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CHANGING HEALTH PARADIGM @ WORK

Dr. Lokman Hakim

Deputy Director General of Health (Public Health), Ministry of Health, Malaysia

They have been rapid changes in the world of work due to responses to new technology and thus new business demands. This is more so with the advent of globalization and the many economic pressures affecting business and social needs. The change from a predominantly agricultural based economy to an industrial economy over a short period of time has caused a severe paradigm shift in the health needs of the working population. The Ministry of Health, Malaysia plays a major role in providing healthcare to employees from all walks of life and faces the task of managing the various injuries and diseases that are associated with the workplace. New industries such those involving nuclear technology also place additional demands on the preparedness of the health care system to manage such cases. Thus the health needs of workers require a collaborative effort between the employer, employee and the health care provider in maintaining their health.

The current way forward is in effecting a change in the lifestyle of the worker in addition to preventive and promotive measures instituted at the workplace. This is also in line with the concept of self care and responsibility of the worker towards maintaining health. A strong commitment is required from the various stakeholders in occupational health to move together to achieve the highest level of health amongst all workers by striving together in accordance to the law.
NANOPARTICLES: A MEDIA HYPE OR AN OCCUPATIONAL HEALTH CONCERN?

Michael Nasterlack

Department of Occupational Medicine & Health Protection, BASF AG, Germany

Human exposure to particulate matter with a diameter of less than 100 nanometers (nm) has occurred during the existence of mankind: the main sources being natural or artificial combustion processes. Such particles are usually referred to as ultrafine materials (ultrafine particulate matter), and they should be distinguished from purposefully produced engineered nanomaterials. The latter have been defined by the International Council of Chemical Associations (ICCA) as solid, particulate substances which are intentionally manufactured at the nano-scale and consist of nano objects with at least one dimension between 1 and 100nm. Nanomaterials often possess different chemical or physical properties compared to those found in the respective bulk materials. This is actually the reason why they are produced and used in nanotechnology. Scientists and producers expect an ever wider array of applications, ranging from everyday products such as UV-blockers in sunscreen lotions; tennis rackets; automotive or airplane hull components; to highly sophisticated applications in medicine, electronics, energy storage, etc. Nanomaterials - brave new world?

However, apart from these intended new properties nanomaterials may also exert toxic effects that might not be simply derived from existing knowledge of the effects of the bulk material. In vivo and animal studies suggest that nanomaterials may cause unspecific inflammatory and fibrogenic reactions, similar to those known from exposures to some coarse particles. However, nanoparticles might elicit stronger effects than these, and affect different target organs in the body. Some researchers have therefore long issued warnings against careless or even reckless use of nanomaterials especially in consumer products, and some environmental NGOs have called for a moratorium on the release of nanomaterials and the use of nanotech applications. Nanomaterials - the new asbestos?

Up to now, human data on specific health effects of engineered nanomaterials do not exist. Some analogy may be assumed to the effects of nanoparticle exposures resulting from long-existing technologies such as welding and flame cutting. Although welding fumes - consisting of highly reactive, partly ionized, sometimes toxic or even carcinogenic metals in conjunction with irritants like ozone, nitric oxides, etc. - may even represent a worst-case model for nanotoxicology, there is a striking paucity of medical findings associated with such exposures, except for the highest exposure categories. Irrespective of these seemingly reassuring “non-findings”, complacency or carelessness in handling nanomaterials is not an acceptable option. This is especially true for the occupational setting, where the highest exposures may be expected in the production and use of primary nanoparticles.

Exposure assessment of nanomaterials is currently not sufficiently developed and harmonized. Exposure measurement techniques for nanomaterials by mass, surface, chemical species or number of particles still need to be standardized. In this situation, the main focus of occupational safety is on technical measures for exposure reduction. This can be achieved through appropriate organizational and engineering controls, which are available even for this new technology.

Given the current lack of knowledge regarding specific health effects of engineered nanoparticles, targeted occupational medical surveillance is currently not feasible. However, general medical surveillance may be performed in exposed employees. The results can provide a basis for future epidemiologic studies. Gathering of health information in such cohorts might lead to the detection of rare but specific health outcomes, if ever they exist. Therefore, the establishment of exposure registries to enable the conduct of large-scale multi-centric prospective epidemiologic studies is recommended.
Rubber wood is the standard common name for the timber of *Hevea Brasiliensis*. World rubber tree plantations are estimated at 9 million hectares, of which more than 90% is in Southeast Asia. The development of a rubber wood processing industry proceeded rapidly; initially, the industry focused on the manufacture of rubber sawn timber, however, more recently, the industry has actively engaged in the manufacture of value-added products, such as furniture and joinery products as well as in the manufacture of rubber wood particleboards and medium density fibreboard. Persistent exposure to airborne rubber wood dust could be associated with acute and chronic health effects, in particular asthma, chronic bronchitis, impairment of lung function and nasal cancer. A cross-sectional study on wood dust exposure and respiratory health effects was conducted at one of the largest rubber wood sawmills in Thailand. All workers (N = 340) from all jobs on a day shift were recruited for individual sampling. Overall, the individual inhalable dust (n = 742) and respirable dust (n = 241) for full-shift samples were collected from persons representing 27 job titles. These data were used to classify workers into high, moderate and low exposure groups, based on the concentrations found in each job. Static samples were also collected, to determine the particle size distribution. Geometric means (GM) were used to present the concentrations of rubber wood dust. Inhalable dust concentrations were high, ranging between 0.2 to 59.4 mg/m$^3$ and with a GM of 4.7 mg/m$^3$. The GM of inhalable dust for each job title enabled classification of the workers into three exposure groups: (1) high >5 mg/m$^3$; (2) moderate 2.0–5.0 mg/m$^3$; and, (3) low 0.18–1.9 mg/m$^3$. Among those in the high exposure group, the highest GM for inhalable dust concentrations were found among those sawing green lumber (12.8 mg/m$^3$) and cutting dry lumber (7.3 mg/m$^3$). Overall, the respirable dust concentrations were low; that is, in the range of 0.1 to 6.0 mg/m$^3$ with a GM of 0.5 mg/m$^3$. The largest percentage of dust in a major operation was in the thoracic fraction; the 50% cutoff diameter was smaller than 9 μm. The size distribution of wood dust indicated a high proportion in the large particle fraction. Following this study, 82.1% (279/340) of the workers participated in the questionnaire interviews and pulmonary function tests. There were more female (78%) than male workers. The mean duration of employment in this factory was 6.2 years. The most common work-related respiratory symptoms were eye irritation (56.6%, 95% CI: 50.8% to 62.5%) followed by dyspnea (37.6%, 95% CI: 31.9% to 43.2%). Work-related upper respiratory symptoms (eye irritation) were higher in the high exposure group, but no such difference was found between the medium and low exposure groups. The result of PFT showed no significant relationship between the exposure intensities and the PFT declined; however, some evidence suggested asthma amongst workers employed in the rubber wood sawmill. In conclusion, the workers exposed to rubber wood dust presented with work-related upper respiratory symptoms more than with lower respiratory symptoms. Exposure intensities may not influence work-related symptoms but rather the particle size appears to play a determining role in work-related respiratory symptoms.
SYMPOSIA
APPORPTIONMENT OF CAUSATION OF OCCUPATIONAL ASTHMA

Sylvia Teo

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Medical apportionment may be defined as the distribution or allocation of causation among multiple factors that caused or significantly contributed to the disease or injury.

A workers’ asthma can be a general medical condition, work-aggravated or caused by a specific agent in the workplace. For proper management of the asthma (which includes prevention and job placement) and for medico-legal reasons, it is important to establish the cause and contributory factors of the asthma. This can be done by taking a detailed exposure history and conducting thorough investigations using well-validated tools e.g. monitoring of peak flow readings both at work and away from work and the specific bronchoprovocation test.

The accurate apportionment of cause is important to various stakeholders: the patient, the treating physician, the employer, the authorities overseeing safety and health and compensation and the courts. There are challenges and limitations as to the extent and accuracy with which such apportionment can be done using current tools and methods.

ISOCYANATES AND BURDEN OF WORK RELATED DISEASE

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Polyurethanes are plastics made by an addition of polyols and different isocyanates. Industries are using aliphatic isocyanates like HDI and IPDI or aromatic isocyanates like TDI and MDI. There is an increasing use of isocyanates in all kinds of industries. The world production of TDI/MDI is more than four million tons per year. Isocyanates can cause sensitization in workers. The target organs are lungs and the skin.

The health protection at larger sites in the producing industries is mostly good, but it may become weak in small companies of the downstream users. There are special problems in some workplaces, e.g. spray painting in car repair shops and it is expected that we will find in the future as yet unknown exposure sources at „new“ workplaces. It is necessary to follow a strategy for health prevention in workers exposed to Iso-cyanates. Isocyanates are claimed as the most common sensitizers at workplaces. In many studies the percentage of workers who developed new allergies caused by isocyanates ranges from 10 to more than 20%. The statistics of occupational diseases make no difference between the types of isocyanates which caused health effects. The cases of painters, workers in car repair shops and workers in chemical industry are put all together in one database. Unfortunately the numbers of occupational diseases in different countries are not comparable because the process of notifying and confirming is varying. In Germany the number of confirmed occupational diseases caused by all types of isocyanates is approximately 50 cases per year since more than ten years. The immunologic process of sensitizing is not clear at all. The risk seems to be higher when there are other allergies and/or allergic asthma documented in the medical history and when the exposure at workplaces varies strongly depending on the kind of work performed (peak exposures).

BASF’s department for Occupational Medicine and Health Protection (OM&HP) started few years ago a worldwide medical surveillance program for isocyanate workers. We perform pre-placement examinations before start of work as a baseline. The first periodic examination follows three months later, thereafter annually. The examination program comprises the medical history focussing on allergies, pneumological diseases, a physical
examination and a lung function test. The evaluation of the year 2009 showed that 75% of the answering sites were using the program and all together performed 3959 examinations during that year.

