

425.

PALM OS-BASED TOOLS FOR ASSESSING ERGONOMIC HAZARDS IN THE U.S. AIR FORCE. K. Giese, R. Walton, Air Force Institute for ESOH Risk Analysis, Brooks AFB, TX; K. Grant, Environmental Quality Management, Brooks AFB, TX; D. Carpenter, Karta Technologies, Brooks AFB, TX

Workrelated musculoskeletal disorders (WMSDs) are second only to hearing loss as the most commonly reported occupational illness in the United States Air Force (USAF). Increasing the efficiency and efficacy of USAF safety and occupational health (SOH) professionals in addressing ergonomic hazards is key to reducing losses associated with these disorders. One avenue for enhancing productivity is to exploit the capabilities of small, hand-held computers for acquiring, analyzing, and storing data in the field. Recently, a Palm OS-based software tool was developed to assist USAF personnel in conducting shop-level ergonomic hazard assessments. The software is based on the Level I Ergonomics Methodology Guides, which enable USAF technicians with limited training and experience in ergonomics to rapidly identify WMSD risk factors, prioritize problem shops, and select cost-effective controls. The program was constructed using C++, and can be loaded on any Palm OS 3.0 and above compatible personal digital assistant. Separate modules are available for administrative and industrial work areas. Once inside the program, successive screens allow the user to electronically record information about the workplace, associated activities and tasks, and the ergonomic risk factors linked with each. Example text and pictures assist the user in completing the assessment. When data entry is finished, the program summarizes the information and prioritizes tasks for follow-up, based on the number of hazards observed and the duration of the workers' exposures to each. The program not only eliminates most analysis time, but it also allows the user to give immediate feedback to the shop supervisor. The data is stored for direct download into AF occupational health information systems where it can be further manipulated. It is hoped that dissemination of this program will allow SOH personnel to address ergonomic hazards more aggressively, while increasing the quality and efficiency of their assessments.

426.

DATA MINING: A TECHNIQUE FOR DISCOVERING NOVEL EXPOSURE AND HEALTH OUTCOME RELATIONSHIPS.

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Data mining, or knowledge discovery, are techniques that are being applied to business data to increase competitiveness and profitability of companies. The data mining process involves large databases which have been developed, sometimes through combining several smaller databases, refining the data so that

it uses the same variables, and then sifting through it to identify previously unsuspected patterns using statistical software models. Data mining techniques are likely applicable to databases beyond business databases, such as exposure and health outcome databases. The techniques of data mining may be useful in better defining relationships or elucidating new relationships between working conditions, exposure, and health outcomes. Two candidate databases for data mining are the U.S. DOL MSHA Coal's Management Information System (CMIS), and the The NIOSH Coal Workers Chest X-Ray Surveillance Program (CWXSP). CMIS is a national database of information on mine status, personnel, time and activity, respirable dust sampling entities and respirable dust and respirable quartz sample results measured by MSHA inspectors at surface and underground coal mines since 1970. The Coal Workers' X-ray Surveillance Program (CWXSP) is a NIOSH-administered occupational health program mandated by the Coal Mine Health and Safety Act of 1969. The primary objective of the CWXSP is to screen miners for coal workers' pneumoconiosis (CWP). Since 1970, all active underground coal miners have been required to have a chest radiograph at the time of hire and again three years later. Subsequently, they can volunteer for radiographs at approximately five-year intervals. In addition to the posterior-anterior chest x-ray, other information is collected, including miner identification, age, tenure, and specific job in the mine. The methods used to combine the databases into a single database useful for data mining, the techniques applied to the database to explore relationships, and the results of the exploration will be presented and discussed.

427.

SELF-INSPECTIONS IN THE PALM OF YOUR HAND. M. Hart, K. Grant-Young, Y. Fitzgerald, C. Noonan, Bristol-Myers Squibb Company, Wallingford, CT

The Environmental Health and Safety Self-Inspection program is conducted in all laboratories on a monthly basis. The purpose of this important program is to identify health and safety issues, incorporate laboratory employees in the inspection process, ensure compliance with all applicable regulations, as they may apply to each department and adherence to site policies and procedures with regards to safety and health.

An application was developed for a palm sized hand-held Personal Digital Assistant, which stores information and then transfers that information to a Personal Computer. This application facilitates in the collection of inspection results, aids in the handling of data and assists in the creation of inspection summary reports. The application has a flexible design and accommodates changes, which may need to be made, such as, addition of questions to the checklist. The checklist addresses the following categories of questions: Biological

Materials, Emergency Equipment, Personal Protective Equipment, Radioactive Materials, Labeling, Hoods, Housekeeping and Storage. There are forty-five questions that need to be answered for each laboratory, before the inspector can proceed to the next laboratory. The inspector can comment on which observations are scheduled for correction or are fixed immediately.

