposures in three ways: 1) self-reports; 2) a job exposure matrix (JEM) linking job titles with O*NET exposure data; and 3) combining 1 and 2 with Empirical Bayes Estimators (EBE).

Results Study recruitment will continue through 2017, enrolling at least 150 cases and 250 controls. Preliminary analyses from half of the participants indicate an average of four jobs/person. Self-reports and job-title based exposures from O*NET were moderately correlated for lifting (Spearman rank correlation=0.48, $p<0.0001$). Frequent reports of whole body vibration exposures were uncommon (<5% of all jobs), suggesting the study will have less power to evaluate this exposure.

Conclusions By combining strengths of JEMs with personal recall, this study sought to improve on previous investigations. EBE provide a formal method for optimising the two types of data.

Oral Presentation

Cancer

0328 EXTENDED MORTALITY FOLLOW-UP OF A COHORT OF WORKERS EXPOSED TO ACRYLONITRILE

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