

women) and kneeling for more than 2 h per day among men (OR 1.8 (1.0–3.0)).

**Conclusions** This study, conducted in a large representative working population, highlights the relation between incident knee pain and occupational risk factors such as handling loads and kneeling.

#### 0066 PROBLEMS OF VISION, HEARING AND BALANCE AND RISKS OF WORKPLACE INJURY

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**Objectives** To assess the role of sensory impairments and disorders of balance in occupational injury.

**Method** The Clinical Practice Research Datalink records all medical consultations, referrals and diagnoses in primary care for 6% of the British population. Using this register we identified 1348 working-aged patients who had consulted medical services over a 20-year period for workplace injury (cases) and 6652 matched controls. Risks were assessed in relation to visual impairment, common eye diseases, hearing loss, perforated ear drum, non-acute otitis media, and disorders of balance, using conditional logistic regression.

**Results** In all, 173 subjects had had an eye problem before the date of injury consultation (index date), 793 an ear problem (including 336 with impaired hearing and 482 with non-acute otitis media), and 266 a disorder of balance. No associations were found with specific eye diseases or perforation of the ear drum, but odds ratios (ORs) were moderately elevated for eye and ear problems more generally, and higher still in relation to blindness or partial sight (OR 1.90) and non-acute otitis media (OR 2.03). The OR for consulting with disorder of balance within the 12 months immediately preceding injury consultation was 1.81 (95% CI 1.03–3.17).

**Conclusions** Problems of vision, impairments of hearing, and disorders of balance may all carry a moderately increased risk of occupational injury.

#### 0068 OCCUPATIONAL EXPOSURE TO HAND-TRANSMITTED VIBRATION AND RISK OF DUPUYTREN'S CONTRACTURE

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**Objectives** To assess the relation between Dupuytren's contracture and occupational exposure to hand-transmitted vibration (HTV).

**Method** We mailed a questionnaire to 21 201 subjects of working age, chosen randomly from the age-sex registers of 34 general practices in Great Britain and to 993 subjects randomly selected from military pay records. We asked about occupational exposure to 39 sources of HTV and about fixed flexion contracture of the little or ring finger. Analysis focused on men at work in the previous week, for whom estimates were made of average daily vibration dose (A(8) r.m.s.). Associations with Dupuytren's contracture were estimated by Poisson regression, both for lifetime exposure to HTV and for exposures >A(8) of 2.8 ms<sup>-2</sup> r.m.

s.in the past week, with adjustment for age, smoking status, social class and manual activities.

**Results** Full information on the study variables was available for 4969 eligible men, including 72 men with a history of Dupuytren's contracture, 2287 with occupational exposure to HTV, and 409 with A(8) >2.8 ms<sup>-2</sup> in the past week. RRs from occupational exposure were elevated 1.5-fold, and were higher still for A(8) >2.8 ms<sup>-2</sup> (adjusted RR 2.85, (95% CI 1.3–5.97).

**Conclusions** Our findings suggest that risk of Dupuytren's contracture is importantly elevated in men with high levels of weekly exposure to HTV.

#### 0072 LOWER-EXTREMITY MUSCULOSKELETAL DISCOMFORT AND FATIGUE IN AUTOMOTIVE ASSEMBLY WORKERS

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**Objectives** To characterise the prevalence of musculoskeletal discomfort and fatigue of the lower extremities (LE) in a large sample of workers in a large, unionised automotive assembly facility. To assess whether floor matting reduced reported prevalence of LE discomfort.

**Method** Questionnaires were administered to 1353 workers representing 39% of the plant's workforce. Discomfort of the LE was assessed on a qualitative scale. Participants rated tiredness overall and in the legs at the end of their shifts. Information on job designation, use of matting, history of LE or back injury, and use of over the counter pain medication was collected.

**Results** Highest mean discomfort was reported in the feet (3.04, SD = 1.04) and lowest in the hips (1.50, SD = 1.30). Assembly line or inspection/repair had the highest adjusted mean for discomfort for each body area. Gender- and age-adjusted fatigue ratings overall and in the legs differed significantly based on job designation (p < 0.0001). The percent of workers reporting matting, fall-related injuries and use of over the counter medication differed significantly by job designation (p < 0.0001, p < 0.0001, and p = 0.0447, respectively). Among inspection/repair employees, there was no significant difference in mean discomfort and fatigue ratings between those who used matting and those who did not.

**Conclusions** There is a high prevalence of self-reported musculoskeletal discomfort and fatigue among automotive assembly workers. The difference in reported discomfort and fatigue levels by job designation warrants investigation into factors such as time spent standing and posture during work. Matting did not appear to reduce prevalence of LE discomfort.

#### 0076 LONG-TERM NIGHTSHIFT WORK AND BREAST CANCER RISK IN HONG KONG WOMEN: RESULTS UPDATE

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## Oral presentation

**Objectives** To report updated results on long-term nightshift work and breast cancer risk in Hong Kong women.

**Method** This ongoing case-control study involves three hospitals in Hong Kong. By 31/03/2013, we've consecutively recruited 443 newly diagnosed breast cancer cases and 335 age-matched controls from the hospital that the cases came from, with a response rate of 90%. We expect to collect 1000 cases and 1000 controls by 31/12/2013. We obtained each participant's lifetime occupational history and shift work, exposure to light-at-night and other important risk factors including family cancer history. We performed unconditional logistic regression analyses to calculate odds ratio (OR) after adjusting for potential confounders.