The laboratory self-inspectors can efficiently and easily record the results of the monthly safety self-inspection with prompts from the Personal Digital Assistant, based on the inspection checklist. The data is downloaded into a safety inspection database on a personal computer.

Administrative staff from each department generates the monthly inspection reports by grouping the result summaries by department manager and distributing the reports electronically to all laboratory personnel in each department.

This safety application has increased the awareness of safety issues because the program now receives greater visibility and has standardized and simplified the inspection and reporting process.

428.

A NEW INFORMATION SYSTEM FOR THE EXPOSURE ASSESSMENT OF OCCUPATIONAL CARCINOGENS AT THE REGIONAL LEVEL. T. Kauppinen, P.

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Effective prevention of occupational cancer requires knowledge on the occurrence and amount of exposure to carcinogens. The Finnish Ministry of Social Affairs and Health asked Finnish Institute of Occupational Health (FIOH) to develop an information system to support activities of the labor safety office in Kymi region in Eastern Finland in controlling occupational exposure to carcinogens. An information system called KymCAREX was developed on the basis of data available from the carcinogen exposure database of the European Union (EU)(CAREX), Finnish Register of Exposure to Carcinogens (ASA), Finnish job-exposure matrix (FINJEM), Exposure Measurement database of FIOH and labor force statistics. KymCAREX provides estimates of numbers of workers exposed at each level of exposure (classes: <10%, 10-50%, >50% of the exposure limit) for 151 physical or chemical carcinogens, and for 95 industrial classes (NACE revision 1 classification of EU) in 2000. The estimates from national data on numbers of exposed and levels of exposure were checked and modified to correspond the exposure situation in the municipalities of the Kymi region in collaboration with labor safety inspectors familiar with the working conditions at work places. According to preliminary results, the most

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ABSTRACTS



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1. RELATIONSHIPS BETWEEN WORK EXPOSURE AND RESPIRATORY OUTCOMES IN POULTRY WORKERS.

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A pilot study was conducted on 74 poultry barn workers in Western Canada during the winters of 1998-2000. General respiratory health, current, chronic and work related respiratory symptoms; general work duties, and work-site factors were ascertained, pre-exposure, by questionnaire. Personal airborne exposure levels and changes in symptoms and lung function were measured across the work-shift for all workers. Workers were classified according to the type of poultry operation (floor based, n=53; cage based, n=13) in which they worked. There was no significant difference in daily hours spent in the barn between those who worked with caged poultry (5.41±2.35 hours) and those who worked with floor-based poultry (4.42±2.48 hours). Age of birds was 47.10±58.36 days for floor based versus 155.91±63.01 days for cage based facilities.

There were no significant differences in personal environmental measurements between cage-based and floor-based facilities (ammonia 13.22±13.70 ppm, 17.34±16.35 ppm; total dust 5.74±4.85mg/m³, 10.01 ±8.84 mg/m³; endotoxin 6046±6089 EU/m³, 5457±5934 EU/m³ respectively). There were no significant differences in across work-shift change in pulmonary function indices between workers from cage and floor-based operations. For the entire sample total dust dose (work hours/day x total dust) significantly correlated with across-shift change in FEV₁, whereas endotoxin dose and ammonia dose did not. Stocking density was significantly correlated with average ammonia (ppm, p=0.002) and ammonia dose (ppm x work hours/day; p=0.004) in floor based operations and with total dust (particles/ml, p=0.002) in cage based populations. Stocking density was also significantly correlated with chronic cough (p=0.003) and across work-shift cough (p=0.05) and chest tightness (p=0.06) for workers from floor based operations; and with phlegm when working (p=0.018) and chest tightness across the work-shift (p=0.004) for workers from cage based operations. Type of poultry production operation and therefore type of work exposures appear to significantly impact symptoms experienced by workers exposed to these atmospheres.

2. DUST GENERATION SYSTEM FOR AGRICULTURAL SOIL DUST. K. Lee, R. Domingo-Neumann, R. Southard, UC Davis, Davis, CA

Agricultural workers are prone to exposure to mixed dust of inorganic and organic compounds. Diverse working conditions and operations in agriculture make direct measurements of the mixed dust exposure difficult. This study was conducted to develop a new dust generation system to determine possible exposure potency indicators of soil samples. The dust generator consists of a blower, a rotating chamber and a settling chamber. The rotating chamber has inner baffles to provide sufficient agitation of the samples while the chamber is rotating. A blower provides air into the rotating chamber, and the suspended dust is moved to the settling chamber through a perforated pipe. A small fan inside the settling chamber helps maintain suspension of the dust. Various size fractions of dust are sampled on filters suspended in the chamber via outlet ports and attached pumps. Air pressure is released through a filter plate mounted on the wall of the settling chamber. Various operating conditions were evaluated: air intake from blower, speed of rotation, soil mass and sampling time. To evaluate the characteristics of dust from the system, we collected dust samples from agricultural fields while the soil was prepared for