

Abstracts

Poster 1

P1.1 METHODOLOGICAL AND LOGISTIC ISSUES REGARDING A STUDY ON MORTALITY CAUSED BY VIOLENCE AT WORK AND WORK RELATED INJURIES IN SALVADOR, BAHIA, BRAZIL

L. C. C. Nobre¹, M. Kato¹, F. M. Carvalho². ¹FUNDACENTRO-CRBA, Salvador, Bahia, Brazil; ²Department of Preventive Medicine, School of Medicine, Federal University of Bahia, Salvador, Bahia, Brazil

Introduction: The Brazilian Mortality Information System does not provide information whether death is work related in most of the cases. The typical work related cases are those attributed to workers injured during their activity with a formal employment contract and were registered among the few deaths from other causes. However, many more deaths could have occurred while workers were on their way to work, at the workplace but apparently not classified as job related injury, and during activities not considered as typical jobs (informal and illegal activities).

Method: We conducted personal interviews among relatives of the deceased using standardised questionnaires to assess the incidence of work related deaths in Salvador metropolitan area occurred in 2004.

Results: The pilot study comprised 145 deaths due to external causes of five subdistricts in Salvador, yielding 93 interviews (64%), 15 refusals (10%), 22 changes of address (15%), and nine not located cases (6%). The investigated deaths occurred mainly among those with lower income living in poorly urbanised areas, frequently considered violent neighbourhoods. Identifying the address of the relatives to be interviewed was the most difficult path because Salvador is a city that underwent an intense and disorganised growth in recent years, with a number of shantytowns located inside better neighbourhoods, changes in the street names, and phone service not available for all the population. With the highest unemployment rate in Brazil, Salvador is also a violent city and interviewers had sometimes difficulties in approaching the neighbourhood. Some relatives of deceaseds refused to answer questions because they still felt threatened.

Conclusions: Several strategies were adopted to deal with logistic difficulties. Depending on the definitions for "work", "work relatedness of injuries", and "violence at work" adopted for the study the results vary considerably.

P1.2 THE QUANTITATIVE RISKS OF MESOTHELIOMA AND LUNG CANCER IN RELATION TO ASBESTOS EXPOSURE: A COMPARISON OF MODELS FROM TWO REVIEWS

A. J. Darnton, D. M. McElvenny, J. T. Hodgson. *Epidemiology and Medical Statistics Unit, Health and Safety Executive, UK*

Introduction: In 2000 we published models for mesothelioma and lung cancer risk in relation to cumulative asbestos exposure and fibre type developed using information extracted from published studies of asbestos exposed cohorts. More recently, in work commissioned by the US Environmental Protection Agency (EPA), Berman and Crump carried out a similar exercise as part of a wider review of the current epidemiological knowledge of asbestos related disease, with the aim of deriving an updated protocol for assessment of risks from asbestos. The aim of this present study was to compare the models for mesothelioma and lung cancer risk resulting from each review in order to determine the extent of, and reason for, any differences, and to summarise the implications for regulatory risk assessment based on the different modelling approaches.

Methods: In order to compare the results of the various models on the same basis, predicted relative risks for lung cancer and mesothelioma rates were converted into lifetime risks relevant to the British population. The resulting mesothelioma and lung cancer risks for exposure to each of the three main asbestos types were then compared informally across a range of cumulative exposures.

Results: Both analyses suggest that risks associated with exposure to amphibole asbestos are considerably higher than those due to chrysotile—particular for mesothelioma. For lung cancer, risks based on the EPA analysis were typically higher than those based on the HSE

analysis for all types of asbestos. For mesothelioma, chrysotile was less potent according to the EPA model than the HSE model. In relative terms there was generally more agreement between the EPA and HSE models at higher exposures. Reasons for the differences in these predictions include: the particular cohorts included in each review, the statistical methodology employed, and assumptions about typical exposure levels for certain influential cohorts.

Conclusions: Caution is required when applying these models to low exposures for risk assessment purposes due to considerable uncertainties which arise particularly due to exposure estimates in the original cohort studies and extrapolation down to exposures well below the levels typically observed in those studies.

P1.3 MESOTHELIOMA MORTALITY IN GREAT BRITAIN FROM 1968 TO 2001

D. M. McElvenny¹, A. J. Darnton, J. T. Hodgson. ¹*Epidemiology and Medical Statistics Unit, Health & Safety Executive, UK*

Introduction: The British mesothelioma register contains all deaths from 1968 to 2001 where mesothelioma was mentioned on the death certificate. The aim of this study was to summarise the occupational and geographical distributions of mesothelioma mortality in Great Britain over a recent 20 year period.

Methods: Standardised mortality ratios (SMRs) were calculated for local authorities, unitary authorities, and counties. Temporal trends in SMRs were examined using trend statistics. Proportional mortality ratios (PMRs) were calculated using Southampton occupational codes, which are based on the 1980 standard occupational classification. Temporal trends in PMRs were also examined using trend statistics.

Results: The annual number of mesothelioma deaths has increased from 153 in 1968 to 1848 in 2001. Current deaths in males account for about 85% of the cases. The areas of West Dumbartonshire (SMR 637), Barrow-in-Furness (593), Plymouth (396), and Portsmouth (388) have the highest SMRs for males over the period 1981 to 2000. The occupations with the highest PMRs for males over the period 1980 to 2000 (excluding 1981) are metal plate workers (PMR 503), vehicle body builders (526), plumbers and gas fitters (413), and carpenters (388).

Conclusion: These data reinforce earlier findings that geographical areas and occupations associated with high exposure to asbestos in the past continue to drive the mesothelioma epidemic in Great Britain. However, the trends over time suggest a change in the balance of risk away from traditional asbestos exposure industries to industries where one could describe the exposure as secondary, such as plumbers and gas fitters, carpenters, and electricians.

P1.4 OCCUPATIONAL EXPOSURE AND LUNG CANCER IN WORKERS AFFILIATED TO THE MEXICAN INSTITUTE OF SOCIAL SECURITY

I. J. Garcia-Rojas, E. Robles-Perez, V. H. Borja-Aburto. *Occupational Health Research Department, Mexican Institute of Social Security, Mexico City*

Introduction: In Mexico, frequency records of workers' neoplasms are not available. Although some authors declare that occupational exposures represent 1 to 8% of total neoplasms; in our country, according to statistics of the Mexican Institute of Social Security (IMSS), there is not a single case of lung occupational cancer reported, at least in five years. The aim of this study was to assess the risk of having lung cancer related to occupational exposure to chemical agents in workers affiliated to IMSS.

Methods: In a case control study, 90 cases and 89 controls, recruited from two high speciality hospitals, were interviewed. Cases were workers with histologically confirmed lung cancer; controls were healthy workers who were selected randomly from the registries of IMSS affiliated population. Data were collected by questionnaires to obtain information on occupation, exposures, and smoking history. Exposure was estimated by self report and by job-task exposure matrix made by an occupational physician. The exposures considered were polycyclic aromatic hydrocarbons (PAHs), pesticides, heavy metals, and inorganic particles in four different periods: 5, 10, 15, and more than 15 years previous to diagnosis. Odds ratios were calculated with unconditional logistic regression analysis and adjusted for sex, age, smoking history, family history of cancer, and education level.

Results: Elevated ORs for PAHs in all periods (4.01, 95% CI 1.83 to 8.77; 3.75, 95% CI 1.68 to 8.36; 4.19, 95% CI 1.73 to 10.12; 13.01, 95% CI 4.89 to 34.62 respectively), heavy metals in the first and fourth periods (15.00, 95% CI 1.85 to 121.87; 4.94, 95% CI 1.40 to 17.50 respectively), and inorganic particles in the fourth period (3.41, 95% CI 1.10 to 10.60) were found. However, after adjusting for the control variables previously mentioned, only the exposure to PAHs in the first period was found significantly associated with lung cancer (OR 13.7; 95% CI 2.9 to 64.2).

Conclusion: This study has shown a significant excess risk of lung cancer among workers exposed to PAHs five years before diagnosis. This risk was independent of sex, age, smoking, family history of cancer, and education level. Some of our a priori hypotheses were not confirmed, possibly because of exposure misclassification or low statistical power.

P1.5 OCCUPATIONAL EXPOSURE TO HYDROCARBONS, HEAVY METALS, PESTICIDES, AND ELECTROMAGNETIC FIELDS ASSOCIATED TO ACUTE LEUKAEMIA IN WORKERS AFFILIATED TO THE MEXICAN INSTITUTE OF SOCIAL SECURITY

E. Robles-Pérez, I. García-Rojas, V. Borja-Aburto. *Occupational Health Research Department, Mexican Institute of Social Security, Mexico*

Introduction: Except for benzene and ionising radiations there are still many controversies regarding the role of occupational exposures and its association with acute leukaemia. In Mexico, there still exist many old industrial processes, which could increase the risk of occupational exposure in the development of this type of neoplasia. The aim of this study was to evaluate the association between occupational exposure to hydrocarbons, heavy metals, pesticide, and electromagnetic fields and the presence of acute leukaemia.