There were only three cases with health problems (1x lung, 1x skin, 1 x rhinitis). There was one case of occupational asthma which was confirmed at a German site. The surveillance program contains recommendations what to do if workers develop allergic symptoms. For every workplace a risk assessment has to be done. The technical equipment must be up to date, the workflow must be checked annually and PPE is only for limited use. An additional measure to check the hygiene at the workplace is ambient monitoring for di-isocyanates and, in selected situations; this is performed in conjunction with biomonitoring examinations in blood or urine. *Toluene diisocyanate (TDI), Methylene diphenyl diisocyanate (MDI), Hexamethylene diisocyanate (HDI), Naphthalene diisocyanate (NDI), Isophorone diisocyanate (IPDI)

RUBBER LATEX ALLERGY AMONG HEALTH CARE WORKERS IN THE ASIA PACIFIC

Naesinee Chaiear

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Exposure to natural rubber latex (NRL) commonly occurs in everyday life. Allergy to NRL is likely attributable to skin contact or inhalation of latex particles. NRL allergy is an IgE-mediated hypersensitivity to NRL, presenting through a wide range of clinical symptoms (i.e., runny nose, conjunctivitis, angioedema, swelling, cough, asthma and anaphylactic reactions). NRL consists of cis 1-4 polyisoprene which is an extract of natural latex, taken from Hevea brasiliensis. NRL allergy is more prevalent amongst those heavily exposed to NRL products such as healthcare workers (HCW), rubber industry workers, janitorial staff and hairdressers. Cornstrach powder—commonly used as a dry lubricant on disposable latex gloves—is an excellent carrier of allergenic latex proteins. Allergy to NRL involves sensitization to multiple constituent proteins. Fresh fruits that are associated with NRL proteins also commonly cause hypersensitivity and include avocado, banana, celery, chestnut and pear. Less common are cherry, kiwi, mango, melon, orange, papaya, passion fruit and pineapple. In recent years, most epidemiological studies show a global sensitisation prevalence of around 2.0-17 vs.1.3-11.0% among healthcare and rubber industry workers, respectively. The sensitization prevalence is 12.5, 18-37 and 34-67% among anesthesiologists, individuals who have undergone surgical procedures and children with neural defects, respectively. There is evidence that the amount of specific allergens found in NRL gloves can cause NRL allergy. Of concern, the majority of the evaluated gloves used by HCW, the concentration are high; therefore, HCWs have a greater risk than workers in other industries. Considering NRL allergy amongst healthcare workers in ASEAN countries, the reported prevalence ranges between 2.0 and 3.1. In other Asian countries, the prevalence of NRL allergy was 6.1% in Indonesia, 6.8% in Hong Kong, 9.6% in Singapore and 12.0% in Taiwan. Interestingly, the prevalence of NRL allergy among Japanese dental professionals was 5%. Indeed, the prevalence of NRL allergy appears to be lower among health professionals than in Western countries, perhaps because of the use of re-sterilised NRL gloves which result in less exposure to NRL proteins. Diagnosis of NRL allergy depends on a high level of awareness in the correct clinical setting. Confirmation is performed by a skin prick test (SPT) and/or in vitro assays for specific IgE. Many studies have shown SPT is more specific than in vitro assays. To help reduce the occurrence of NRL allergy amongst HCW, avoidance of the provoking NRL allergen is the most effective strategy. NRL-free synthetic rubber (i.e., neoprene, nitril, styrene butadiene rubber (SBR), butyl and vitron) are viable alternative polymers. A reduction in NRL allergy has been reported in Japan after a training and education campaign: the result has been an overall decrease in workplace NRL exposure and a decrease in allergic symptoms and positive SPT test results among patients. In conclusion, NRL allergy amongst HCW in Asia-Pacific remains prevalent because of a limited and lackadaisical program to reduce NRL exposure. In ASEAN countries, which are the world’s primary NRL exporters, technologies which can reduce the allergens in/from NRL are doubly important because of the economic impact of a potential replacement.
Almost all countries worldwide have reported the transmission of tuberculosis (TB) in health care settings to both patients and health care professionals (HCPs). Tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*, transmitted through droplet nuclei aerosolized by patients with infectious pulmonary tuberculosis.

Health Care Professionals have always been at a greater risk of contacting tuberculosis due to close contact with patients, ineffective control measures, the effects of the HIV epidemic on TB and the emergence of multi drug resistant (MDR) strains. Health care management procedures such as aerosol-generating or aerosol-producing procedures, including bronchoscopy, endotracheal intubation, suctioning, other respiratory procedures, open abscess irrigation, autopsy, sputum induction, and aerosol treatments that induce coughing have all contributed to higher risk of transmission of tuberculosis among HCPs.

Many of these HCPs who are infected do not develop the symptoms of the disease: this is called latent tuberculosis infection (LTBI). It is important to detect these latent TB cases among HCPs and in order to prevent infected people from developing active TB and also prevent spread of the disease within the community.

It has been reported in medical literature that patients with LTBI have a 10% chance of developing tuberculosis infection in their lifetime. The greatest chance of LTBI turning into TB disease is in the 2 years after becoming infected.

Early identification and successful treatment of persons with TB disease remains the most effective means of preventing disease. There are several screening methods available in preventing disease transmission; one of the screening methods is the Tuberculin Skin Test (TST). A TST reaction of \( \geq 10 \) mm induration is considered positive.

A new generation of diagnostic tests for LTBI, the interferon-\( \gamma \) release assays (IGRA) have recently become available. The test is intended for use as a diagnostic tool for *M. tuberculosis* infection, including both TB disease and LTBI. The advantages of IGRA compared with TST are that 1) requires only a single patient visit, 2) the variability associated with skin-test reading can be reduced because “reading” is performed in a qualified laboratory, and 3) IGRA is not affected by previous BCG vaccination. Limitations of the test include the need for phlebotomy, the need to process blood specimens within 12 hours of collection, the limited number of laboratories that process the test, and a lack of clinical experience in interpreting test results. The elimination of the second visit for reading the TST, however, is likely to render the IGRA competitive in cost-benefit considerations. As with a TST, IGRA cannot distinguish between LTBI and TB disease and should be used in conjunction with risk assessment, radiography, and other diagnostic evaluations.

HCW training and education still remains an essential part of administrative controls in a TB infection-control program, besides, environmental controls and personal protective equipment.
HIV AT THE WORKPLACE - SHARING EXPERIENCES

Pg Khalifah Ismail

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Brunei Darussalam has had remarkable success in eliminating infectious diseases. The worldwide explosion of the HIV/AIDS pandemic presents another health challenge. Since the introduction of sero-surveillance in August 1986 till April 2011, a cumulative total of 62 HIV cases have been detected among Bruneians and permanent residents.

Those found to be living with HIV/AIDS were predominantly male and in the working age group. The type of transmission has been observed with heterosexual mode of transmission being the commonest followed by homosexual transmission. In Brunei Darussalam, those living with HIV/AIDS receive equitable care and are given antiretroviral treatment without charge.

The presentation will be discussing the management of HIV positive persons, especially targeting on relevant policies relating to health care workers, issues in the management as well as future directions in managing HIV positive workers. The role of NGOs will also be highlighted.

LEPTOSPIROSIS

Anita Suleiman

Selangor State Health Department

Leptospirosis is endemic in many countries especially in tropical and subtropical areas with incidences range from approximately 0.1-10 per 100 000 per year globally and may reach over 50 per 100,000 during outbreaks and in high-exposure risk groups. Leptospirosis is a serious illness and potentially fatal, it is therefore a significant biological hazard that must be recognized and managed appropriately especially at workplace setting. Understanding the disease clinically and epidemiologically is crucial for both health care providers and workers to ensure effective prevention and control measures. This presentation will cover briefly the clinical manifestations, mode of transmission, groups at risk and principle of prevention and control.

Leptospirosis comes in mild and severe forms with illness onset usually 7 to 10 days after exposure. The diagnosis is based on clinical manifestation and a positive laboratory test. The Microscopic Agglutination Test (MAT) or Polymerase Chain Reaction (PCR) is used to confirm a diagnosis of leptospirosis. Conjunctival suffusion and muscle tenderness, most notable in the calf and lumbar areas, are the most distinguishing physical findings, however many cases present with non-specific symptoms resulting to underdiagnosed. Suspicion is increased if there is a history of occupational or recreational exposure to infected animals or to an environment potentially contaminated with animal urine. The risk of infection depends on exposure either through occupation, the environment or life-style. It is difficult to eliminate and isolate leptospires from the environment, hence control measures usually concentrates on ways to minimize the hazard. Information about the hazard, and training in preventive procedures, is an essential first step, as well as changes to procedures and practices, ensuring that protective clothing and equipment is provided, accessible and used, monitoring employees’ exposure to the hazard, and making available that information to the employees. Early detection of the disease and prompt treatment by health care provider is helpful in preventing complication. Unfortunately, Leptospirosis is often under-diagnosed at least in this country because of its non-specific clinical symptoms.

Both employers and employees are responsible to ensure that their actions do not result in harm to themselves and others, including members of the public. Generally, employers are required to take all practicable steps to reduce risk of infection to employees and managing hazard in a systematic process while the employees are required to follow all instructions and ensure their actions do not put themselves and others at risk.
DESIGNING WORK EQUIPMENT

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Workplace design and work equipment design: the way in which any work space is arranged can impact a worker’s safety, health and performance. An optimal layout ensures a person stays in the best posture and uses the least effort to perform the work. Principles of optimizing workplace layout incorporating ergonomics guidelines include: i) convenience - frequently used equipment is most conveniently located, ii) location - equipment can be easily accessed without postural deviations (bending, leaning, or twisting), and iii) frequency - frequently performed tasks are located together, iv) Physical environment conditions at work: Job design, selection, and training: these are ways of organizing work activities to maximize work output and quality without adversely affecting workers.

