

registry catchment areas was determined. Standardised incidence ratios (SIR) and standardised rate ratios for bladder cancer were calculated by exposure category and cumulative rank quartiles for different lag periods. Cox regression was used to model bladder cancer incidence with estimated cumulative rank, adjusting for confounders. Indirect methods were used to control for smoking. **Results** Excess bladder cancer was observed compared to the New York State population (SIR=2.87, 95% confidence interval [CI] 2.02–3.96), with higher elevations among workers definitely exposed (moderate/high) (SIR=3.90, 95% CI 2.57–5.68) and in the highest cumulative rank quartile (SIR=6.13, 95% CI 2.80–11.6, 10-year lag). Bladder cancer rates increased significantly with estimated cumulative rank (10-year lag). Smoking only accounted for an estimated 8% elevation in bladder cancer incidence. **Conclusions** Bladder cancer incidence remains elevated in this cohort and significantly associated with estimated cumulative exposure. Results are consistent with earlier findings in this and other cohorts. Despite other concurrent chemical exposures, we consider o-toluidine most likely responsible for the bladder cancer incidence elevation and recommend a reexamination of occupational exposure limits.

0095 MULTIMORBIDITY AND PREVIOUS SICKNESS ABSENCE EPISODES ARE DETERMINANTS OF INCIDENCE AND DURATION OF FUTURE EPISODES

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10.1136/oemed-2014-102362.30

Objectives While sociodemographic and work-related factors are frequently studied as determinants of sickness absence (SA), health-related determinants have surprisingly received little attention. We examined the effect of multimorbidity and previous SA on the incidence and duration of future SA. **Method** A retrospective (2004–2008) cohort of 373,905 workers who underwent a standardised medical evaluation in 2006 from which information on chronic conditions, health-related symptoms and behaviours was used to construct a sex-specific multimorbidity score (MMBS). Information on SA episodes occurring during the two years prior to the examination came from the employment history. We estimated the effect of the MMBS and prior SA on the 2-year incidence and duration of SA post-examination using a Cox model adjusted for age and occupational social class. Effects on SA duration were also adjusted for diagnosis. **Results** Men, but not women, showed an effect with a trend of higher SA incidence risk from low (HR=1.06; 95% CI: 1.01–1.11) to high MMBS (HR=1.22; 95% CI: 1.18–1.28). Having five or more prior episodes was related to higher SA incidence risk, both in men (HR=2.19 95% CI: 2.11–2.28) and in women (HR=2.47; 95% CI: 2.35–2.61). Women, but not men, had longer SA duration from low (HR=0.91; 95% CI: 0.83–0.99) to high MMBS (HR=0.88; 95% CI: 0.78–0.99). Having 5 or more prior SA episodes was related to shorter duration in men (HR=1.67; 95% CI: 1.30–2.16) and women (HR=2.12; 95% CI: 1.56–2.89). **Conclusions** Multimorbidity increases the risk of higher SA incidence and duration while the effect of prior SA episodes is more complex.

0096 MARGINAL STRUCTURAL MODELS FOR RISK OR PREVALENCE RATIOS AND DIFFERENCES

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10.1136/oemed-2014-102362.31

Objectives Occupational epidemiologists often analyse binary outcomes in cohort and cross-sectional studies using multivariable logistic regression models, yielding estimates of adjusted odds ratios. When the outcome is common the adjusted odds ratio will not closely approximate the covariate-adjusted risk or prevalence ratio. Consequently, investigators may decide to directly estimate the risk or prevalence ratio using a log-binomial regression model; however, such models tend to be unstable and may not converge. **Method** A marginal structural log-binomial model can be used to estimate risk and prevalence ratios and differences. The approach reduces problems with model convergence typical of log-binomial regression by shifting all explanatory variables except the exposures of primary interest from the linear predictor of the outcome regression model to a propensity score model for the exposure. The approach also facilitates evaluation of departures from additivity in the joint effects of two exposures. **Results** We illustrate the proposed approach using data from several illustrative occupational studies of common outcomes. **Conclusions** The proposed approach facilitates analysis of risk or prevalence ratios and differences in cohort and cross-sectional studies with common outcomes.

0097 MATCHING AND COUNTER-MATCHING ON PROPENSITY SCORES IN NESTED CASE-CONTROL STUDIES

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10.1136/oemed-2014-102362.32

Objectives Occupational cohort studies often collect information on a primary exposure of interest and a small set of potential confounders. A nested case-control study may be undertaken to collect additional information on covariates that are potential confounders. **Method** We describe and illustrate an approach to matched nested case-control studies in such settings. The approach reduces problems of sparse data typical of matched nested case-control studies by reducing the set of matching on explanatory variables to a single dimension defined by a propensity score model for the exposure. We then consider additional uses of propensity score for matching. We first consider varying control: case ratio in matched designs to increase efficiency when exposure prevalence is rare. Next we consider a second propensity score that include additional covariates not in the set of strong confounders selected for matching. Counter matching on this score can further increase efficiency. **Results** We illustrate the proposed approach using data from a cohort study of underground miners. **Conclusions** The proposed approach can improve efficiency of nested case control designs.

0103 RACIAL AND GENDER DIFFERENCES IN THE RISK OF ISCHAEMIC HEART DISEASE AND THE HEALTHY WORKER SURVIVOR EFFECT AMONG AUTOWORKERS

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10.1136/oemed-2014-102362.33