Methods: Case controls study. Cases: workers with recently diagnosed acute leukaemia, who fulfilled the selection criteria. Controls: they were obtained through a random selection applied to workers at the Mexican Institute of Social Security (IMSS). Three questionnaires were given to every worker selected; such questionnaires included sociodemographic aspects, dietary, smoking and alcoholism habits, exposure out of work, family background of cancer, and a work history. Occupational exposures were estimated by an industrial hygienist in four different periods of time: 5, 10, 15, and more than 15 years prior to the diagnosis or to the interview used in controls. Analysis plan: conditional logistic regression.

Results: Sixty nine cases and 88 controls were obtained; no differences in sex, age, alcohol consumption, educational background, or smoking habits were found. Risk between cancer and leukaemia family history showed an OR 2.17, 95% CI 1.04 to 4.55. A bordering association was found with exposure to hydrocarbons in the 10 to 15 year period previous to the diagnosis (OR 2.56, 95% CI=0.96 to 6.87). When this exposure was included in a model of logistic regression, OR happened to be 2.63 (95% CI 0.93 to 7.37).

Conclusions: The results show differences with bordering significance for exposure to hydrocarbons, mainly during the 10–15 year period previous to the diagnosis. No associations were found with exposure to pesticide, heavy metals, and electromagnetic fields.

This study was supported by CONACYT grant: SALUD-2002-C01-8426.

P1.6 PARENTAL OCCUPATIONAL EXPOSURE TO CARCINOGENS ASSOCIATED TO ACUTE LEUKAEMIA IN THEIR CHILDREN WITH DOWN'S SYNDROME

E. Robles-Pérez¹, J. M. Mejía-Arangure², H. Flores-Aguilar², M. C. Ortega-Alvarez², A. Fajardo-Gutiérrez². ¹Occupational Health Research Department, ²Clinical Epidemiology Research Department, Pediatric Hospital, Mexican Institute of Social Security, Mexico

Introduction: There are many controversies regarding parents' occupational exposure and leukaemia development in children. It has been said that susceptibility plus an exposure to carcinogenic agents at any level, could lead to a high and consistent association with the presence of this kind of neoplasia. The aim of this study was to determine parents' occupational exposure to carcinogenic agents related to acute leukaemia presence in their children with Down's syndrome.

Method: Cases controls study. Cases: children with Down's Syndrome and acute leukaemia. Controls: children with Down's syndrome but no acute leukaemia. Three questionnaires were applied on parents' social-demographic, family, and personal aspects, as well as their work history. The occupational exposure level to carcinogenic agents was determined through a validated index based on activities, instruments,

and materials used in parents' jobs. Analysis plan: non-conditioned logistic regression.

Results: Thirty cases and 63 controls were obtained between 1998 and 2002. Non-significant associations were found for some occupations, economic activities, and chemical agents. According to the proposed exposure index to carcinogenic agents, fathers who had a high exposure presented strong and significant associations with acute leukaemia in their children for such periods as before, during, and after pregnancy. Mothers had significant risk with high exposure to carcinogenic agents only during the post-pregnancy period.

Conclusions: By improving exposure measurement and using a sensitive group of people, it was possible to find strong associations between high exposure level to carcinogenic agents for both parents and the presence of leukaemia in their children with Down's syndrome.

P1.7 SMOKING AND CLONAL CHROMOSOMAL ABERRATIONS IN LUNG CANCER PATIENTS: SUPPORT FOR SPECIFIC ASSOCIATIONS?

M. Albin¹, A. Oudin^{1,2}, J. Björk², M. Soller³. ¹Department of Occupational and Environmental Medicine; ²Competence Centre for Clinical Research; ³Department of Clinical Genetics; Lund University Hospital, Sweden

Introduction: Associations between exposure and specific clonal chromosomal aberrations (karyotype) in tumour cells have been observed in myelodysplastic syndromes and acute myeloid leukaemia. We are investigating if such specific associations exist also for solid tumours. Lung cancer and bladder cancer were selected since these tumours have high population attributable fractions of known exogenous risk factors, including smoking which we suggest may be used as a "positive control" when investigating occupational exposures. We here report preliminary results for lung cancer.

Methods: The study was based on 281 subjects with lung cancer diagnosed 1987–93 in Southern Sweden, from whom tumour cells had been cytogenetically investigated at the Department of Clinical Genetics in Lund. Information on smoking habits was obtained from interviews (n=139; mainly with next of kin), or medical records (139 subjects), providing data from either source for 204 subjects (73%; 58 women, 146 men; 18 non-smokers, 186 smokers). They were classified as having: normal karyotype (n=61), loss of the Y chromosome (n=47), complex aberrations (n=69), or other aberrations (n=27). Using a case only approach, odds ratios adjusted for sex and age, with 95% confidence intervals (CI), were calculated using the subjects with a normal karyotype as referents.

Results: The overall odds ratio for smokers was close to unity (OR 1.2, CI 0.3 to 4.5) for complex aberrations, increased for loss of the Y chromosome (OR 4.3, CI 0.8 to 23), and decreased for other aberrations (OR 0.6, CI 0.1 to 3.1). The risk did not increase with pack-year category for any of the aberrations.

Conclusion: Generally the estimates were imprecise and preclude firm conclusions. The results do so far not support specific associations between smoking and clonal chromosomal aberrations in lung cancer cells, although the suggested association with loss of the Y chromosome should be looked further into. As smoking is a well established genotoxic exposure, as well as a prevalent one, this may indicate that if such associations exist, they may not be as strong as we expected or be found in smaller subgroups.

P1.8 MALE LUNG CANCER RISK IN INDUSTRIES IN THE NETHERLANDS: RESULTS FROM A POPULATION BASED COHORT STUDY

L. Preller^{1a}, L. E. Voorrips^{1a}, B. Blatter^{1b}, P. A. van den Brandt², R. A. Goldbohm^{1a}. ¹Netherlands Organisation for Applied Scientific Research TNO, Quality of Life, ^aZeist, ^bHoofddorp, the Netherlands; ²Maastricht University, Department of Epidemiology, Maastricht, the Netherlands

Introduction: The Netherlands Cohort Study (NLCS) is a prospective population based study on diet and cancer and included 58 279 men aged 55–69 years at the start of the study in 1986. Available information on occupational history enables also studying associations between cancer and occupation.

Methods: Incident cases of lung cancer were detected by periodic record linkage with the Dutch national cancer registry over a follow up time of 7.3 years. 1170 male incident cases of lung cancer were included. The person-years at risk of the cohort were estimated from a subcohort, a random sample of the cohort (2239 male subjects included). Data were analysed according to a case-cohort approach. Occupation and industry were coded according to systems of the Dutch Central Bureau

of Statistics and allocated to 26 (two digit) industrial categories. Occupations were defined as blue collar or white collar jobs based on a standardised classification method (EGP). For each industry a person was assigned to one of three categories: (1) never worked in it; (2) ever worked in it but only as a white collar worker; (3) ever worked in it as a blue collar worker. Rate ratios (RRs) were adjusted for age and smoking. **Results:** Statistically significant elevated RRs were observed for three groups of blue collar workers: in the wood, paper, furniture, and furnishing industry (45 cases, RR 1.65; 95% CI 1.04 to 2.62), in the building materials, glass, clay, stone industry (23 cases; 2.16; 1.17 to 4.01), and in the construction and home building business (148; 1.40; 1.06 to 1.85). A borderline increased risk was found for workers in the production of transportation means (50; 1.53; 0.99 to 2.37).

Conclusion: Despite relatively crude categorisation of occupational groups, several plausible elevated lung cancer risks were observed, with RRs adjusted for individual smoking habits. The separation between white and blue collar workers made the exposure classification more specific than occupational sector alone. RRs for the wood, paper, furniture, and furnishing industry and for the building materials, glass, clay, and stone industry were relatively high when compared with other studies.