Organizational design and management: includes peoples’ motivations and how to best organize them into teams. Ergonomists generally agree that the risks of musculoskeletal injuries, such as sprain and strains, are associated with three interrelated factors: i) Force: movement requires force, but high forces increase injury risks. The amount of force exerted by a muscle group also depends on the body posture, ii) Repetition: high rates of repetitive movements without pauses for recovery can cause cumulative micro trauma, that may result in an injury, iii) Posture: every articulating joint in the body has a neutral zone of movement that does not require high muscular force or cause discomfort. Injury risks are minimized when working with body segments in their neutral range rather than outside this in a deviated posture.

This presentation is aimed at examining the state of work equipment design at workplaces that affected many workers in various industries. The focus of our attention will be on the ergonomics risks and hazards posed by the designs to the workers themselves. In addition, discussion is also presented in the corrective measures needed to be taken to minimize the existence of musculoskeletal disorders including low back pain, shoulder pain and leg pain caused by the designs themselves.

DESIGNING WORKSTATIONS

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This paper defines and examines the objectives of Workstation Design in various industries in response to the problems related to poor design of the workstation. The main safety and health issue is Musculoskeletal Injuries and Disorders (MSDs), besides other problems like accidents, labour turnover and inefficiency along the work processes. The author identifies the principles in the design of workstation and explains how these can be adopted and practiced at the workplace. The 9 principles include a) Maintaining Proper Posture b) Reducing Excessive Force c) Keeping everything within Reach d) Working at Proper Heights e) Reducing Excessive Repetition f) Minimizing Contact Stress g) Providing Clearance and Access h) Maintaining Healthy Lifestyles/Keeping Fit i) Maintaining Comfortable Environments. Practical solutions are given in relation the each of the principles mentioned.
CARPAL TUNNEL SYNDROME

Abed Onn

Society of Occupational & Environmental Medicine (SOEM) - MMA, Malaysia

Carpal tunnel syndrome (CTS) is a well-established condition that can affect the wrists of individuals who perform repetitive activities with their hands in the workplace. This ergonomic health hazard can result in pain and swelling of the affected wrist accompanied by tingling sensation of the thumb, index and lateral half of the middle fingers. The condition at its worst may also present with weakness of the digits concerned. Nerve conduction tests usually exhibit slowing down of neural transmission of the affected median nerve at that point in time. In the early phase of the condition, symptomatic treatment with wrist splints, non-steroidal anti-inflammatory medications usually suffices. If it does not improve, steroid injections may be offered while at its most severe stage; surgical excision of the affected flexor retinaculum is the treatment of choice. There is no doubt that early intervention is key to avoid the symptoms from worsening to manifestation of intractable pain and nerve dysfunction. It is also well-accepted that a worker should not return to repetitive activities in the workplace and be provided alternative work to ensure that the condition does not worsen or recur. There are also preventive measures that could be implemented in workplace to prevent CTS from developing.
SYMPOSIUM 4: OCCUPATIONAL LUNG DISEASES

OCCUPATIONAL EPIDEMIOLOGY BIOMARKERS OF EXPOSURE

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A biomarker is defined as “a characteristic that is objectively measured and evaluated as an indicator of normal biologic processes, pathogenic processes, or pharmacologic responses to a therapeutic intervention”. Biomarkers of exposure are commonly measured in occupational health practice. They can be chemical, physical or biological parameters that measure internal dose of the hazard (acute or cumulative) that the worker is exposed to. Biomarkers of internal dose measure total dose of intake from all routes - both occupational as well as non-occupational. The level of the biomarker would indicate the likelihood of disease occurrence. In addition to measurement of internal dose, health surveillance of exposed workers may include measurement of biomarkers of early effect. These biomarkers measure the presence of subclinical disease (which is potentially reversible) and take into account biological variation in human response. In this presentation, some recently introduced occupational health biomarkers of exposure and early effect will be discussed. These include:

1. measurement of urine trans, trans muconic acid and s-phenyl mercapturic acid among personnel exposed to low levels of benzene,
2. use of blood interferon gamma release assays to detect Mycobacterium tuberculosis infection and nucleic acid amplification tests for sputum TB detection and rifampicin resistance testing for persons occupationally exposed to TB,
3. measurement of oto-acoustic emissions to assess cochlear function among noise exposed workers.

OCCUPATIONAL DISEASES AMONG CASHEW FACTORY WORKERS IN SOUTH INDIA

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Background: The cashew tree (Anacardium occidentale), is native to northeastern Brazil, but was brought to India by the Portuguese in the 1500’s. India is today the largest producer and exporter of cashew kernels in the world. Over 65 per cent of the world export of cashew kernels is accounted for by India. The Indian cashew kernel is well acclaimed for its good quality, taste and appearance.) It is a versatile industrial raw material being used in preparation of resins, varnishes, paints, plastics, insecticides, brake linings, wood preservatives etc. The kernel oil is reported to be superior to olive oil and almond oil. Anacardic acid and cardol the main cashew nut shell liquid (CNSL) components, are responsible for contact dermatitis acting as both irritants and sensitizers and are the main cause of occupational contact dermatitis in cashew nut workers. Cashew processing is a traditional export oriented labour-intensive industry with limited use of technology. Cashew processing involves cutting the outer shell to separate the edible portion. The steps include cleaning, soaking, roasting, cutting the outer shell, drying the kernels, grading and packing. The workers are exposed to awkward positions during processing in the cashew factory. Hence they are prone to develop various health problems because of their occupation. Aim and Objective: The objective of the present study was to assess the prevalence of occupational diseases among workers of a cashew factory in coastal Karnataka, South India.

Methodology: A Cross-sectional study was conducted in a cashew factory at Karkala taluk, in coastal Karnataka. The research team interviewed and examined 247 workers working in various sections of cashew processing using a pre-tested semi-structured questionnaire. The data was analysed using SPSS 16 software.

Results: The common health problems of cashew factory workers were contact dermatitis (41.7%), followed by musculoskeletal discomfort (30.7%) and respiratory diseases (11.3%). Of the 247 workers 106 (42.9%) were working
in the cutting section of the process. Of these 73% had lesions only on the left hand, 23 % only on the right hand and 4.0% on both hands. Musculoskeletal complaints of pain (14%) and joint pain (34.9%) were found to be maximum in the workers of the cutting section.

Conclusion: Among the workers in the cashew nut factory occupational disorders were found to a major concern (contact dermatitis, musculoskeletal and respiratory diseases). These morbidities can be reduced by mechanisation, use of gloves (especially in the cutting section), pre-placement and periodic examinations.

REPORTING SYSTEMS IN OCCUPATIONAL HEALTH

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Reporting systems have been put in place to enable safety and health in the workplace is monitored. Information on occupational injuries and diseases is collected for legal, compensation, administrative and preventive purposes. Stakeholders involved in reporting systems include enforcement agencies, compensation bodies, insurance companies, doctors, employers and employees. Information on occupational injuries and diseases is also obtained from labour surveys, Sentinel Event Notification Systems for Occupational Risks (SENSOR), death certificates and hospital data.

The need for comprehensive statistics on occupational injuries and diseases is essential for policy formulation and programme planning. This is to enable estimating the true extent of the problem. Poor reporting of occupational accidents and diseases results in underestimates of the magnitude of the problem. All facets of reporting including identifying data sources, facilitating data collection and responding to needs of data users need to be enhanced. While there may be no ideal system lessons learnt have shown that in addition to making it mandatory to report to enforcement agencies it is important to use multiple sources and motivate those reporting.

The greatest challenge faced in most reporting systems is underreporting. Causes of this include lack of awareness among employers on the need to report and employees on system of claims and possible exposure, lack of training of doctors to diagnose occupational diseases, employees fear of losing jobs if disease gets reported, doctors reluctance to report to non-doctors and doctors fear of losing their contracts with employers. Reporting can be improved if guides are provided to ensure that employers know their duty to report and whom to report to, employees aware of system of claims, doctors are trained on occupational diseases, reporting systems are simplified and legislative measures in place to allow examination of medical files. The ILO Code of Practice on Recording and Notification of Occupational Accidents and Diseases can be used for guidance on establishing systems for reporting. The minimum information required includes facts on the enterprise, establishment and employer, person affected by the occupational disease and the occupational disease the individual suffers from.

List of occupational diseases vary by country from one extreme of an open system (e.g. Sweden) to a system based on specific symptoms, type of work and time limit (e.g. France) with the rest of the countries between these two extremes. In some countries diseases that need reporting are included in a list of Prescribed Diseases. The ILO List of Occupational Diseases in the Code of Practice could be used by countries establishing or revising their list. Occupational diseases are also classified in accordance to the International Classification of Diseases 10 (ICD-10).

Poor reporting systems make it impossible to convince policy-makers of the hidden burden of occupational injuries and diseases. Hence the urgent need to improve reporting systems.
SYMPOSIUM 5: ETHICS IN OCCUPATIONAL HEALTH

SICKNESS ABSENCE

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Sickness absence is defined as an absence from work due to or related to illness and/or injury and it’s accepted by the employer (Whitaker, 2001). Sickness Absence denotes an imbalance in the dynamics between employee, work, organization and the community (Mets & LaDou, 1994).

Sickness absence is a very complex issue and is affected by factors outside the working environment, organizational culture and practices and by the individual factors. The term “Sickness” is very broad and vague often leading to different interpretations. Although sickness absence is strictly due to an illness, very often it is not. Studies have shown that managing sickness absence more effectively can benefit both the employer and employees, as well as the taxpayers; it could improve productivity, boost growth and that many more people no longer have to rely on handouts.

In the Sickness Absence management process, doctors play a role. In Malaysia, this is a requirement under the Employment Act 1955 in order for the “sick employee” is entitled to sick pay leave.

Because of its complexity, Sickness Absence poses many ethical issues for the examining doctor who is appointed by management to carry out Sickness Absence assessment on their employees. This is a delicate position faced by the doctor; he is placed in between the employer who wants sick leave to be as low as possible and some employees who would like to have unrestricted number of sick leave. Many cases of abuse have been reported. One such abuse was a case highlighted during a random survey covering 321 workers from among those with more than 200 days of medical leave for work-related injuries. It was found that 275 of them were given medical leave of one to two years. In the same survey one worker was found to have been given medical leave for eight years. Cases like these raise many ethical issues.

