healthcare and estimated hazard ratios (HR) and 95% confidence intervals (CI).

Results Multiple atlases of occupational injuries was constructed to visualise trends in location, industry, injury characteristics, and severity. Accessibility to healthcare, specifically specialty health care, affected risk of increased severity, claim duration, and disability.

Conclusions This innovative way of combining and visualising data may identify risk factors for occupational injury, including those that may be spatially or community-based. It may provide new strategies for proactive injury prevention or severity reduction efforts

Oral Presentation

Other

0424 RISK OF MESOTHELIOMA AND RISK OF EXPOSURE TO ASBESTOS IN PEOPLE SUPPOSEDLY UNEXPOSED TO ASBESTOS

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Objectives Malignant mesothelioma (MM) is a rare and generally fatal cancer, usually caused by asbestos, although about 5%–10% of cases report no asbestos exposure. This study aimed to identify sources whereby people in Western Australia (WA) may be unknowingly exposed to asbestos or to other exposures which may cause MM.

Methods Cases with no known asbestos exposure were selected from the WA Mesothelioma Register. Matched controls were selected from hospital patients admitted for conditions unrelated to asbestos. Occupational histories were coded by an industrial hygienist. Data were analysed using conditional logistic regression.

Results Eligible cases were far fewer than anticipated. After 9 years there were 38 MM cases (from a total of more than 400 reported cases of MM over the same time period), 65 other cancer controls and 69 medical controls recruited. Odds ratios did not differ by type of control so both sets of controls were combined. Thirty-eight MM participants and 134 controls were recruited. Risk of MM was increased (OR=3.1, 95% CI 1.0–9.6) after no known, but likely, exposure to asbestos at work.

Conclusions Because of its widespread use, very few people in WA have never been exposed to asbestos and careful elucidation of occupational and environmental histories usually uncovers likely exposures sufficient to cause MM. This study suggests that most cases of MM in people with apparently no known exposure to asbestos occur, at a low rate, among the large numbers of people who have had small amounts of incidental asbestos exposure.

Oral Presentation

Risk Assessment

0425 AN OCCUPATIONAL EPIDEMIOLOGY MODEL FOR CLIMATE CHANGE IMPACT ASSESSMENT

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Thermal physiology science shows the health threats to workers caused by exposure to heat when doing heavy physical labour. Climate change increases environmental heat levels in most of the world and it is a key issue for climate change and health research. Our model links climate and workforce data (current and predicted) and estimates work capacity loss at individual and population level and related economic loss. The model incorporates climate conditions, population estimates, workforce distributions, heat exposure estimates, exposure-response relationships, and socio-economic impact functions. The basis of the model is occupational epidemiology.

Much of the data upon which heat stress health risk functions are based comes from thermal physiology laboratory research. While this research has provided valuable information about human function at different heat exposures, the individuals studied are generally not the same mix of ages and physical conditions of typical working populations. Very few published studies have included the quantitative occupational epidemiology analysis needed for climate change related health risk assessments. For example, different model settings produce annual moderate intensity work hours lost due to heat (in the shade) by the 2050s at 0.7%–1.6% for USA and 1.1%–3.0% for China. Many of these lost hours will reduce the annual GDP, estimated at 34 trillion USD in the USA and 58 trillion in China (2050). Even a small loss creates many billion USD of economic losses. Our model can identify evidence missing for reducing the uncertainties in impact estimates, which can guide decisions about climate change mitigation and adaptation.

Poster Presentation

Chemicals

0426 CHRONIC CADMIUM INTOXICATION WITH RENAL INJURY AMONG WORKERS IN A SMALL-SCALE SILVER SOLDERING COMPANY

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Background/Aim Cadmium exposure may induce chronic intoxication with renal damage. Silver soldering may be a source of cadmium exposure.