**Results** The age at diagnosis (interview) between cases and controls is comparable ( $55.1 \pm 11.9$  vs.  $54.2 \pm 14.6$  years). More cases than controls were non-parity and non-breast feeding, but gave first birth slightly late. A significantly elevated (adjusted OR=1.90, 95% CI: 1.24–2.89) breast cancer risk was observed in never employed women. Among those ever employed, 19.8% of breast cancers had ever worked at nightshift at least once per month for  $\geq 1$  year and it was 21.7% for the controls. Further analyses revealed that nightshift work for  $\geq 15$  years resulted in an adjusted OR of 1.55 (95% CI: 0.76–3.14) but power is limited. There is no excess breast cancer risk for women with nightshift work for  $< 15$  years.

**Conclusions** This ongoing study provides supportive evidence on a positive association between long-term nightshift work and breast cancer risk. [Research Grants Council (Project no.: 474811) and Direct Grant (Project no.: 2041788), shelly@cuhk.edu.hk].

### 0079 EXAMINING MULTIPLE EXPOSURE PATHWAYS OF BERYLLIUM USING MIXED AND STRUCTURAL EQUATION MODELING TECHNIQUES

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**Objectives** Inhalation beryllium exposures are associated with sensitisation, however dermal exposures are also important. In a previous study, we identified strong correlations between dermal-air, dermal-surface, and air-surface measurements. The aim of this study was to investigate workplace factors associated with exposures using mixed-effects models and structural equation modelling (SEM).

**Method** Beryllium was measured in personal air, on gloves, and on surfaces at three manufacturing facilities. Predictor variables included substance and activity emission potential (REACH classification), dilution, segregation, PPE, personal behaviour, and work shift.

**Results** The mixed model described 57 and 59% of total variance for air and dermal, respectively. The total variance explained by the SEM model for air and dermal was 0.51 and 0.48% respectively. In both models activity and substance emission potential, surface contamination, dilution, and personal behaviour were significant predictors of air concentrations ( $p \leq 0.05$ ); and surface contamination and air concentrations were significant predictors of dermal loading on cotton gloves ( $p \leq 0.05$ ). However, work shift and personal behaviour were predictive of dermal loading in the SEM ( $p \leq 0.03$ ), but not in the mixed model. In addition, the SEM reported a parameter

estimate for air concentration as a predictor of dermal loading that was an order of magnitude higher than in the mixed model.

**Conclusions** Although SEM requires relatively large sample sizes, it is useful for modelling multiple, correlated dependent variables. In addition, full-information maximum likelihood (FIML) methods can be used in SEM to include missing predictor variable data. Although we found both models to be useful, SEM has the potential to illustrate indirect pathways of outcome variables.

### 0086 PREGNANCY OUTCOMES FOR WOMEN EMPLOYED AS HAIRDRESSERS, COSMETOLOGISTS AND LABORATORY WORKERS-SYSTEMATIC REVIEW OF THE LITERATURE AND DATA- ANALYSIS OF FINNISH MATERNITY BIRTH REGISTRY

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**Objectives** This study examines pregnancy outcomes in Finland: gender differentiation, low birth weight, high birth weight, pre-term delivery and post-term delivery, small-for-gestational-age, large-for-gestational-age, stillbirth and early neonatal death for study occupations compared to controls

**Method** Among 507 659 prima gravida women were 12 854 hairdressers, 1841 cosmetologists and 3587 laboratory workers. The control populations consisted of 40 405 teachers, 1968 musicians and 447 004 women from the general population.

Adjusted odds ratios (aOR) were calculated using binomial logistic regression analysis. Adjustments made: maternal age, smoking habit, marital status, socioeconomic status.

**Results** aOR for male births was lower for hairdressers than teachers 0.92 (95% CI 0.87–0.98). aOR for post-term delivery was greater for cosmetologists compared to teachers, 2.13 (95% CI 1.04–4.35).

Crude odds ratios (ORs) were also statistically significant Cosmetologists compared to musicians for ratio of male/female births, OR 1.04 (95% CI 1.00–1.08). Hairdressers compared to the general public: small for gestational age, OR 1.01 (95% CI 1.00–1.02), large for gestational age, OR 1.02 (95% CI 1.00–1.03) and post term delivery OR 1.06 (95% CI 1.02–1.11).

The statistically significant results for pooled effect size (ES) from the meta-analysis: low birth weight in hairdressers, ES 1.1 (95% CI 1.01–1.20) and small-for-gestational-age infants among hairdressers ES 1.18 (95% CI, 1.08–1.30).

The pooled effect size for large for gestational age infants among hairdressers was statistically significantly reduced for LGA infants among hairdressers, ES 0.71 (95% CI 0.55–0.91).

**Conclusions** Hairdressers, increased risk of certain pregnancy outcomes. Policy recommendations to improve protection for pregnant workers have been made.

### 0088 NERVOUS SYSTEM DISEASE AMONG KOREAN WORKERS EXPOSED TO MANGANESE

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**Objectives** Exposure to excess levels of manganese in occupational settings has been associated with a neurological syndrome. So morbidity of nervous system disease among Korean workers exposed to manganese described through this large cohort study.