It is important to remember that doctors and occupational health professional who are involved in the sickness absence process must make rational decision about employee welfare within the context of employer-employee relationship. The traditional doctor-patient relationship is subtly or overtly altered in occupational medicine because interests of employer must also be served.

MEDICO LEGAL CONFIDENTIALITY

N.K.S. Tharmaseelan

Malaysian Medical Association

Doctors treating patients should be aware that they owe both a legal and an ethical duty of confidentiality to their patients. Doctors are mandated not to release or disclose any information gleaned during the course of managing the patient to any third party. These third parties will include employers, who may demand information as of ‘right’ in the belief that they entitled to all information regards their employees by virtue of footing the bill or having some authority over the patient. Patient autonomy and medical confidentiality are paramount and exceptions are only made in certain well defined circumstances.
GENETICS IN PRE-EMPLOYMENT SCREENING. IS IT ETHICAL?

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With the Human Genome Project and its subsequent biomedical advances, genetic testing in the workplace is becoming technologically more promising. Generally, genetic testing in the workplace can be in two forms: genetic monitoring and genetic screening. There is less controversy with genetic monitoring, which is a form of biological monitoring for genotoxic effects due to workplace hazards. Genetic screening on the other hand aims at identifying workers who may be at increased susceptibility to workplace hazards. This has been fraught with ethical peril. There may be some justification to identify the small number of workers who may be at much higher health risk to a particular workplace exposure. However, with the genomic revolution, genetic risk markers for common diseases and traits are becoming commercially available as test kits. The indiscriminate use of these are potentially damaging in the workplace context. Occupational health professionals must take leadership in providing education and guidance in the use of such genetic tests in the workplace.
PULMONARY FUNCTION TEST

Abed Onn

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The spirometry (pulmonary function test) in the workplace is a common medical surveillance tool. However, its conduct according to the American Thoracic Society (ATS) criteria are often not adhered to, particularly when large numbers of workers are involved and the tests are conducted by untrained nurses or technicians. This presentation serves to remind participants of the ATS criteria for a proper spirometry and the accurate interpretation of the results obtained. It will also provide the interpretation of whether the subject has an obstructive or restrictive respiratory pathology. The proper conduct of spirometry is essential for the accurate assessment of lung function of workers who may be exposed to respiratory hazards. Conducting regular spirometry examination at the workplace is required by the Asbestos and Mineral Dust Regulations spelt out in the Factories and Machinery Act.

NEUROBEHAVIOURAL TESTING

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The purpose of conducting the Neurobehavioral Core Test Battery (NCTB), WHO (1986), is to detect early impairment of nervous system due to neurotoxic agents. Specifically, the neurobehavioral functional domain tested includes the attention and response speed, auditory memory, manual dexterity, perceptual motor speed, visual perception and memory as well as the motor steadiness. The use is intended for health hazard assessment when testing time is limited and the use of sophisticated equipment is not possible.

The NCTB consists of 7 core tests namely Simple Reaction Time, Digit Span, Santa Ana Dexterity, Digit Symbol, Benton Visual Retention, Pursuit Aiming and Trail Making. These tests are to assess the functional domain including attention or response speed, auditory memory, manual dexterity, perceptual-motor speed, visual perception or memory, and motor steadiness.

The NCTB was applied under standard conditions of administration and interpretation of data as guided in the Operational Guide for WHO NCTB (WHO, 1986) to assure the validity of the test results. Before carrying out the test, the researcher had been trained thoroughly and given sufficient practice by experienced personnel. The NCTB test should be conducted in a comfortable room, free from distracting noise and intrusions, have adequate lighting as well as suitable table and chairs, so that the researcher and the respondent can sit either face-to-face or at a 90 degree angle with each other. Before conducting the NCTB test, instructions given in doing the tests were standard, clear and distinct. The time needed for performing all the 7 core tests was approximately 45 minutes. The raw score obtained directly after the NCTB was then changed as a standard score of neurobehavioral test in order to make it comparable to scores noted from other studies.

Results from previous studies conducted on industrial workers who are exposed to workplace organic, electronic workers exposed to lead solder, paddy farmers exposed to pesticides and school children exposed to atmospheric lead will be discussed in this paper. The neurobehavioral performances of the exposed subjects were impaired. Exposure variables such as the employment period, work days per week, employment period in the exposed section and daily work duration significantly influenced the neurobehavioral performance which is a chronic effects of long term exposure to neurotoxins.
SEXUAL HARASSMENT AT WORK

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Surveys carried out in a number of industrialized countries showed that the proportions of female employees who had been subjected to sexual harassment in those countries ranged from 42 to 70 per cent. Sexual harassment has been reported to be one of the most offensive and demeaning experiences an employee can suffer. It can also affect the victim’s health, resulting in physical and psychological stress. In extreme cases, victims have reported anxiety, nervousness, emotional trauma leading to depression and even reclusion.

Sexual harassment is any unwelcome sexual advance or conduct on the job that creates an intimidating, hostile, or offensive working environment. Any conduct of a sexual nature that makes an employee uncomfortable has the potential to be sexual harassment. Sexual harassment is a gender-neutral offense, at least in theory.

Sexual harassment at work not only affects the victim’s morale but also his/her job performance. This causes the organisation to suffer in terms of productivity and high sick absenteeism among the workers. Some workers opt to resign due to their timid nature leading to high job employee turnover including the higher training cost incurred. Sexual harassment if left unchecked can be infectious within the organisation.

There are 2 categories of sexual harassment namely: sexual coercion; sexual harassment that results in some direct consequence to the victim’s employment and sexual annoyance; sexually-related conduct that is offensive, hostile or intimidating to the recipient, but nonetheless has no direct link to any job benefit.

Sexual harassment in the workplace includes any employment related sexual harassment occurring outside the organisation. There are 5 possible forms, namely: verbal harassment, non-verbal/gestural harassment, visual harassment, psychological harassment and physical harassment.

Presently there are no laws addressing sexual harassment in the country except the Penal Code, section 509. This law addresses the physical aspects and is currently handled by the police. Nevertheless, the Industrial Relations Act 1967 may be amended to provide for action against sexual harassment perpetrators. In 1999, the Ministry of Human Resources introduced the Code of Practice against sexual harassment to prevent sexual harassment at the workplace.

The Code of Practice outlines the statement of purpose, legal definition of harassment, descriptions of behaviour that constitutes harassment, how employees should handle harassment, how the company handles complaints, what kind of disciplinary action and name and phone numbers to lodge a complaint. It is sad to say that majority of businesses in Malaysia do not have any form of policy against sexual harassment.

There has been a call by several quarters including non-governmental organisations to enact a law for sexual harassment at work. The government withdrew the Employment Act (Amendment) Bill 2010 when it came up for second reading at the Dewan Rakyat (House of Representatives) on 12.10.2010 to enable several changes to be made and provisions to be added. The Bill will be tabled again after the changes are made.
IAQ: IS OUR WORKPLACE AIR GOOD OR BAD?

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Indoor Air Quality (IAQ) or more accurately the lack of it is typically associated with a set of common complaints among building occupants. The most common complaints are reports of odors, uncomfortable temperatures and physical symptoms, such as headaches and respiratory irritation. These complaints are often attributed to the presence of chemical contaminants (volatile organic compounds (VOC), formaldehyde), microbial contaminants (molds, fungi), radon, particulates and combustible products (carbon monoxide, carbon dioxide). As building occupancy levels increase, so can the number of complaints.

Heating, Ventilating and Air Conditioning (HVAC) systems are closely linked with compromised IAQ, specifically in terms of poor design or improper maintenance. The building design and positioning of occupancy plays a role when designing a HVAC system as the supply and return duct shall be placed close as possible to the occupants as well as the volume of supply and return need to be considered. Inspection of the ducts and intakes are also essential as even worn insulation can lead to fibers/particles being drawn into the HVAC system. Wet insulation or insulation with stains can also be breeding ground for microbes. Air intake shall be placed away from potential sources of pollutants (cooling towers, garbage dumpsters) and shall be inspected for blockage (bird nests, dry leaves).

Legionnaire’s disease is one of the notable incidents involving disease causing organisms associated with poor IAQ. Legionella pneumophila bacteria, which cause this disease, can be found in water systems such as drip pans and cooling towers of the HVAC system. The bacteria is transmitted through air (mist/aerosol) and when inhaled, can cause pneumonia like disease with fever, chills, general aches and pains within two days to a week after exposure.

What can I do to achieve acceptable IAQ? Communication is one of the main tools to address issues related to poor IAQ. Established hazard and risk communication at workplace, serve as a tool to communicate concerns related to compromised IAQ. These concerns can be channeled to the Industrial Hygiene practitioner as well as the building owner or maintenance crew for further investigation. One measure is to check on the effectiveness of the HVAC system by carrying out an IAQ assessment.

Industrial Code of Practice on Indoor Air Quality 2010 published by Department of Occupational Safety and Health (DOSH) can be used as a guide. A qualitative IAQ assessment can be carried out to preliminary investigate, to determine a more accurate and targeted quantitative assessment. Basic instruments can be used to evaluate IAQ such as gas detectors to measure presence of chemicals, thermometer to determine temperature, velometer to measure airflow velocity and smoke tubes to determine airflow patterns. Carbon dioxide is often used as an indicator of the effectiveness of the HVAC system in terms of adequate mixing and supply of air. Once hazard and risk communication tool are established, preventive maintenance of the HVAC system are in place and good house keeping are maintained at indoor areas; concerns on IAQ shall be greatly minimised.
RESPIRATORY PROTECTION FOR HEALTH CARE PROFESSIONALS

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Healthcare Professionals are exposed to various infections. To minimize exposure to airborne biological agents, healthcare professionals should use respiratory protection. Respirators used in health care settings should be selected according to the efficiency of the respirator filters in filtering aerosols and according to the type of procedure to be carried out.