P1.9 TEXTILE WORK AND BLADDER CANCER IN SPAIN: DURATION AND PERIOD OF WORK

C. Serra^{1,2}, D. Turuguet³, M. Kogevinas³, F. Fernandez³, P. Stewart⁴, N. Malats³, D. Silverman⁴, N. Rothman⁴, A. Tardon⁵, R. Garcia-Closas⁶, A. Carrato⁷, G. Castaño-Vinyals³, M. Dosemeci⁴. ¹Pompeu Fabra University, Barcelona, Spain; ²Corporació Parc Taulí, Sabadell, Spain; ³Municipal Institute of Medical Research, Barcelona, Spain; ⁴National Cancer Institute, Bethesda, USA; ⁵Universidad de Oviedo, Spain; ⁶Hospital Universitario de Canarias, Tenerife, Spain; ⁷Hospital General de Elche, Spain

Introduction: A previous analysis of risk of bladder cancer in the textile industry in Spain showed increased risks for weavers, mechanics, those ever worked in winding, in warping, sizing and/or dressing, and for those exposed to synthetic materials and cotton (Serra C, *et al.* EPICOH 2004). We report here a further analysis of these risks by duration and period of employment.

Methods: We conducted a hospital based case control study in Spain between 1998 and 2001, including 1226 cases of bladder cancer and 1271 controls (87% males). Lifetime occupational history was recorded through a computer assisted personal interview and exposures in the textile industry were assessed by a detailed modular questionnaire. Occupations, specific locations, tasks and materials used within the industry were recorded. Odds ratios (OR) and 95% confidence intervals (CI) were adjusted for age, sex, region, other high risk occupations, and smoking. Risks were examined for duration (≤ 10 years and >10 years) and period of work (before 1960, 1960–74, after 1974).

Results: Working for more than 10 years was associated with an increased risk for weavers (OR 2.3, CI 1.0 to 5.3), those who had ever worked in winding (OR 5.4, CI 0.6 to 50.1), in warping, sizing and/or dressing (OR 4.7, CI 0.5 to 40.6), in the weaving room (OR 2.9, CI 1.2 to 7.1), and those exposed to cotton (OR 2.0, CI 1.0 to 3.8) and synthetic materials (OR 2.6, CI 1.1 to 6.0) (all *p* values for trend <0.05). Excess risks were found for weavers exposed after 1974 (OR 5.9, CI 1.4 to 24.63) and those in the winding section before 1960 (OR 10.6, CI 1.1 to 103.0).

Conclusions: A dose-response relation between bladder cancer risk and duration of exposure was found for several occupations, sections, and materials in the textile industry. Period of exposure could explain some of these increased risks. These results confirm the overall findings from a previous analysis in the same study and are the most detailed analyses to-date of risks within the textile industry.

P1.10 MEASUREMENTS OF ELECTRIC FIELDS ONBOARD THE ROYAL NORWEGIAN NAVY VESSELS KNM TERNE AND KNM UTVAER

O. J. Møllerlækken, B. E. Moen. Section for Occupational Medicine, University of Bergen, Norway

Introduction: The question about electric and magnetic field effects on human health and reproduction is a topic that is not well understood; studies which have investigated this have not been consistent in their findings. Through the project HMS Sea in the Royal Norwegian Navy we wanted to test personnel's exposure for electro and magnetic fields. In this way we would also test the electromagnetic environment onboard the navy vessels.

Methods: The vessels chosen were a missile torpedo boat and a submarine, because they are small and have been in question before. We used an instrument called NardAlert XT which is personnel-carried, very easy to use, and measures electric fields. The personnel were asked after each measurement about position and activity, and resulting data were used to produce graphs in Microsoft Excel.

Results: The electric field values measured were in general between 0% and 10% of the guidelines given by ICNIRP, with the limit value given at 100%. Some values measured are however higher than the limit. There were higher exposures above deck than under, and the exposures increase with use of radio equipment.

Conclusions: The fields measured can not with today's knowledge be said to be a health hazard, but there are some values measured that are higher than recommended and need further investigation or measures.

P1.11 A PROSPECTIVE STUDY ON MECHANICAL WORK EXPOSURE AND BLOOD PRESSURE IN TECHNICAL SCHOOL STUDENTS

K. B. Veiersted¹, T. Nordberg¹, M. Wærsted¹, N. Østerås², K. M. S. Gould³. ¹National Institute of Occupational Health, Norway; ²Section of Occupational Health and Social Insurance Medicine, University of Oslo, Norway; ³Section for Occupational Medicine, University of Bergen, Norway

Introduction: The causes of arterial hypertension (AH) are mostly unknown; nine out of 10 cases with AH are essential (also called primary or idiopathic). Isometric muscle contractions dramatically increase acute blood pressure. A hypothesis may therefore be that work exposure consisting of sustained isometric muscle contractions (as for, for example, electricians and hairdressers) may cause long lasting physiological effects leading to AH. The aim of this abstract is to present preliminary correlations between mechanical work exposure and blood pressure.

Methods: The analyses are based on data from a prospective field study starting autumn 2002 on 420 second year technical school students, consisting of exposed (electrician, hairdresser) and controls (art, media, and design). To this date (March 2005) eight questionnaires have been collected, four of them included data on mechanical work exposure, at baseline, and after 3, 12, and 24 months. The answers were on a three point category scale (none, some, or much). These datasets included at least 12 validated questions (constituting an index variable; MIX) on activities resulting in isometric muscle contractions of the upper extremities—for example, work with elevated arms. Blood pressure was measured by an Omron M4-1 monitor, according to the recommendations by the European Society of Hypertension (2003), on 140 students (86 females and 54 males) at the 24 month registration. Systolic (SYS), diastolic (DIA), and mean arterial blood pressures (MAP) were recorded.

Results: The MAP was negatively correlated to MIX (Pearson Correlation; -0.17 , $p < 0.05$) but not significant to work with elevated arms (-0.05 , NS). The females had significantly lower SYS compared with the males (119 v 130 mmHg, M-W test $p < 0.001$), but the same level of DIA (76 v 74 mmHg, NS). No significant difference in blood pressure was found between the exposed students compared to controls when stratifying for sex. MAP was negatively correlated to musculoskeletal pain reported at the same time (-0.24 , $p < 0.01$).

Conclusion: The results did not support a positive correlation between work exposure consisting of isometric muscle contractions and blood pressure.

P1.12 OCCUPATION AND BREAST CANCER: A CASE CONTROL STUDY IN POLAND

B. Peplonska¹, A. Blair², P. Stewart², J. Rusiecki², M. Garcia-Closas³, L. Brinton³, N. Szeszenia-Dabrowska¹, J. Lissowska⁴. ¹Department of Occupational and Environmental Epidemiology, NIOM, Łódź, Poland; ²Occupational and Environmental Epidemiology Branch, NCI, Bethesda, MD, USA; ³Hormonal and Reproductive Epidemiology Branch, NCI, Bethesda, MD, USA; ⁴Division of Cancer Epidemiology and Prevention, Cancer Center and M Skłodowska-Curie Institute of Oncology, Warsaw, Poland

Introduction: Although mammary tumours commonly occur in rodents exposed to chemicals, epidemiological studies provide limited support for occupational causes of breast cancer. Possible associations with PAHs, solvents, and pesticides emphasise the need for further studies. We therefore examined occupational relations with breast cancer risk in a large population based case control study in two cities in Poland.

Methods: The study included 2272 cytologically or histologically confirmed breast cancer cases and 2417 controls from the general

population matched to the cases on city of residence and age. Detailed lifetime occupational histories and information on other potential breast cancer risk factors were obtained through personal interviews. Conditional logistic regression analyses calculated odds ratio (OR) associated with various occupations and industries after control for potential confounders.

Results: We found statistically significant excesses of breast cancer among marketing, advertising, and public relations managers (OR: 4.4), inspectors/compliance officers (2.4), economists (2.0), sales representatives (2.0), health record technologists/technicians (2.5), printing machine operators and tenders (3.3), textile, apparel and furnishing machine operators/tenders (1.3), hand sewers (1.8), engineers (2.0), retail salespersons (1.2), fabricators, assemblers, and manual workers (1.3), with a positive trend for duration of employment present in the last three occupations. Industries showing significantly increased risks included food stores (1.3), miscellaneous shopping goods stores (2.0), non-psychiatric specialty hospitals (2.2), electronic and electric equipment manufacturers (1.7), and special trade contractors (2.2); a trend for duration of employment was seen for the last two industries.

Conclusion: Several occupations and industries appeared related to increases in breast cancer risk. Further analyses are underway to clarify the role of specific exposures.

P1.13 WORK ABILITY AND PSYCHOSOCIAL AND ORGANISATIONAL FACTORS IN NURSING PERSONNEL IN HOSPITALS

P. Kiss^{1,2}, M. De Meester^{1,2}, R. Verpraet², S. Stordeur³, W. D'Hoore³, L. Braeckman². NEXST Study Group. ¹Progecov Occupational Health Service, Ghent, Belgium; ²Department of Public Health, Ghent University, Ghent, Belgium; ³School of Public Health, Université Catholique de Louvain, Brussels, Belgium

Introduction: The aim of the study was to evaluate the influence of psychosocial and organisational factors on work ability (WA) in nurses working in hospitals.