Methods We analysed working environment measurement data and periodic health screening data from a small silver soldering company with ten workers. Concentrations of cadmium in air from working environment measurement data were obtained. Concentrations of blood and urinary cadmium, urine protein and urine beta2-microglobulin (B2M) were obtained. We used generalised linear model to identify the association between blood and urine cadmium and urine B2M. Clinical features of chronic cadmium intoxication focused with toxicological renal effects were described.

Results Mean duration of work was 9.7 years (range 3–20 years). Cadmium concentrations in air were ranged from 0.006 to 0.015 mg/m³. Blood cadmium was elevated in all ten workers with highest level of 34.5 µg/dL. Urinary cadmium was elevated in nine workers with highest level of 63.0 µg/g Cr. Urine B2M was elevated in three workers. Urinary cadmium was positively associated with urine protein (beta coefficient 10.27, 95% confidence interval [CI] 4.36, 16.18), while blood cadmium was not significantly associated with urine protein (beta coefficient –1.37, 95% CI –10.00, 7.28). Electron microscopic findings and other clinical parameters were compatible with renal tubular damage.

Conclusions Cadmium intoxication may occur at quite low air concentrations. Exposure limit may be needed to be lowered.

Poster Presentation

Exposure Assessment

0427 OCCUPATIONAL EXPOSURES AMONG HOME-BASED INFORMAL WORKERS IN A POOR URBAN AREA OF BRAZIL

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Background In Brazil, the National Health System provides primary health care, PHC, in which interdisciplinary teams support community health agents, CHA, responsible for families living in catchment areas.

Objectives To describe occupational exposures among informal home-based workers, HBW, in order to integrate occupational health and safety into PHC.

Methods Based on PHC families' files, home-based informal workers were listed and recruited. Trained interviewers and CHAs visited worksites to identify hazards using a checklist, assessing levels of noise and formaldehyde in the air, and other self-reported threats to health. Tablets with ODK Collect software were used.

Results There were 450 worksites and 468 invited workers agreed to participate. The majority comprises women (77.1%), of black skin colour (92.5%), 18–50 years of age (54.7%), 6–9 school years (65.4%), and an average US\$300.00 income per month (75.4%). Prevailing trades were retail (35.3%),

food (25.8%) and personal beauty care (17.1%). Almost all workers reported to be self-employed (92.5%), had no resting days (45%) and 45 to 135 work hours per week (48.5%). All worksites had occupational exposures of interest for health. From 19.6 hours continuous assessment, the noise level was 77 dB(A), and formaldehyde exposure over threshold limit value was detected in five beauty salons out of 10 investigated.

Conclusions Home-based businesses is a mainly women survivorship strategy, who work for long journeys, in poor urban areas of Brazil. The integration of workers' health into PHC can identify, in this context, situations of health problems and support planning of preventive measures.

Oral Presentation

Occupational Medicine (SCOM/Modernet)

0429 DAYTIME WORKPLACE NOISE EXPOSURES LOWER THAN OCCUPATIONAL CRITERIA CAN DISTURB NIGHTTIME SLEEP

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Background Nighttime noise exposure has been shown to affect sleep quality. However, effects of daytime noise exposure on nighttime sleep have been inconclusive. A quasi-experimental study was carried out using crossover design to determine daytime occupational noise exposure on polysomnography (PSG)-documented sleep quality.

Methods From two hospital cafeterias, 48 employees were recruited to participate in this study. Each participant was randomly assigned to expose to high noise level areas for 8 hours and, on a separate occasion, low noise level areas for 8 hours. The high and low noise periods were separated by a washout period of 14 days. Personal noise exposure, pure tone audiometry, autonomic nerve system (ANS) function tests, and overnight PSG were measured.