One of the most common respirators used in health care facilities is the N95 disposable respirator. Surgical masks that are commonly used are not respirators. They have limited preventive role for the healthcare professional. They do not protect the user adequately from exposure to infectious airborne biological agents. Available data from the National Institute for Occupational Safety and Health (NIOSH) in the United States suggest that infectious droplet nuclei (the sneeze particles from an individual) range in size from 1 mm to 5 mm. The projection of a spray of droplets of saliva and other secretions from a person is usually limited to a distance of 30-60 cm between a source and the recipient (host). In SARS, some experts believed the virus may have been projected to a distance of 100 cm. Generally, particles greater than 10 mm are filtered off naturally by the nose and seldom pose a health problem. Those particles of 5 mm or less are most harmful to an individual as they can penetrate deep into the alveoli. Respirators used especially in health care settings and other public places should therefore be able to efficiently filter the smallest particles in this range that will be able to reach the lungs. Surgical masks may be worn by patients with infectious respiratory disease. This is to protect the healthcare professional from large infectious droplet nuclei that may be expelled by the patients.

A quantitative and qualitative fit test is required to be undertaken by users of the respirators. This is a means of determining an individual’s ability to obtain a good face fit with a particular respirator.

Improper or wrong usage of protective equipments creates a false sense of security to the user and anxiety among the public.
ORAL PRESENTATIONS
MANAGING OCCUPATIONAL HEALTH IN THE ASIA PACIFIC REGION - THE BASF EXPERIENCE

Jefferelli SB

BASF East Asia, Trauth, B. BASF SE

BASF is the biggest chemical company in the world. In Asia Pacific itself it has more than 15,000 employees and over 124 production sites. To ensure delivery of Occupational Health within the company, a BASF Group Directive-Occupational Medicine and Health Protection was developed. This directive provides information on the Occupational Medicine and Health Protection goals, scope, definitions, responsibilities, performance standards, audits and communication. To facilitate delivery of the directive globally, network of Regional and Country Coordinating Physicians is established. To provide specialist advice the centres of excellence: organization and management, biomonitoring, documentation and biostatistics, epidemiology, emergency medicine and disaster preparedness, environmental medicine, ergonomics and rehabilitation, health promotion, human toxicology and product stewardship, occupational dermatology, occupational pulmonary diseases, reproductive health, alcohol and drug abuse, general psychiatry, health management of expatriate and travelers and occupational diseases was established. Current OH Focus areas in the region include Managing Medical Emergencies in offices, Stress Management, Medical Data Protection, Site Pandemic Flu plan updates, Health promotion-skin protection program, Medical Examination for Executives and Basic Site Health Assessment for all sites. Among the challenges faces are: ensuring OH Physician cover for small and remote businesses, managing newly acquired businesses, ensuring medical emergency preparedness of all sites, quality assurance of risk management including Medical Surveillance and talent retention. We believe that progress in OH delivery in the region can be made by establishing regional priorities, establishing SMART objectives and close follow-up, ensure all CCOHPs and key leaders and partners are fully onboard, explore creative and workable solutions for smaller sites, being aware of industry development, regular and clear communication with stakeholders and promoting talent growth and appreciation.

OCCUPATIONAL HEALTH AND SAFETY (OHS) EDUCATION IN SECONDARY SCHOOLS OF SOUTH AUSTRALIA

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Introduction: Young and inexperienced workers represent a significant proportion of people injured at work. In Australia there appears to be inconsistency in the provision of safety training and induction in high schools and few data are available pertaining to evaluation. There is a vast quantity of Occupational Health and Safety information and resources available in Australia, but there is limited evidence for the effectiveness of these resources or educational programs in general. This study aims to investigate introductory Occupational Health and Safety (OHS) education in secondary school of South Australia, particularly those in year 10, who are receiving OHS education for the first time.

Methodology: To assess current practice in OHS education, a postal questionnaire survey was sent to all 211 South Australian secondary school teachers via principal... Information on current practice, teachers’ perceptions and barriers and incentives was obtained.

Results: The response was obtained from 49% percent of the schools and majority were female (63%, n=156). About half of the respondents were Vocational Education and Training Coordinators (VET) or Structured Workplace Learning (SWL) Coordinators. The rest include a wide variety of teachers available within the school including other subject teachers. The majority of the teachers (61%) had received in service OHS training while 16% had no
formal OHS training. However, more than eight out of ten teachers (86%) described the school management as supportive of OHS education. More than one third of the teachers (36%) mentioned that their provision of OHS education is compromised by other demands of their role. Most of the teachers expressed that, schools are not consistent in the delivery of OHS education in South Australia. There is no standardization in terms of content and delivery methods. Formal integration of OHS education into main curriculum was strongly suggested by teachers. Seventy nine percent of (79%) participants indicated that they used websites as a resource. Three out of four teachers (76%) agreed that the web resources were accessible and similar proportion of teachers rated the resources as appropriate. The total time spent in teaching OHS per year ranged from 30 minutes to 88 hours, in majority of schools it was less than 10 hours per year. Sixty percent of teachers thought that students gained significant knowledge in OHS through the school.

Discussion: The findings of this study reveal strong and widespread agreement that school-based OHS education is important and should be provided to all students. However, teachers reported that delivery is inconsistent and that some students do not receive any OHS education at school. There are gaps in the coverage of training of OHS teachers, quality of training provided to them. The teachers face barriers associated with workload, teachers’ skill and experience. These need to be addressed in a coordinated way involving all the stakeholders and there should be rigorous evaluation of OHS education initiatives.

HEALTH AND SAFETY PROVISIONS AT WORKSITES, STUDY FROM OCCUPATIONAL HEALTH DIVISION REPORTS

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Introduction: Based on Workplace Safety and Health Order 2009, under Article 83(3) of Constitution Brunei Darussalam, ILO Convention (No. 155) and Recommendation (No. 164) in 1981, conventions, codes of practice and manuals concerning occupational safety and health(OHS) and OHS Act of 1970 by Occupational Safety and Health Administration(OSHA) United States; regular worksite inspections have been carried out by a team from Occupational Health Division(OHD), Ministry of Health, Brunei Darussalam in order to reduce and prevent worksite accidents, injuries, and work related diseases and to promote safety culture at work. Thus based on visits to work settings, an evaluation was carried out to find the current status.

Methodology: A review of Annual reports of 2007, 2009 and worksite inspection reports was conducted. The parameters observed during worksite visits were availability of H&S Policy and Committee, safety officers, fire safety measures, emergency evacuation procedures, and electrical safety.

Results: In 2007, out of 93 worksite visited, it was observed that majority of worksites did not meet safety parameters, H&S Policy and committee, safety officers, fire safety provision and emergency evacuation procedures: availability were 5% (5), 8 % (7), 25 % (23) and 14% (13) at worksites respectively. The rest of worksites were unsatisfactory : 95 %(88) of workplaces were without H&S policy and committee, 92% (86) without safety officers, 75% (70) without satisfactory fire safety provision and 86% (80) without satisfactory emergency evacuation. However, with regard to electrical safety, the results were better than other parameters with 70% (65) of worksites showing satisfactory electrical safety. Worksite visits in 2009 showed better achievements in terms of H&S even though safety requirements still needed to be fulfilled to satisfactory levels. Out of 41 work site inspections, improvements were reported with the availability of H&S policy and or committee in 12% (5) of work places, fire safety provisions in 56% (23), satisfactory emergency evacuation procedures in 34% (14) and satisfactory electrical safety in 85% (35). However, the availability of safety officers was at 7%, (3) which were almost the same as in 2007. Compared to 2007 H&S results, unsatisfactory conditions have been significantly reduced in 2009: H&S policy and committee at 85 % (35), fire safety provisions at 44% (18) of worksites, emergency evacuation procedure at 66% (27) and electrical safety at 15% (6) at workplaces though the lack of safety officers 93%(38) at worksites, still remains the same as in 2007.

Discussions: From the results, it is observed that, work places did not comply well in H&S needs in 2007 though better compliance was seen in 2009. Hard work of OHD with regular visits of worksites after strengthening the manpower in 2005 did bring better results even though requirements still need further improvement. Trainings,
health education and reevaluation of implementation of H&S practices in industries will serve as solutions to promote safe work environment and ensure healthy and productive workforce.

WORK-RELATED HAND INJURIES: TYPE, LOCATION, CAUSE, MECHANISM AND SEVERITY

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Introduction: Hand injuries cases seen at emergency department could be due to many causes such as self inflicted, motor vehicle accident, domestic injury and work related. Important information related to work related hand injury can be lost because victims were defaulted for orthopaedic clinic follow-up. Objectives: to determine the prevalence of severe Work Related Hand Injury (WRHI) and its associated factors seen at emergency department in a tertiary hospital.

Methods: All cases of hand injuries seen at emergency department at a tertiary hospital from January to June 2010 were eligible and a pre-tested validated questionnaire was used to obtain data. Statistical analysis was carried out using SPSS version 18. Categorical variables were presented as frequencies and percentages. Continuous variables were presented as means with their 95% confidence interval (CI). The Pearson's chi-square test (x²) test was used to determine the associations between categorical variables. Binary Logistic regression was done for multivariate analysis. A p-value of < 0.05 was considered as statistically significant.

Results: Out of the 297 industrial accidents, 74 (24.9%) were WRHI. Among those with WRHI, (47.3%) of them had severe hand injuries. The overall mean age of the respondents was 30.36 (± 9.54 SD) years. Majority (82.5%) of the injuries occurred between Mondays to Friday. Majority (70.1%) of hand injuries were caused by machine and 48.6% of the hand injuries occurred when the hand was caught in the operating part of the machine. Majority (62.1%) of the respondents had finger's injuries and 32.4% had open fracture. Bivariate analysis showed that there was significant association between severity of WRHI and locations of injury, mechanisms of injury, and sources of injury (p ≤ 0.05). Logistic regression analysis showed that WRHI was significantly associated with injuries resulting from machines.

Conclusions: WRHI contributed to 24.9% of all industrial accidents seen at the emergency department and orthopaedic clinic and 47.3% of the respondents with WRHI had severe hand injuries. Severity of WRHI was significantly associated with injuries resulting during operation on mechanical machine.