Methods: A cross sectional questionnaire study was performed in 4399 nurses working in 15 hospitals. WA was assessed by means of the Work Ability Index (WAI) questionnaire. Logistic regression analysis was used to identify the variables that contributed significantly to a "poor" WA (WAI<37). Organisational and psychosocial work factors considered in the analysis were: emotional demands, quantitative demands, decision latitude, social support from superiors and colleagues, possibilities for development, quality of leadership, harassment, insecurity at work, underqualification, lack of information, conflicting demands, and dissatisfaction with information transfer between shifts. As confounders were considered: number of working hours, job title, seniority, age, sex, overcommitment, and family strain affecting work.

Results: Eventually 2303 nurses took part in the study. After correction for number of working hours (OR 0.98; 95% CI 0.96 to 0.99), overcommitment (OR 1.14; 95% CI 1.10 to 1.19) and family strain affecting work (OR 1.23; 95% CI 1.05 to 1.43), emotional demands (OR 1.26 95% CI 1.02 to 1.56), harassment (OR 1.40; 95% CI 1.08 to 1.79), insecurity at work (OR 1.51; 95% CI 1.03 to 2.21) and dissatisfaction with information transfer between shifts (OR 1.44; 95% CI 1.13 to 1.85) increased the risk for a poor WA, while decision latitude (OR 0.73; 95% CI 0.62 to 0.87), possibilities for development (OR 0.57; 95% CI 0.47 to 0.69), and quality of leadership (OR 0.84; 95% CI 0.75 to 0.95) decreased the risk for a poor WA.

Conclusion: Two non-occupational factors turned out to be significant confounders (family strain affecting work and overcommitment). To our knowledge this has previously not been reported. Increasing decision latitude, possibilities for development, quality of leadership and satisfaction with information transfer between shifts would increase WA. Measures to decrease emotional demands, harassment, and insecurity at work would increase WA.

P1.14 ASSESSMENT OF POSTURE BY RULA METHOD IN AN ELECTRICAL AND ELECTRONIC DEVICES MANUFACTURING COMPANY

G. N. Saraji¹, M. J. Fahool¹, F. Golbabaie¹. ¹School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

Introduction: It is known that, work related musculoskeletal disorders (WRMSDs) are the most important occupational disease in the workplaces. The aim of this study, which has been carried out in an electrical and electronics devices manufacturing company, was to evaluate the incidence of WRMSDs and analysis the postures.

Methods: Rapid upper limb assessment technique (RULA) was used for posture analysis and then the action levels were identified. For estimation of WRMSDs incidence rate, the Nordic Questionnaire was used. A total of 240 workers were examined. They were belong to different sexes and covered 35 job groups.

Results: Except knee pain, the incidence of different type of WRMSDs in females was significantly different from males ($p < 0.05$). The incidence rates of neck, trunk, lumbar, and upper limbs disorders in both males and females were high. The results of RULA technique for assembling shop showed that (a) 11% of job groups got score of 7 and action level of 4; (b) the score of 5–6 and action level of 3 were calculated for 20% of job groups; (c) these figures for 69% of job groups were 3–4 and 1–2 respectively. The latter categorisation covers 84.8% of the total employees.

Conclusion: 15.2% of job groups are categorised in hazardous action level. Therefore, the work postures should be revised and adjusted according to machine, man, and environment.

P1.15 EVALUATION OF RISK FACTORS ASSOCIATED TO WORK RELATED MUSCULOSKELETAL DISORDERS OF UPPER LIMBS EXTRIMITY IN AN AUTOMOBILE MANUFACTURING INDUSTRY, IRAN

M. Pourmahabadian¹, K. Azam², M. Ghafoori¹. ¹Occupational Health Department, School of Public Health, Tehran University of Medical Sciences, Tehran; ²Epidemiology and Biostatistics Department, School of Public Health, Tehran University of Medical Sciences, Tehran

Introduction: In recent years investigations of work related musculoskeletal disorders (WRMSDs) have been attracted considerably because of its importance in assessing ergonomics risk factors involved in industrial workplaces. However, only several risk factors of WRMSDs are known and it is believed that they are highly dependent on occupations. However, still more study is needed for better understanding of these factors in detail. In this paper exposure assessment of individual workers to risk factors associated with work related upper extremity musculoskeletal disorders (UEMSDs) were examined in presswork shops of an automobile manufacturing industry in Tehran, Iran.

Methods: Nordic Musculoskeletal Questionnaire (NMQ) and Rapid Upper Limb Assessment (RULA) were applied among 50 workers in bending, impact, and hydraulic press shops. Then obtained RULA and NMQ results were analysed and then compared statistically by using SPSS package, version 11.

Results: The results of this study showed that the prevalence of low back pain and shoulder and back in press workers are 60% and 16%–18%, respectively, but in other parts of the body such as thighs and legs, wrist and neck it varies from 22%–44%. In addition, good agreement was observed between RULA and NMQ results for bending press workers only. It is found that 75% of workers have score 3 for arm, forearm, and wrist, while 63% of workers have score 2 for neck, trunk, and foot. Significant differences were observed between RULA body part scores (1 and >1) and the NMQ results in neck and trunk ($\chi^2 = 6.41$ (1 df), $p = 0.011$ and $\chi^2 = 4.94$ (1 df), $p = 0.026$, respectively).

Conclusion: It can be concluded that musculoskeletal disorders is mostly prevalent in investigated automobile press workers and RULA method could be considered as a useful method for the evaluation of risk factors associated to WRMSDs.

P1.16 PREDICTIVE FACTORS FOR INCIDENT MUSCULOSKELETAL DISORDERS IN AN IN-PLANT SURVEILLANCE PROGRAMME

A. Descatha¹, Y. Roquelaure², J. Mariel³, B. Evanoff¹, M. Melchior¹, A. Leclerc¹. ¹INSERM U687-IFR69, St-Maurice, France; ²Consultation de pathologie professionnelle, CHU, Angers, France; ³Service médical inter-entreprise de l'Anjou, Angers, France

Introduction: A surveillance programme for upper limb musculoskeletal disorders (UMSD) based on assessment of health and risk factors was implemented between 1996 and 2000 in a large shoe factory. The study aimed to identify workers with an increased risk of UMSD incidence.

Methods: In 1996, 1997, and 2000, 166 workers filled out a questionnaire and underwent a standardised physical examination. Bivariate analyses on factors (general, personal, and occupational factor, from the 1996 questionnaire) associated with UMSD incidence in 1997 were performed to select dichotomised variables (p level at 0.20). Selected variables were introduced in a logistic model, also taking into account sex and age. The performance of a risk factor score based on this model was analysed in 2000, using the Wilcoxon test and ROC curves.

Results: In 1997, 28 incident cases of UMSD were observed ($n=105$, 26.2%). Work pace and prior history of UMSD were the only significant factors associated with 1997 UMSD incidence (respectively 33% $n=23$ v 13% $n=5$, $p=0.02$, and 58% $n=7$ v 22% $n=21$, $p=0.01$). Psychological distress (36%, $n=13$ v 21%, $p=0.10$), physical fatigue (35% $n=12$ v 22% $n=12$ $p=0.14$), repetitiveness (30% $n=22$, v 18% $n=6$, $p=0.17$), and task precision (33% $n=16$ v 21% $p=0.16$) were also introduced in the logistic model based on 1997 UMSD incidence with sex and age. Prior history of UMSD remained associated with 1997 incidence (OR=5.5, 95% CI 1.4 to 21.8). In 2000, 24 incident cases since 1997 were observed ($n=107$, 23.5%). The risk factor score, based on variables of the 1997 model, was significantly different for incident cases (median=6 in incident cases v 4.5 for healthy subjects, $p=0.02$). ROC curves indicated that the highest agreement reached only 67% of sensitivity and 59% of specificity. Among the subjects who did not change their task ($n=71$ with 18 incident cases, 25.4%), performance reached 66% for specificity with the same sensitivity.

Conclusion: This study suggested that UMSD surveillance programmes should take into account personal and occupational factors, prior history of UMSD. Health examination remained essential.

P1.17 INCIDENCE OF CARPAL TUNNEL SYNDROME IN A FRENCH AREA IN 2002–03

Y. Roquelaure^{1,2}, C. Ha¹, M. C. Pelier-Cady², E. Imbernon¹, A. Leclerc³, M. Goldberg¹. ¹Department of occupational health, National Institute for Public Health Surveillance, France; ²Faculty of Medicine, Angers, France; ³Inserm U687, France

Introduction: A network was implemented in the Maine and Loire area (745 486 inhabitants in January 2003) in the French Pays de la Loire region to estimate the incidence of carpal tunnel syndrome (CTS) in a general population according to age, sex, industrial activity, and occupation.