Results A total of 20 men and 20 women completed the study, with average tenure of 10.0 years. Average daily noise exposure (time-weighted average in 8 hours, TWA-8 hours) was 73.5 dBA during the high noise exposure day, and 64.4 dBA during the lower noise day ($p=0.001$). Subjective sleep quality was not different between nights after higher and lower noise days. Comparing to nights after low noise days, deep sleep by PSG was significantly shorter, sleep efficiency worse, resting heart beats and blood pressure after cold pressor test (CPT) higher after high noise days, after adjusting for covariates.

Conclusions Daytime noise exposure had a sustained effect on nighttime sleep, including shorter deep sleep and lower sleep efficiency. The sleep disturbance could be partially explained by post-shift ANS activity.

Poster Presentation

Psychosocial

0430 FEMALE WORKERS SUFFERED HIGHER PSYCHOLOGICAL SYMPTOMS AFTER OCCUPATIONAL INJURIES THAN MALE WORKERS

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Introduction This study aimed to examine the prevalence rates of psychological symptoms and risk factors between female and male workers at 12 months after their sustaining occupational injury. Demographic and injury-related risk factors for psychological symptoms were evaluated.

Methods Our study candidates were injured workers in Taiwan who were hospitalised for 3 days or longer and received hospitalisation benefits from the Labour Insurance program. A self-reported questionnaire including the Brief Symptom Rating Scale was sent to workers at 12 months after injury.

Results A total of 1233 workers (response rate 28.0%) completed the questionnaire, including 356 women and 877 men. A higher percentage (30.1%) of women had elevated BSRS-5 score of 6 or higher than men (22.5%). The risk factors for elevated psychological symptom scores for female workers were lower education level (odds ratio, OR=1.8, 95% confidence interval, CI=1.1–3.0), main income contributor of the household (OR=1.8, CI=1.1–3.0), severely affected physical appearance due to injury (OR=2.8, CI=1.3–5.9), and having adverse life event after injury (OR=2.0, CI=1.1–3.6) after mutual adjustment. Whereas the risk factors for elevated psychological symptom scores for female workers were loss of consciousness after the injury (OR=2.0, CI=1.3–3.1), severely affected physical appearance due to injury (OR=3.7, CI=2.3–6.0), having adverse life event after injury (OR=2.5, CI=1.6–3.8), not return-to-work (OR=3.2, CI=2.0–5.1), and reduced salary as compared to that before injury (OR=2.4, CI=1.3–4.1).

Conclusions After occupational injury, women suffered from higher rate of psychological symptoms. Risk factors were different between men and women who sustained occupational injuries.

Poster Presentation

Methodology

0431 HOW CAN WE AVOID RE-IDENTIFICATION RISK IN BIG-DATA ANALYSIS? PROPOSITION OF A NEW STRATEGY OF GEOGRAPHICAL SUBDIVISIONS USING GIS TOOLS

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In order to look for relevant signals for detection of emerging occupational diseases among agricultural workers, we developed a data-mining approach applied on health-insurance data (see C. Maugard communication). Applied on the databases of the French dedicated social security system (MSA), this approach first aims to look for associations between chronic diseases and occupational activities (recorded as activity sector codes in the MSA contributors database).

To avoid re-identification, workers location has not been provided, although it is recognised as closely related to cultural practices. Therefore, it was not possible to directly estimate individuals involvement in specific cultures (through existing parcel register and agricultural census for instance) and finally use cultures x pesticides to estimate pesticides exposures.

To deal with this issue, we used an innovative approach to cut off the national territory into "meshes", to obtain a geographical variable accurate enough to assess cultures types while respecting a sufficient number of agricultural workers per meshes to avoid re-identification. This approach consists of an iterative process dividing each geographical unit into 4 parts while respecting a minimum threshold of workers in each mesh. The process continues until each mesh contains a homogeneous number of individuals. Taking into account the prevalence of the chronic diseases of interest, and typology of cultures, we defined a minimum number of individuals per mesh (n=1500). This methodological development allows us to get indirect information about location by MSA at a level interesting to identify cultures (proxy for pesticides use), but restricting the possibilities of individuals re-identification.