WATER QUALITY AND WATERBORNE DISEASES AT THE LOWLAND ECOSYSTEM IN THE DISTRICT OF BANYUASIN, SOUTH SUMATERA

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Introduction: Water quality and quantity is always an important issue at the lowland ecosystem (estuarine ecosystem) of South Sumatera. Low domestic water supply sanitation is considered as having an important contribution on the high frequency of waterborne diseases in the area.

Methodology: The study aims at recording water borne diseases and the water quality in the lowland area of Banyuasin District, South Sumatera, Indonesia. Two hundred and ten (210) head of families participated as respondents of the study. Water quality in terms of physical and chemical aspects were tested for 18 samples and one sample for bacteriological test.
Results: All respondents (100%) used river water for sanitary purposes and 35% of them also have dug wells. Of those who used river water for sanitation, 68.5% used some sorts of water treatment. Results of water quality tests are 100% have objectionable color, and high iron content with low pH. Waterborne disease in the form of diarrhea are detected in 131 respondents, most of them are farmers.

Discussions: In the lowland area with the estuarine ecosystem water quality and scarcity are serious problems. This in turn caused the high prevalent of waterborne diseases such as diarrhea. Low level of education and socio-economic status make it difficult for the local people to overcome these problems. Outside intervention especially government so as to improve the condition is needed.
FREE PAPERS (2) - RESPIRATORY RELATED DISEASES

RESPIRATORY HEALTH OF TRADITIONAL SONGKET MAKERS
SOUTH SUMATERA INDONESIA

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Introduction: Songket is a traditional custom of South Sumatera usually worn during marriage and other traditional ceremonies. One of the health hazards in the process of songket making is textile dust.

Methodology: This paper studies respiratory health of songket makers using spirometry and respiratory questionnaires. One hundred and five women workers participated in this study and undergone health examination using spirometry and standardized respiratory questionnaire. Spirometric parameters used in this study were FVC (liter), FEV1 (liter) and FEV1/FVC (%).

Results: Personal dust exposure was measured on 22 workers and results varied in the range of 0, 18 to 1, 26 mg/M³ with a mean of 0,470 mg/M³. Depending on the parameter used, spirometric abnormality detected among the study subjects were 45, 7 % (FVC), 42, 9% (FEV1) and 55, 2% (FEV1/FVC) respectively. The frequencies of respiratory symptoms observed among the workers were cough and phlegm (28, 6%) and shortness of breath and asthma (24, 8%). It was found a positive correlation between respiratory symptoms and length of service as songket makers.

Discussion and Conclusion: It is concluded that exposure to textile dusts is a significant health hazard in traditional songket making. Spirometric abnormality and respiratory symptoms are prevalent among songket workers and are related to the length of service.

DUST EXPOSURE AND RESPIRATORY SYMPTOMS IN A CEMENT FACTORY, UAE

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Introduction: In UAE the rate of industrialization has increased significantly over the past decades. However, few studies have been conducted to investigate occupational hazards and the knowledge & practice of the working population relevant to these hazards. The objectives of this study were to assess cement dust exposure and its relationship to respiratory symptoms; and to evaluate the practice of workers towards exposure to the dust in cement factory in UAE.

Methodology: A cross-sectional study involving 149 exposed and 78 non-exposed subjects randomly selected. Personal “total” dust level was determined by the gravimetric method. The British Medical Research Council Questionnaire on Respiratory Symptoms (MRC) was used in this study, with additional questions relevant to the objectives of the study.

Results & Discussions: Concentration of the total dust ranged between 4.20 mg/m³ in crusher area and 15.20 mg/m³ in packaging area. It was higher and exceeded the exposure limit (10 mg / m³) for the workers in the cement packaging and raw mill. The exposed group had a significantly higher prevalence than non-exposed for cough (19.5%; O.R= 4.5; p< 0.05), and phlegm (14.8%; O.R= 13.3; p< 0.05). About 11% of the exposed workers had grade II or more severe forms of dyspnoea, compared with 4% of the non-exposed. The prevalence of shortness of breath, and chronic bronchitis was high among the exposed group compared with that among non-exposed, but not
high enough to attain statistical significance. All the three workers who reported to have diagnosed asthma were exposed to dust. The prevalence of cough and phlegm was significantly higher amongst non-smokers exposed workers than non-smokers amongst non-exposed group. The prevalence of cough, phlegm, shortness of breath, chronic bronchitis, and diagnosed asthma was related to the cumulative dust exposure. Logistic regression analysis revealed that exposure to dust and smoking habit were the predictors for the symptoms cough, and phlegm, while smoking habit was the only predictor for the chronic bronchitis. The prevalence rate of the cough and phlegm reported in this study was consistent with that reported by other studies (12.0% - 29.9%) in the region. Respiratory protection devices (masks) were available for factory workers and 118 (79.2%) workers claimed to use them. However, only 29 (23.7%) workers of them reported to wear them all the time, and the remaining 89 (59.7%) workers used them sometimes. Twenty one (72 %) and 18 (81.8%) exposed workers of those claimed to have cough and phlegm respectively said they never or rarely used masks. Logistic regression analysis revealed that dust level (dusty job) was the only variable that influenced the workers to use the masks all the time.

**Conclusion:** Total cement dust exposure was found to be related to respiratory symptoms particularly cough and phlegm. It is recommended that control measures be adopted to reduce the dust and workers should be educated about health effects and control measures of dust and be encouraged to use respiratory protection devices during the working time.

**INDOOR AIR QUALITY ASSESSMENT AT THE RECORD OFFICE, HOSPITAL TAWAU, SABAH**

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**Introduction:** Indoor air quality (IAQ) generally refers to the quality of air in a workplace where it is free from harmful contaminants which can affect the health of the workers and consequently influence productivity and quality of work on a day to day basis. Factors that can contribute to poor IAQ includes the poor design and maintenance of the ventilation system of the workplace/building, type of building, humidity, external and internal sources of contaminants, human factors and the surrounding environment. Sick building syndrome can result from poor IAQ.

**Methodology:** An indoor air quality survey which included the inspection of the Air Handling Unit and workplace was carried out at the Record office, Hospital Tawau, Sabah State Health Department in response to a complaint received from the Director of Hospital Tawau. The objective of this survey was to assess the parameters for IAQ and to compare the results with The Code of Practice on IAQ 2005, Department of Occupational Safety & Health, Malaysia and also with the IAQ Investigator’s Guide of the American Industrial Hygiene Association 2006. The survey also includes the health effects of poor IAQ among the workers in this office. Q- Trak Indoor Air Quality Meter 7565 with Probe 982, DustTrak Aerosol Monitor 8520, Mini Rae 2000, TSI plus Velocity meter and COMARK Thermohygrometer was used for this survey. The sampling for the various parameters was carried out according to The IAQ Investigator Guide and from The IAQ Assessor Course conducted by The Malaysian Industrial Hygiene Association.

**Results:** The workplace was observed to be neat but dusty and had stale smell. No observable external factors contributing to poor IAQ noted. All 12 workers (100%) responded to the IAQ survey using a modified George Washington University of America Indoor Air Quality Questionnaire. The most common symptoms faced by the workers were nasal symptoms (91.7%), eye symptoms (58.3%) and throat symptoms (91.7%) while occurrence of skin symptoms was 75%. Two workers (16.7%) experienced asthma like symptoms since they began working in the record office. The parameters for IAQ (respirable particulates, volatile organic compound, carbon dioxide, carbon monoxide) in the record office was within normal limits, but, the temperature (above 25.5°C) and relative humidity (above 60%) was raised. Measured outdoor air flow was 16cfm per occupant while the measured outdoor air flow and Carbon dioxide level was at negative levels. The Measured Air Change per Hour (ACH) was 0.25.

**Conclusion:** The Air Handling Unit was poorly maintained and the workplace dusty and had stale smell. This was shown by the various parameters which indicated poor air flow and could have contributed to the health effects in the workplace. Measured outdoor air flow was 16cfm per occupant which was below the recommended 20cfm. The
PREVALENCE OF CARDIOVASCULAR RISK FACTORS AMONG SABAH HEALTH OFFICES EMPLOYEES IN 2008

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Introduction: Prevalence of cardiovascular risk factors is increasing among the general population, but little is known about employee’s risk factor who works in the health office. The objective was to assess the prevalence of cardiovascular risk factors among health office employees and relationship to other contributing factors. Method: Cross sectional data were obtained from Feb-March 2008 as part of the non-communicable disease employee screening program. Universal sampling method was used. 341 employees were agreed to participate in Sabah state health offices. Data was collected through a questionnaire on risk factors, anthropometric and blood pressure measurement, random blood glucose and cholesterol analyses. Data was analyzed using SPSS version 15.0 and presented by descriptions, univariate and multivariate analyses for significant risk factors.