Methods: Cases were included from the only four electrodiagnostic centers in the Maine and Loire area, using the same standardised methods for diagnosis of CTS. Only new cases occurring in patients aged 20–59 years, living in the Maine and Loire area, were included without other selection criteria. Medical and work history during the past five years was collected by postal questionnaire. Age and sex incidence rates were estimated by patient and not by wrist, using the Census data of 1999. French classifications were used to code industrial activities (60 categories) and occupations (42 categories). Standardised incidence ratios (SIRs) were computed by dividing the number of observed cases by the number of expected cases for each industrial activity and occupation.

Results: A total of 1181 new cases of CTS corresponding to 856 patients were included between February 2002 and January 2004. The annual incidence of CTS was 1.57 for 1000 women and 0.64 for 1000 men. The incidence of CTS increased with age in both sex. The questionnaire response rate was 97% (835 patients); 26% reported at least one medical condition known to be associated with CTS: obesity (15.9%), diabetes mellitus (4.7%), thyroid diseases (13.0% in women only). Employment was associated with a higher incidence of CTS in women (1.80 per 1000 v 1.07, $p<0.001$) and men (0.67 per 1000 v 0.32, $p<0.001$). The SIRs were significantly higher for manufacture of computers, service activities, manufacture of food products, agriculture, retail trade, hotels and restaurants, health and social work among women, and for manufacture of basic metals, sand quarrying, manufacture of motor vehicles, of furniture, of footwear, construction, manufacture of food products and fabricated metal products among men. Numerous occupations were associated with an excess of risk.

Conclusion: These results are in accordance with previous studies showing an increased incidence with age, a higher incidence among women and a higher risk in employed population in comparison with the non-employed population. The pursuit of the study will permit to precise the risk of CTS among the general population and to monitor the variation of the incidence according to economic changes.

P1.18 MUSCULOSKELETAL DISORDERS IN PODIATRISTS

J. Schreiber, E. Wacławski, P. Jeffrey. *Occupational Health Service, NHS Argyll and Clyde, Paisley, UK*

Introduction: Musculoskeletal disorders (MSD) have rarely been investigated among podiatrists. Occupational risk factors include

postural difficulties and type of instrument used. This project was undertaken to describe the prevalence of self-reported MSD symptoms in podiatrists compared to another group of healthcare workers (laboratory staff).

Methods: A cross sectional questionnaire survey was carried out using a modified Nordic Questionnaire with additional questions added on working hours, domiciliary work, handedness, and ability to choose instruments. Data were analysed by non-parametric and regression analysis methods. This was sent to all podiatry staff working in this NHS area (NHS and private) and to laboratory staff based at three hospital laboratories in the area.

Results: Seventy five podiatrist and 100 lab staff completed the questionnaire. Twenty one podiatrists performed domiciliary work. Associations were noted between sex (being female) and positive responses to questions about shoulder, elbow, and wrist/hand symptoms. There were also associations between handedness and neck and upper back symptoms. There were significant associations between role (podiatry) and responses in the neck, shoulder, wrist/hand, upper and lower back. (for example, Neck: pain in last 12 months (P12) 67% of podiatrists compared with 43% of lab staff (odds ratio 2.7; 95% CI 1.4 to 5.2); pain in last 7 days (P7) 35% of podiatrists compared with 17% of lab staff (OR 2.6; 95% CI 1.2 to 5.6); prevention of activity (PA) 27% of podiatrists compared with 11% of lab staff (OR 2.9; 95% CI 1.2 to 7.3). Shoulder: P12 55% compared with 35% (OR 2.2; 95% CI 1.2 to 4.3); P7 27% compared with 14% (OR 2.3; 95% CI 1.0 to 5.4); PA 20% compared with 9% (OR 2.6; 95% CI 1.0 to 7.1). Regression analysis confirmed associations with role (podiatrist). A subanalysis of podiatrists has identified an association between domiciliary work and elbow, wrist/hand symptoms.

Conclusion: Work in podiatry is associated with excess symptoms of MSD. Further work is needed to define the clinical conditions in this workforce. Additional work in a larger population of podiatrists is needed to further test the hypothesis of increased risk. Ergonomic assessment and advice is needed to improve the work environment.

P1.19 A PROSPECTIVE STUDY ON PHYSICAL ACTIVITY, STRESS LEVEL, AND MUSCULOSKELETAL DISORDERS IN TECHNICAL SCHOOL STUDENTS

T. Nordberg¹, K. B. Veiersted¹, M. Wærsted¹, N. Østerås², K. M. S. Gould³. ¹National Institute of Occupational Health, Norway; ²Section of Occupational Health and Social Insurance Medicine, University of Oslo, Norway; ³Section for Occupational Medicine, University of Bergen, Norway

Introduction: Musculoskeletal disorder (MSD) is a major health problem and there are several studies identifying the risk factors in this relation. The documentation on preventive factors are however scarce. The aim of this analysis was to identify characteristics in technical school students with report a low complaint of neck, shoulder, and upper back pain (NSUP) over a period of two years.

Methods: The analysis is based on data from a prospective field study on technical school students consisting of electrician, hairdresser and art, media, design students. A sample of 420 students was obtained at the first baseline examination in 2002. They were then followed with a questionnaire every third month. Eighty students completed all eight questionnaires. They were asked to report experience of NSUP the previous four weeks. A pain index was calculated multiplying pain duration and intensity. Based on the sum of the eight pain indexes, the students were dichotomised into two groups: no/little pain and moderate/severe pain. Similar indexes were calculated for total physical activity (PA) and stress level at school reported over the two year period. Both variables were dichotomised into two groups; Low and High PA and Low and High stress level. Background variables as sex, educational category, and variables for relaxation ability (RA) were used from the baseline examination. Association between NSUP and the variables were tested by χ^2 .

Results: Fifty six per cent of the students reported no/little pain in all the eight questionnaires. Of those reporting no/little pain 64% were male and 52% female students, revealing no significant sex difference. The moderate/severe pain group had 3.5 (95% CI 1.3 to 9) time higher risk of reporting stress at school. The relations between NSUP and physical activity, educational category, and relaxation ability were all non-significant.

Conclusion: Stress level and NSUP were strongly correlated, but there is need for analysis regarding cause-effect. In order to reduce NSUP in technical school students, more documentation on risk factors and health promoting factors is needed.

P1.20 PREVALENCE OF MUSCULOSKELETAL SYMPTOMS AMONG HAIRDRESSERS

B. E. Hollund, B. E. Moen, T. Morken. *Section for Occupational Medicine, University of Bergen, Norway*

Introduction: Selection into and out of a profession is a known phenomenon in jobs such as hairdressing, in which the workers are exposed conditions capable of causing work related symptoms and diseases. The aim of this study was to determine the prevalence of musculoskeletal symptoms among current and former hairdressers compared to a control group. Work as hairdressers is physically demanding, but so far few studies have been performed to determine their prevalence of musculoskeletal symptoms.

Methods: A cross sectional questionnaire study of a general population of 12 054 females aged 40–47 years in Hordaland County, Norway, was carried out in 1997–99. The classification of hairdressers was code 5141, based on the form the International Standard Classification of Occupations- ISCO-88, and a single question "Have you earlier in your life had income from work as a hairdresser?" In the same questionnaire it was asked about musculoskeletal symptoms more than three months last year; have you at any time had trouble (ache, pain, discomfort) in your shoulders, neck, elbows, hands, upper back, lower back, hips, knees, and feet. The answers used were yes and no. The questionnaire included questions about age, smoking, and physical activity. The differences between common hairdressers, former hairdressers, and controls were tested using a χ^2 test and logistic regression analysis where smoking and physical activity were included.

Results: A total of 10 521 women gave information about occupation including 221 (2.1%) hairdressers. Former hairdressers reported highest prevalence for musculoskeletal symptoms compare to current hairdressers and control group. The musculoskeletal symptoms the last year in elbows, hand, upper and lower back, hips, knees, and feet were highest. There were significant differences between former hairdressers and current hairdressers for symptoms from knees and feet, and significant differences between the controls and former hairdressers for hand, upper back, knees, and feet. There were no differences between current hairdressers and controls.

Conclusion: Hairdressers who stay in their profession are more healthy than the women who have left this occupation. There might be a selection out of this work as a result of musculoskeletal symptoms.

P1.21 WORKER HEALTH STATUS IN KHON KAEN PROVINCE 2002–03

N. Chaiear¹, S. Paileeklee¹, B. Jindawong¹, K. Yimtae¹, P. Thanawiratnanij¹, B. Thinkamrop², P. Sakulkoo². ¹*Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand;* ²*Faculty of Public Health, Khon Kaen University, Khon Kaen, Thailand*

Introduction: Khon Kaen is considered as an industrial province in the Northeast region of Thailand. 46.3% of its working age population works in the commercial, industrial, and service sector. This study aimed to assess the workers health status in Khon Kaen province during 2002–03.

Methods: During May 2002 to February 2004, 2401 workers in 20 workplaces were interviewed using a structured questionnaire, and a physical check up was obtained. Pulmonary function test (PFT) and audiometry test were taken only for those having indications. Descriptive statistics were applied to assess the data.

Results: The majority of them were female (61.85%) with the average age of 33.41 years. 4.9% were ex-smokers and 18.5% current smokers. Almost half of them (42%) were current alcoholic drinkers. The average work day was 5.98 day. 66.2% reported personal protective equipments (PPE) use, and a disposable dust mask was the most common. 78.5% of workers obtained a health examination within the last 12 months. The most common health problems were muscle pain (54.7%), back pain, respiratory diseases, fatigue, and stress (53.1%, 45.7%, 40.5%, and 33.0% respectively). From 2401 physical check ups, 34.9% were considered as normal and 65.1% abnormal. Hypertension was found 12.1%. Among 474 workers who obtained PFT, 24.47% were abnormal. Among 584 obtained audiometry test, 45.72% were considered as hearing loss.

Conclusion: The most common health problems were musculoskeletal disorder. Hypertension is higher than that of the general population. Abnormal results of PFT and audiometry test were considerably high.

P1.22 ASSOCIATIONS OF MATERNAL EMPLOYMENT WITH LENGTH OF GESTATION AND GROWTH RETARDATION: DIFFERENCES AND SIMILARITIES IN NORWAY AND SPAIN

E. Ronda¹, A. Irgens², E. Regidor³, L. M. Irgens⁴. ¹*Department of Public Health, Universidad de Alicante, Spain;* ²*Department of Occupational Medicine, Haukeland University Hospital, Bergen, Norway;* ³*Department of Preventive Medicine and Public Health, Universidad Complutense de Madrid, Spain;* ⁴*Medical Birth Registry of Norway, Locus of Register-Based Epidemiology*

Introduction: To assess the effect of occupational exposure on reproductive health represents a growing field of research. However, few studies have examined the association between maternal employment status, that is, paid work versus not, what means different exposition to risk factors, and various pregnancy outcomes, such as preterm delivery or low birth weight. This study investigated the effects of maternal unemployment on birth weight and gestational age in Norway and Spain.

Methods: The Spanish data were derived from the National Registry of Stillbirths and Births (1999–2000) and the Norwegian from the Medical Birth Registry (1999–2002). The analysis was restricted to perinatal outcome in after 26 completed weeks of gestation. It has been estimated the prevalence of preterm birth and low birth weight in both categories of maternal employment status. The associations were estimated by crude and adjusted for weeks of gestation, age, and marital status of mother odds ratios obtained in logistic regression.

Results: Unemployed women had the highest risk of preterm delivery and low birthweight in term births both in Spain and Norway. The adjusted relative risk of preterm birth in the unemployed compared to employed women in Norway was 1.08 (95% CI 0.99 to 1.18) and 1.21 (95% CI 1.18 to 1.26) in Spain, and of low birthweight in term births was 1.39 (95% CI 1.14 to 1.70) in Norway against 1.12 (95% CI 1.07 to 1.18) in Spain.

Conclusion: The results point out that two countries with different employment rates for women have similar results: a higher prevalence of preterm birth and low birth weight in term births among the unemployed.

P1.23 REPRODUCTIVE DISORDERS AMONG MALE AND FEMALE GREENHOUSE WORKERS

R. Breiveld, G. Zielhuis, N. Roeleveld. *Department of Epidemiology and Biostatistics, Radboud University Nijmegen Medical Centre, Nijmegen, the Netherlands*

Introduction: Pesticides are widely used in agriculture and a large number of men and women are exposed to these chemicals. Therefore, it is a cause for concern that pesticides have been mentioned as possible reproductive toxicants. The aim of this study was to determine whether pesticide exposure in male and female greenhouse workers results in reproductive disorders.

Methods: Data were collected through questionnaires with detailed questions about reproductive disorders of the most recent pregnancy, lifestyle habits, work tasks, and occupational exposures in a six months period before conception of the most recent pregnancy. Relations between the different outcome measures and exposure to pesticides among men, women, or both were studied by means of logistic regression analyses. We performed the analyses separately for all most recent pregnancies (n=2466) and for primigravidae couples only (n=423), because in non-experimental research of reproductive failure most pregnancies are planned, whereby past pregnancy experience is used in planning and may bias the results.

Results: The analyses of all most recent pregnancies showed an increased risk of spontaneous abortion among exposed women (OR_{women}=2.45; CI 1.13 to 5.34) and decreased risks of prolonged time to pregnancy (OR_{men}=0.68; CI 0.49 to 0.94) and preterm birth (OR_{men}=0.47; CI 0.35 to 0.64) among exposed men. Restricting the analyses to primigravidae couples, which is the most valid analysis, resulted in increased risks of prolonged time to pregnancy (OR_{women}=1.90; CI 0.81 to 4.44) and spontaneous abortion (OR_{women}=4.01; CI 1.12 to 14.41) in particular among exposed women. On the other hand, a decreased risk of preterm birth (OR_{men}=0.10; CI 0.02 to 0.42) was found among exposed men. This seems to be an artificial result as the prevalence of preterm birth among exposed men was similar to the prevalence of preterm birth in the general population.

Conclusions: This study adds evidence to the hypothesis of adverse effects of pesticide exposure on time to pregnancy and spontaneous

abortion, especially when women are exposed before or during the early stages of their first pregnancy.

P1.24 CONGENITAL MALFORMATIONS IN CHILDREN OF OBSTETRIC NURSES USING NITROUS OXIDE

N. Roeleveld, M. van Gelder. *Department of Epidemiology and Biostatistics, Radboud University Nijmegen Medical Centre, Nijmegen, the Netherlands*

Introduction: We examined a cluster of congenital malformations at the Department of Obstetrics and Gynaecology of a general hospital in 1994–2004. Among 20 women who had at least one child while working at this department, six (30%) had a child with a congenital closure defect (orofacial schisis, digestive tract atresia, and VSD). Likely causes of such clusters, such as familial disorders and consanguinity, were excluded.

Methods: To identify potential causal factors, an explorative case control study was performed in which 19 women participated. Using personal interviews, we collected detailed information on fertility issues, pregnancies, general health, lifestyle habits, work activities, and exposures during the second and third month of pregnancy. As a result of incomplete or missing information, only five cases and 11 controls could be included in the analysis.

Results: The age of both parents at time of birth was comparable for the two groups and alcohol and tobacco were scarcely used. No differences were found in medical drug use or vitamin use just before and during pregnancy, but cases reported more menstrual disorders and subfertility. Cases and controls worked the same number of hours per week and handling of medical drugs, disinfectants, and cleaners was comparable. However, major differences were observed between cases and controls for exposure to Entonox, a 50% nitrous oxide/50% oxygen mixture used for pain relief during deliveries. Exposure to Entonox at least once a week resulted in a 1.5-fold increased risk of congenital malformations (OR = 15.0; 90% CI 1.3 to 208.1). Differences were also found in the frequencies of Entonox use and for some specific exposure situations, such as changing of Entonox cylinders.

Conclusions: Despite the small study population and the retrospective character of this study, it provides strong indications for an increased risk of having a child with a congenital closure defect after incidental exposure to nitrous oxide in delivery rooms during the second and third month of pregnancy.

P1.25 TIME TO PREGNANCY AMONG MALE GREENHOUSE WORKERS

R. Bretveld, S. Kik, G. Zielhuis, N. Roeleveld. *Department of Epidemiology and Biostatistics, Radboud University Nijmegen Medical Centre, the Netherlands*

Introduction: Couple subfertility, which can be measured by time to pregnancy (TTP), may be due to a female or a male factor or a combination of both. Occupational exposure to exogenous agents with endocrine disrupting properties, such as some pesticides, is assumed to be a potential risk factor for subfertility, but it is unknown to what extent pesticides may impair fertility in male workers. The aim of this study was to determine whether TTP is prolonged for male greenhouse workers in comparison with a non-exposed referent group.

Methods: A study was performed among 694 male horticulture workers in greenhouses and a reference group of 613 male workers not exposed to pesticides, consisting of male cleaners, market stallholders, and shopkeepers. Data were collected through postal questionnaires with detailed questions on TTP, lifestyle factors (for example, smoking habits, coffee and alcohol consumption), work tasks, and occupational exposures of the men and their partners in the six months before conception of the last pregnancy. The relation between TTP and pesticide exposure was studied by means of the Cox's proportional hazards model.