Results: The response rate was 96.6%. The prevalence of raised blood pressure (17.9%, [95%CI: 14.1-22.5]), blood cholesterol (21.7%, [95%CI: 17.5-26.5]), blood glucose (10.0%, [95%CI: 7.1-13.8]), smoking (17.3%, [95%CI: 13.5- 21.8]), physical inactivity (29.6%, [95%CI: 24.9-34.8]) and drink alcohol (9.7%, [95%CI: 6.9-13.5]) were lower than general population studies in the National Morbidity Survey Report III and Malaysian NCD surveillance of 2006. The prevalence of overweight (BMI > 23 kg/m²) was 62.2% [95%CI: 61.6-72.2]. Out of 62.2%, 36.4% was Pre-Obese (BMI 23.0-27.4 kg/m²), 24.0% was Obese1 (BMI 27.5-34.9 kg/m²), 1.5% was Obese2 (BMI 35.0-39.9 kg/m²) and 0.3% was Obese3 (BMI>40.0 kg/m²). All these cardiovascular risk factors, the prevalence were higher in older age group but was not statistically significant except for overweight and raised blood pressure (p<0.05). The prevalence of smoking habit was higher in younger age group and statistically significant (p<0.05). The result of univariate analysis showed that overweight (BMI>23 kg/m²) was significantly (p<0.05) associated with older age group category [(<28: reference), (28-35: 1.9, [95%CI: 1.0-3.8]), (35-45: 2.3, [95%CI: 1.2-4.3]), (>45: 3.4, [95%CI: 1.7-6.6])], male gender 2.2, [95%CI: 1.4-3.6]), drink alcohol 3.9, [95%CI: 1.3-11.6] and smoking habit 2.2, [95%CI: 1.1-4.4]. Multivariate logistic regression revealed male gender and older age group were associated with overweight, adjusted odds ratio (AOR) 2.2, [95%CI: 1.3-3.6] and 1.1, [95%CI: 1.0-1.1] respectively. Physical inactivity was not associated with overweight 1.3, [95%CI: 0.8-2.2]. Combinations of cardiovascular risk factors (RF), 17.0%, [95%CI: 13.2-21.5] have no cardiovascular risk factors. This means that the majority (83%) of them have at least one risk factor. Of this 83%, 32.6%, [95%CI: 27.7-37.9] have one RF, 25.2%, [95%CI: 20.8-30.2] two RF, 17.9%, [95%CI: 14.1-22.5] three RF, 5.3%, [95%CI: 3.3-8.4] four RF and 2.1%, [95%CI: 1.4-10.6] have five or more RF. But these risk factor combinations were lower when compared to the general population studies in the Malaysian NCD surveillance of 2006.

Conclusion: As the employees exposed to health related promotion and prevention activities, their cardiovascular risk factors were lower compared to the general population. However, Overweight problems need to be resolved urgently by optimizing continuous employee health monitoring and appropriate weight management strategy. Even though male gender and older age group were the contributing factors of overweight problems, further study about diet and other environmental factors or genetic predisposition will benefit current problems. The reason physical inactivity was not associated with overweight probably due to health awareness. Other cardiovascular risk factors also need to be monitored and reviewed accordingly.
TUBERCULOSIS RISK IN HEALTH CARE WORKERS: A REVIEW OF CASES FROM 2006 - 2010

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Introduction: To determine the extent of risk of tuberculosis (TB) among health care workers (HCWs) and describing the socio-demography of those at risk.

Methodology: This is a review of TB incidence and case descriptions among HCWs from 2006 - 2010. Data was retrieved from reports of notified cases to the state health department. All notified TB cases among HCWs were included and analysed to show the incidence and describe the relevant socio-demographic characteristics.

Results: A total of 78 cases were notified to the tuberculosis control unit of the state health department. All these HCWs were from the government sector and no notifications were received from the private sector during the aforesaid period. The annual incidence of TB among HCWs has always been higher than that of the general population. The highest incidence rate was in 2010 at 130.2 per 100 000 HCWs, more than double that of the general population. Females comprised 64.1% of TB cases among HCWs. About two thirds of the cases were from the 21 - 40 age group. More than half, 56.4% of those with TB were allied health staff, while doctors accounted for 19.2%. In 2010, however, the incidence of TB in doctors was highest at 248.0 compared to 205.3 per 100 000 in the allied health staff. Among the allied health staff, nurses accounted for 84.1% of cases which was the highest. Pulmonary TB accounted for 70.5% of cases of which 74.5% were positive for acid fast bacilli. About 68% of cases had changes in their X-rays, of which, 69.8% were classified under the moderate to severe category. Seventy eight percent of cases diagnosed among HCWs came from those working in the hospitals, whereas, only 17.9% were from HCWs working in health centers.

Discussion: TB is a re-emerging health threat not only to the general population but also to HCWs. On the average, HCWs are 1.8 times at a higher risk of contracting TB compared to the general population. Infection control measures need to be evaluated and analysed to detect the point of failure. The spiking of the incidence of TB among HCWs from 50.4 to 130.2 per 100 000 should be studied. Reinforcement of simple measures of prevention and control can go a long way in the prevention and control of this re-emerging occupational hazard.

SAD STORY OF SILICOSIS-TUBERCULOSIS

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Introduction: It is important for medical practitioners able to diagnose and classify cases seen at clinics and hospitals as occupational diseases. This is a story of failure to diagnose a case as occupational disease and the failure caused an impact to patient when compensation denied.

Methodology: This is a case study of a 53 years old man, work at a quarry in Machang, Kelantan since year 1979 as Crushing Plant Operator. On 18 December 2005, case first presenting at Occupational Health Clinic with symptoms of coughing and shortness of breath on exertion, then was investigated with Spirometric Test, Chest X-Ray and Audiometric Test by Occupational Health Doctor and clinically diagnosed as Silicosis as well as Noise Induced Hearing Loss. Case was notified to Department of Occupational Safety and Health and referred to Social Security Organization for compensation. Medical Board done in year 2006, however case denied for compensation due to conclusion by Medical Physician as case should be investigated further to confirm as Occupational Lung Disease. From the time, case regularly treated as out-patient at nearby clinic although symptoms progressively worsening. On 18 February 2008, case came again at Occupational Health Clinic for second application of Invalidity Pension Scheme and reviewed again by Occupational Health Doctor. Case strongly supported for compensation and Computer Tomography Scanning done although clinically was diagnosed as Silicosis by previous Occupational
Health Doctor. Result confirmed for Silicosis. At the same time, also was diagnosed as Tuberculosis when investigated further by Occupational Health Doctor. Anti-Tuberculosis treatment started. On 2 April 2010, case was pronounced death due to complication of Chronic Silicosis and Tuberculosis. On 3 June 2010, after 5 years struggled for compensation, Social Security Organization finally approved for compensation. A Chemical Health Risk Assessment was done at nearby quarry by registered assessor and found that hazardous chemicals commonly exposed by quarry workers are Silica, Bitumen and Methylene Chloride.

**Results:** This case was investigated thoroughly and diagnosed as Silicosis. Chemical Health Risk Assessment concludes that there is significant risk of exposure to Silica and other chemicals in quarrying industries.

**Discussion:** There are lessons to be learned from this sad story. 1) This is an example of a failure to diagnose a case of occupational disease. Failure to diagnose will cause severe impact to worker and family; 2) It is important for medical practitioners to differentiate diseases seen at clinic as occupational diseases, work related diseases or general diseases; 3) Early management of occupational diseases is crucial and medical surveillance should be appropriate for workers exposed to chemicals listed under Schedule 2, USECHH Regulation, 2000; 4) Compensation and insurance bodies should have view and justification by their respective advisors when dealing with compensations and should not only depend on medical specialist at hospitals.
FREE PAPERS (3) - PHYSICAL HAZARDS

KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) AND ASSOCIATION WITH NOISE INDUCED HEARING LOSS AMONG QUARRY WORKERS IN KELANTAN

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Introduction: Noise is one of the environmental and occupational hazard listed in the Factory and Machinery Act 1967. Noise-induced hearing loss (NIHL) is the consequence of being exposed to the loud noise at the workplace. This study was to assess the knowledge, attitude and practice (KAP) towards NIHL and their association with NIHL among quarry workers in Kelantan.

Methodology: A cross sectional study was conducted at 6 quarries in Kelantan with 97 consented respondents who answered a validated version of questionnaire and underwent pure tone audiogram. The respondents were male, aged between 18 to 50-years-old, working in the quarry area for at least 6-month duration and has no family history of ear diseases.

Results: The means percentage score of KAP were 44.3 (10.68), 69.7 (10.31) and 27.8 (16.05) percents respectively. The prevalence of NIHL found to be 56.7% (95% CI: 46.84, 66.56). Multivariate analyses showed there was an association between practice score with NIHL with OR=0.89 (p=0.008 95% CI: 0.81, 0.97).

Discussion: The KAP scores were found to be low in this study and the poor practice was found to have significant contribution to high NIHL prevalence among quarry workers in Kelantan. Therefore a better hearing conservation program including health and safety at workplace promotion and emphasizing on using of hearing protection devices is needed.

PREVALENCE AND ASSOCIATED FACTORS OF BACK PAIN AMONG GOVERNMENT DENTAL PERSONNEL IN NORTH EASTERN STATE MALAYSIA

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Introduction: Dentistry is a high risk profession for the development of back pain as it requires high visual demands which results in adoption of affixed and uncomfortable postures. This study was conducted to determine the prevalence and associated factors of back pain among government dental personnel in Kelantan, Malaysia.

Methodology: A cross sectional study was conducted among 350 dental personnel working in all government dental clinics in Kelantan. A validated Branson Posture Assessment Instrument (BPAI), direct observation of the subjects while performing their routine task and a proforma on sociodemographic and occupational characteristics were used as research tools. Descriptive statistics including mean and standard deviation for numerical and percentage for categorical data were calculated. Multiple logistic regression analysis was performed to determine factors associated with back pain.
Results: From 350 respondents, majority of them were female (79.1%) and Malay (98.0%). Age of the respondents ranged from 22 to 56 years old. The prevalence of back pain was 44.9% (95% CI: 39.65, 50.07). Among the respondents, dental technician had the highest prevalence of back pain [52.4% (95%CI: 40.05, 64.71)]. Multiple logistic regression analysis showed that after controlling for potential confounders, the significant risk factors associated with back pain were self-reported abnormal posture (OR: 5.53; 95%CI: 2.24, 13.75), doing repeated task (OR: 2.29, 95% CI: 1.22, 7.16) and had abnormal posture as scored by BPAI (OR: 1.07; 95% CI: 1.04, 1.10).

Conclusion: The prevalence of back pain among dental personnel working in Kelantan was relatively high. The significant risk factors associated with back pain were abnormal posture and doing repeated task. Innovation of ergonomic friendly dental equipment is one of the methods to improve the work practice and health of dental personnel.

SLEEP QUALITY AND INSOMNIA IN NURSES WITH INTER-INDIVIDUAL DIFFERENCES IN MORNINGNESS- EVENINGNESS ORIENTATION

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Introduction: Morningness and eveningness preference, an endogenous component of the circadian clock, is characterized by an interindividual difference in circadian phase and requires of humans a specific timing of behavior. Circadian rhythms have a strong effect on the ability to perform work activities in shift workers.