Results: A prolonged TTP was found for horticulture workers regarding their partner's first pregnancy, reflected by a crude fecundability ratio (FR) of 0.74 (95% CI 0.54 to 1.01). After correction for confounding, the adjusted FR for pesticide exposure was 0.67 (95% CI 0.47 to 0.95) among primigravidae couples. Among duogravidae couples and multigravidae couples, no associations were seen between pesticide exposure and TTP after correction for confounding (FR = 1.04, 95% CI 0.86 to 1.26 and FR = 1.12, 95% CI 0.92 to 1.37, respectively). In a different comparison, employees in flower greenhouses seemed to be less fecund than their employers (FR = 0.72, 95% CI 0.57 to 0.93), which could be linked to different work practices.

Conclusions: Pesticide exposure may cause male subfertility in several situations, especially when the workers are trying to conceive their first child.

P1.26 OCCUPATIONAL DISEASES IN POLAND IN THE PERIOD OF TRANSFORMATION OF NATIONAL ECONOMY

N. Szeszenia-Dąbrowska, U. Wilczyńska. *Nofer Institute of Occupational Medicine, Lodz, Poland*

Introduction: Current situation in the epidemiology of occupational diseases is a resultant of many contributing factors, such as: occupational exposures of the worker population, social and economic circumstances, medical factors, legislation, and the continuing changes in the national economy.

Methods: This work is based on the information compiled from the occupational disease reporting forms gathered in the Central Register of Occupational Diseases run by the Nofer Institute of Occupational Medicine, Lodz, Poland.

Results: For several years already a systematic falling trend in the number of occupational diseases has been observed. In 1998, as many as 12 017 cases were recorded (117.3 per 100 thousand workers), while for 2004, the corresponding number was 3790 (41.0 per 100 thousand). The observed decrease is due to the continuing transformations in the national economy. Changes in the character and level of the occupational exposures have affected the profile of the occupational pathologies. Data for 2004 show that over 50% of occupational diseases were noted in workers employed outside the industry. In the past 10 years, voice disorders (affecting mainly teachers) constitute the most numerous group of occupational diseases. Medical factors, such as vaccinations for high risk groups have contributed to reduce the incidence of occupational diseases. For example the number of cases of occupation related viral hepatitis in 2004 was six times lower than in 1994. In the present day work environment, psychical stress, and health problems associated with "white collar" workplaces, which are not included in the current Polish list of occupational diseases, represent a significant health hazard.

Conclusions: To ensure that occupational diseases statistics is a dependable source of information on health status of worker population and workplace conditions, it is necessary to assure not only that the disease certifying and data collecting systems are reliable, but also that the list of occupational diseases is as compatible with the nation's actual social and economic situation and health problems as possible.

P1.27 DEVELOPMENT OF A QUESTIONNAIRE TO MEASURE WORK EXPOSURES IN THE NEW ZEALAND CONTEXT

R. Lilley, H. Firth, A-M. Feyer, C. Paul. *Department of Preventive and Social Medicine, University of Otago, Dunedin, New Zealand*

Introduction: A recent national review of occupational exposure and outcome surveillance found monitoring of exposures to be lacking in New Zealand (NZ). A comprehensive tool to measure the full range of potential occupational exposures was not available internationally. The aim of this study was to develop a questionnaire to measure working conditions, occupational exposures, and health outcomes for use in NZ.

Methods: International questionnaire based surveys on working conditions were reviewed to identify key dimensions for inclusion. Questions were selected if they fulfilled the following criteria: were of known reliability and validity, offered a standardised response format, and provided the potential for comparison with international/national data. Some new dimensions were added to complete the questionnaire and pretesting was undertaken. The questionnaire was used in a study of 300 workers to assess the method of data collection and suitability of questions. Participants were randomly allocated into telephone or face to face interview groups. An additional method of collecting occupational histories via an occupational history calendar, which uses both personal and historical events to aid the recall of work histories and previous exposures, was tested in those interviewed face to face. Focus groups were held to assess acceptability and understanding of questionnaire items in the NZ context.

Results: Dimensions covering work organisational characteristics, work hours, physical and ergonomic hazards, psychosocial environment, occupational history, health related lifestyle factors, health and safety climate, and work-life balance were included in the final questionnaire. Outcome dimensions of injury, sickness absence, musculoskeletal pain, and physical and mental health status were also included. Results will be presented on comparisons of methods of data collection, occupational

history collection, and acceptability of individual questions in the NZ context.

Conclusions: This data set, if collected on a national basis, would substantially increase the data available on occupational hazard exposure in NZ and allow trends in exposures and health outcomes to be monitored. This questionnaire is currently being used in a cross sectional study of cleaners and clerical workers in NZ.

P1.28 EVALUATION OF TWO SELF-ADMINISTERED QUESTIONNAIRES TO ASCERTAIN DERMATITIS AMONG METAL WORKERS AND ITS RELATION WITH EXPOSURE TO METAL WORKING FLUIDS

B. van Wendel de Joode^{1,2,3}, R. Vermeulen⁴, D. Heederik¹, C. J. van Ginkel⁵, H. Kromhout¹. ¹Institute for Risk Assessment Sciences (IRAS), Utrecht University, Utrecht, the Netherlands; ²Food and Chemical Risk Analysis, TNO Chemistry, Zeist, the Netherlands; ³Currently at: Instituto Regional de Estudios en Sustancias Tóxicas (IRET), Universidad Nacional, Heredia, Costa Rica; ⁴Occupational and Environmental Epidemiology Branch, National Cancer Institute, Rockville, USA; ⁵Department of Dermatology, University Medical Centre, Utrecht, the Netherlands

Introduction: Studies investigating the relation between occupational exposure to metal working fluids and contact dermatitis seldom assessed dermal exposure quantitatively. We performed an exploratory study in order to: (1) evaluate two self-administered questionnaires assessing dermatitis (2) investigate a possible exposure-response relation between dermal exposure to semi-synthetic metal working fluids (SMWF) and dermatitis.

Methods: A cross sectional survey on dermatitis was conducted in 80 metal workers exposed to SMWF and 67 referents. We applied two self-administered questionnaires to assess dermatitis: a traditional symptom based questionnaire and a skin screening list with pictures. To determine the accuracy of the questionnaires, two dermatologists examined workers' hands in a subset of the studied subjects. Dermal exposure levels to synthetic metal working fluids (SMWF) were assessed on hands, forearms, and face by applying an observational method called DREAM. DREAM estimates were validated with the fluorescent tracer method VITAE.

Results: The questionnaires showed distinct results for the assessment of hand dermatitis as compared with the clinical evaluation. The traditional questionnaire had a relatively high sensitivity (0.86) but moderate specificity (0.64), the skin screening list had a low sensitivity (0.36) and a relatively high specificity (0.84). The skin screening list seemed to represent the more severe cases of dermatitis as compared with the traditional questionnaire, and showed an exposure-effect relation between dermal exposure level to SMWF and the occurrence of dermatitis on hands, forearms, and face.

Conclusions: The skin screening list seems to be more appropriate for studying the relation between exposure to SMWF and dermatitis in epidemiological surveys, because of its higher specificity, resulting in fewer false positives. We recommend repeating this study in a larger study population.

P1.29 IMPROVEMENT OF HEALTH GRADIENT IN WORKERS WHO PARTICIPATED IN A PHYSICAL TRAINING PROGRAMME

I. J. Garcia-Rojas, M. C. Ortega, E. Robles-Perez, J. Sandoval. *Occupational Health Research Department, Mexican Institute of Social Security, Mexico City, Mexico*

Introduction: The health of workers is the most valuable heritage a country can possess. Traditionally, to measure health, indirect or negative indexes have been used, which measure deviations of health and not health itself. In this work, in order to measure health gradient, we introduced a model that uses four positive indicators of health which are: muscular strength, corporal flexibility, maximum oxygen intake, and body composition. These indicators have been evaluated by means of a physical training programme. The purpose of this study is to establish and validate an easy and inexpensive methodology to increase the health gradient in Mexican workers, which is assessed by the improvement of the health indicators mentioned previously.

Methods: This was a quasiexperimental study. Eleven workers from a self-service store, aged 18–55 years, both sexes, with different occupations in the store, and healthy, were included in this study. Anthropometric and physiological measures were obtained to determine the four positive health indicators mentioned above. In the next 10 weeks the workers participated in a physical conditioning programme that lasted an average of 20 minutes per day, beginning with flexibility and

strength exercises, followed by aerobic exercise, and increasing gradually the time and intensity. At the end of this period, all measures were taken again. These measures were analysed with the Wilcoxon signed rank test, using the statistical package STATA.

Results: Muscular strength, corporal flexibility, maximum oxygen intake, muscular mass, and overall health gradient showed an increase of 44.67%, 14.68%, 11.11%, 4.15%, and 16.36% respectively. Body fat decreased in 6.23%. All these results were statistically significant ($p < 0.05$).

Conclusion: The physical training programme was applied successfully to these workers and was well tolerated, thus allowing an improvement in their physical condition. The simplicity and low cost of this programme is an obvious advantage, and can be applied during the working day or in the worker's house. The usefulness of this programme to increase the health gradient is thus confirmed and provides a useful tool to implement measures for the worker's health promotion and surveillance.

P1.30 IMPACT OF A PREVENTION PROGRAMME ON THE PREVALENCE OF LOW BACK PAIN IN NURSING PERSONNEL

F. Gobba¹⁻⁴, S. Martinelli³, G. Artioli², M. Vinceti², M. Bergomi², L. Roccatto⁴. ¹Cattedra di Medicina del Lavoro; ²Corso di Laurea in Infermieristica, sede di Reggio Emilia; ³Scuola di Specializzazione in Medicina del Lavoro; ⁴Dottorato di Ricerca in Sanità Pubblica, Università di Modena e Reggio Emilia, Facoltà di Medicina e Chirurgia, Modena, Italy

Introduction: Low back pain (LBP) represents an important occupational risk in nursing personnel. Intervention programmes for the prevention of LBP in this occupational group has been developed, but the effectiveness has been seldom evaluated. We studied the prevalence of self-reported LBP in a group of nursing personnel, its relation with various occupational and non-occupational factors, and the impact of a prevention programme.

Methods: One hundred and eighty hospital nursing professionals (89% women), mean age 39.5 years (SD 7.3), working in different units (medicine, surgery, emergency) were studied. The prevalence of self-reported LBP episodes during the last 12 months, various occupational and non occupational risk factors, the participation to a prevention programme, and the actual application of provided preventive measures, were studied by questionnaire.

Results: The prevalence of LBP in the whole group was 64%, without any difference among working units (medicine, surgery, emergency). The number of LBP episodes during the last 12 months was one in 26% of the workers, 2–4 in 31%, more than four in 7%. About half of subjects referred LBP is related to work activity, and mainly with patient handling. This belief is somewhat supported by the observation of a tendency toward an increase of LBP prevalence related to the number of years of work in hospitals, but not with age, at multivariate analysis. The prevalence of LBP revealed lower among subjects that received adequate training for LBP prevention and refer a constant application of correct work techniques learned: 27% versus 67% in subjects not applying any prevention technique. Another result is that regular physical activity seem to reduce LBP prevalence.

Conclusions: The results of this study confirm a high prevalence of LBP in nursing personnel, and support the hypothesis that the constant application of preventive techniques learned during prevention programmes can significantly reduce the risk.

P1.31 A COMPARISON OF THE EFFECT OF TWO METHODS OF HIV/AIDS HEALTH EDUCATION ON KNOWLEDGE AND ATTITUDES OF WORKERS IN A CHEMICAL INDUSTRY IN TEHRAN

D. Shojaezadeh, N. Ghrbanzadeh, E. Shojaezadeh. *Health Services Department, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran*

Introduction: History is full of examples in which breakthroughs for public good are borne out of tragedy; behind a cloud there is sometimes a silver lining. The tragic circumstances that define the global problem of AIDS have given rise to opportunities never before afforded to workplaces. The severity of the epidemic, the essential role of education in world prevention strategy, together with the public demand for action, offered the perfect opportunity for a proactive approach in the global fight against AIDS and for strengthening comprehensive workplace health education.

Methods: This is a quasi-experimental study comparing the effect of two methods of health education on workers' knowledge and attitudes about HIV/AIDS. The target population consisted of 218 workers who work in

a chemical industry in a Tehran suburb. Random samples of 106 workers were selected by using simple random sampling method. The workers were randomly divided into two experimental groups. One group was educated about HIV/AIDS using a direct method of health education such as lectures and an indirect method such as self education was used for the other group. A questionnaire was developed to collect the data and it consisted of four sections: demographic factors, source of gathering information, knowledge, and attitudes.

Results: The finding of the study indicated that there is a significant difference between each group in knowledge and attitudes about HIV/AIDS, before and after the educational programmes. Comparison of two educational methods showed that there was no significant difference in workers' knowledge about HIV/AIDS. However, results of the study showed that there was significant difference between two methods of health education in changing workers' attitudes towards HIV/AIDS.

Conclusion: Direct methods of health education (lectures) were more significantly effective in changing workers' attitudes toward HIV/AIDS than indirect methods (self education).

P1.32 THE AWAKENING CORTISOL RESPONSE AND PSYCHOSOCIAL FACTORS

N. H. Eller¹, B. Netterstrøm¹, Å. M. Hansen². ¹Clinic of Occupational Medicine, Hilleroed Hospital, Hilleroed, Denmark; ²Institute of Occupational Health, Copenhagen, Denmark

Introduction: The acute stress response involves activation of the hypothalamic-pituitary-adrenocortical axis with increased excretion of cortisol. Cortisol can easily be measured in saliva, but many different methods have been used. The last few years interest has focused on "the awakening cortisol response" (ACR), which is defined as the increase in salivary cortisol the first 30 minutes after awakening. Though used as a measure of chronic stress the associations between ACR and psychosocial factors are only sparsely examined.

Methods: In 1998 and 2002, 95 people participated in a study on psychosocial factors, biomarkers of stress, and early atherosclerosis. In both years psychosocial factors at home and at work was evaluated. In 2002 ACR was measured both on a working day, ACRw and a non-working day, ACRn. Participants with ACRw <2.49 nmol/l were excluded leaving (n=59). Psychosocial factors at home were social status, cohabitation, children at home, family obligations, and time pressure in daily life. Psychosocial factors at work were objective work load, weekly work hours, the demand control model, and the effort reward model. Paired *t* test was used to evaluate differences between ACRw and ACRn. Simple regression analyses were used to evaluate associations between psychosocial factors and ACRw.

Results: Among the women ACRw was significantly associated with family obligations, weekly work hours, and time pressure in daily life,

while ACRw among the men were associated with not being cohabiting, effort, and effort reward imbalance. ACRw was significant larger than ACRn among participants with children at home and participants experiencing high effort, low reward, and high effort reward imbalance. **Conclusions:** The study demonstrates the need for use of objective measures of stress in epidemiological studies. Use of ACR presumable will add to the understanding of relations between psychosocial factors and health. The two sexes perceive load at home and at work differently.

P1.33 ALLERGENICITY OF MACROORGANISMS USED FOR BIOLOGICAL CONTROL

J. Baelum¹, P. Larsen¹, G. Doekes², P. S. S. Skov³, T. Sigsgaard⁴. ¹Department of Occupational and Environmental Medicine, Odense University Hospital, Denmark; ²Institute of Risk Assessment Sciences, University of Utrecht, the Netherlands; ³Reflab ApS Copenhagen, Denmark; ⁴Institute of Environmental and Occupational Medicine, University of Aarhus

Introduction: Predatory animals have been used for several years in greenhouses to minimise attacks of a number of insects and mites. Most often used in Danish greenhouses are the mites *Amblyseius cucumeris*, *Amblyseius californicus*, *Phytoseiulus persimilis*, *Hypoaspis miles*, and the predatory wasps *Aphidius colemani* and *Encarsia Formosa*. As sources of complex proteins they are likely candidates as allergens. The animals can survive and reproduce in the greenhouse environment and therefore are a continuous source in the environment and possibly in the end products—primary ornamental plants.

Methods: The present study included a cross sectional material of 579 people (32% males and 68% females) in 31 greenhouse companies. The people were followed for 2–3 years with annual examinations in the period 1997–2001. Symptoms and work conditions were obtained by interview. Besides spirometry and bronchial challenge, skin prick test with standard inhalatory allergens were measured. The cohort has been followed for three years. In the present analyses specific IgE against six beneficial species *Amblyseius cucumeris*, *Amblyseius californicus*, *Phytoseiulus persimilis*, *Hypoaspis miles*, *Aphidius colemani*, and *Encarsia formosa*, as well as of the two pest species, the two-spotted spider mite *Tetranychus urticae* and the mould mite *Tyrophagus putrescentiae* are measured.

Results: Preliminary; a screening of samples for each person in the two last runs is being carried out. In the next step a more extensive analysis of all samples of the persons reacting to selected animals will be analysed to estimate the incidence of sensibilisation and the relation to clinical symptoms. A person in the material, a 35 year old woman, developed rhinitis in relation to handling *Amblyseius cucumeris* during the period of investigation. Symptoms in relation to this mite have not been reported previously.