Methodology: We conducted a cross sectional study among 160 nurses. Nurses completed the Horne and Ostberg questionnaire to assess distribution of morningness or eveningness, and Pittsburg Sleep Quality Index (PSQI) and Insomnia Severity Index (ISI) questionnaire to measure self reported sleep quality and prevalence of insomnia. Furthermore, all of participant answered a questionnaire about demographic information. We compared demographic information and type of morningness-eveningness at nurses with better and worse sleep quality and nurses with or without insomnia.

Results: Insomnia and poor sleep quality was a common complaint in our nurses. The results showed that the morningness-eveningness was the most important factor for detecting quality of sleep. Evening type nurses had worse sleep quality in our study. No significant association emerged between the shifting type and age of nurses with quality of sleep (P>0.05).

Discussion: Our results suggested that determining if nurses were attributed to morning or evening types is the most important issue in pre employment assessment at nurses with shift work.

PREVALENCE OF ASBESTOS RELATED ILLNESS AMONG ASBESTOS WORKERS IN SRI LANKA

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Introduction: Asbestos is proved beyond doubt as a carcinogen and a toxin causing effects in humans. However, lack of proper statistics, still make some countries to, still manufacture and use asbestos. This study looks at the situation in Sri Lanka. The main objective of this study was to learn the prevalence of asbestos related illness including Mesothelioma among workers in the asbestos-related occupations in Sri Lanka.
Methodology: 450 Participants were recruited from different occupations using asbestos in their work and 392 volunteered to participate. Consent was obtained and X-rays were done of the chest. Participants accepted the screening procedure well and there was no apparent health anxiety during the screening. Study included persons who had worked for more than 7.5 years.

Results: Chest X-rays showed 27 (n=27) 6.9% lung fibrosis cases. Other non related lesions (e.g. enlarged cardiac shadows) were also observed.

Discussion: Screening for lung disease among asbestos-exposed workers is important to detect fibrosis and other lung disease. However, better evidence and prevalence is seen among those who are exposed to longer periods. This study too may have generated different prevalence rates if exposures of most participants were longer than 10 years. The study, for the first time, generated a prevalence rate on fibrosis among asbestos workers in Sri Lanka. The findings could contribute towards policy changes in the use of asbestos in Sri Lanka

MISMATCH BETWEEN SCHOOL FURNITURE WITH ANTHROPOMETRIC MEASUREMENTS OF PRIMARY SCHOOL CHILDREN IN MERSING, JOHOR

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Introduction: Children spend 5 hours per day sitting down while doing their school work. Therefore, school children are at risk of suffering negative effects from poorly designed furniture owing to their prolonged sitting hours during classroom lessons. This study is a cross-sectional study the objectives to determine mismatch between school furniture and anthropometric measurements among primary school children in Mersing as well as to proposed new school furniture dimension more suitable to the children’s anthropometric measurements.

Methodology: Two schools were randomly selected from the Mersing Districts in Johore. One class each from Year 2 and Year 5 was selected from the selected schools. The sample consisted of 91 primary school children (46 male and 45 female) from Year 2 and Year 5 in two schools. Seven anthropometric measurement (height, weight, popliteal height, buttock-popliteal length, hip breadth, shoulder height and elbow height while sitting) as well as 5 furniture dimensions (seat height, seat depth, seat width, backrest height and seat to desk height) were taken. Instruments used were Martyn type anthropometer set, ruler, height scale and weighing scale.

Results: Findings showed 100% mismatch for seat height, seat depth, backrest height and seat to desk height among the Year 2 students. While for Year 5 students, mismatch were reported for seat height (82.6%), seat depth (97.8%), backrest height and seat to desk height (100%) respectively. There was no significant difference between genders for both age groups. Using a model “Match Criteria“, with the proposed dimension, the percentage of mismatch for seat height, seat depth and seat to desk height with the children anthropometric measurements were reduced.

Conclusion: There was mismatch between furniture and children’s anthropometric measurements. School furniture should be redesigned according to the proposed dimensions that fit children’s physiological measurements.
EMPLOYEE ASSISTANCE PROGRAMME FOR STRESS: THE IMPACT ON WORKERS HEALTH IN A PUBLIC UNIVERSITY

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Introduction: University staff reported significantly higher levels of stress relating to work relationships, control, resources and communication and significantly lower level of commitment both from and to their organization. Employee Assistance Program (EAP) is a worksite-based program designed to assist work organizations in addressing productivity issues, and employee in identifying and resolving their personal concerns that may affect job performance. EAP for stress is specially designed to overcome occupational stress. The objective of this study was to determine the effectiveness of EAP for Stress in the improvement of workers physical and psychological health status.

Methodology: This is a randomised-controlled trial done among workers in a public university in Kuala Lumpur. A total of 150 participants was selected and randomised into intervention and control group. Baseline information on socio-demographic data and self-perceived depression, anxiety and stress was obtained from a questionnaire. Biochemical data (fasting serum lipid and fasting blood sugar) and clinical data (blood pressure, body mass index, waist circumference and hip circumference) were measured pre- and post-intervention. Sickness absence data was obtained from Human Resource Department of the university. Intervention of EAP for Stress was delivered to participants in intervention group for 6 months period, from October, 2009 to March, 2010. As for control group, only self-help material was given.

Results: The mean age of participants was 43.0 ± 7.9 years in intervention group and 44.2 ± 6.7 years in control group. Most of the participants were Malays with 92% and 84% of participants in intervention and control groups respectively. Majority of them were females (64% in intervention group and 54.7% in control group). Majority of participants were married and had secondary level education or above. The pre-intervention overall self-perceived depression, anxiety and stress was 38.7%, 74.7% and 58.7% respectively. After the intervention, there were significant difference in improvement of self-perceived depression (p <0.001), anxiety (p <0.001) and stress (p <0.001) among intervention group as compared to control group. However, the biochemical, clinical and sickness absence indicators did not show significant difference after the intervention.

Discussion: Occupational stress has become an important entity to be tackled by Occupational Physician as it is taking its toll on human lives and organizational effectiveness. EAP for Stress is one of the effective programmes that can give positive impacts on workers psychological health. EAP was well established as one of the preventive measures for occupational stress in most of multi-national company. The return of investment for EAP was well documented by research from western country. From the result of this study, we found that EAP has proven is effectiveness in local setting.
SEEKING PLEASURE - RISKING LIFE: SEXUAL BEHAVIOUR OF YOUNG EPZ WORKERS IN SRI LANKA

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Introduction: As a part of industrial promotion, several export promotion zones (EPZs), with both foreign and local investments, were established in different parts of Sri Lanka, significantly contributing to resolve the problem of massive unemployment. EPZs attracted a large young population particularly females due to the nature of labor required by the industries. The result was the emergence of a unique culture in the EPZs catering to economic, social, psychological and emotional needs of these young and naïve women, a culture that promoted liberal indulgence in sex, entertainment and purchasing, leading to labeling of EPZ workers in a stigmatizing way. This study looked at the sexual behavior patterns of these female workers.

Methodology: Researchers lived in with the female workers in their hostels to obtain information using one to one interviews and Focus Group discussions (FGDs).

Results: Women in the free trade zone were still involved in target oriented production processes, day and night shifts under low living conditions, far away from their families and loved ones in the midst of social and psychological isolation. The peer groups filled the vacuum introducing them to the new culture and lifestyles thus motivating them to seek pleasure and happiness, fulfilling the psychological needs of security and interpersonal attachment while deriving sexual pleasure within the newly formed, often temporary relationships. Commercial sex working formed a part of the behaviour pattern.

Discussion: Provision of better living facilities and education on lifestyle is of paramount importance to this group of employees.

JOB STRESSORS IN RELATION TO SMOKING CESSION AMONG MALAYSIAN MALE EMPLOYEES IN WORKSITE SMOKING CESSION PROGRAMMES

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Introduction: Job stressors may reduce the likelihood of quitting smoking. We assessed the association between job strain and smoking cessation among Malaysian male employees involved in a smoking cessation programme.

Methodology: Employees from two major public universities in Malaysia received an invitation to participate in this study. At the start of treatment, participants were administered a questionnaire on sociodemographic variables, smoking habits and Job Content Questionnaire (JCQ). The JCQ consists of scales of job control, job demand, supervisor support, co-worker support, job insecurity, job decision latitude and job skill discretion. Behaviour therapy with free Nicotine Replacement Therapy (NRT) was given as treatment for two months. Participants were contacted at 1 week, 3 months and 6 months to determine their smoking status.

Results: One hundred and eighty five staff from both Universities responded and voluntarily showed interest to quit. At 1 week, 55.7% (N=108) of smokers quit, while at 3 months and 6 months the percentage of quitters declined to 14.6% (N=27) and 13% (N=24) respectively. After adjusting for sociodemographic variables and smoking
history logistic regression revealed that there was no difference noted at 1 week. At three months (OR=8.96; 95% CI: 1.14; 70.76) and six months (OR=8.9; 95% CI: 1.20; 82.68), men with higher co-workers’ support demonstrated a higher likelihood of quitting. Smokers in a “passive job” also demonstrated higher likelihood of quitting compared to relaxed category at six months (OR=9.92; 95% CI: 1.20; 82.68). No meaningful associations were found between other psychosocial job variables and smoking cessation.

**Conclusion:** Good relationship with co-workers and their support are important factors for worksite smoking cessation.

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**METALLOTHIONEIN GENE EXPRESSION IN PERIPHERAL BLOOD LYMPHOCYTES AS BIOMARKERS OF CADMIUM EXPOSURE AMONG DIE CASTING MALE WORKERS IN SELANGOR**

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**Introduction:** Die casting processes probably emits cadmium (Cd) which causes Metallothionein (MT) gene expression and can be measured by quantitative reverse transcriptase polymerase chain reaction (RT-PCR) is applicable as a biomarker of Cd exposure. Objective of this study is to determine the relationship between urinary and blood concentrations of Cd with MT gene expression in peripheral blood lymphocytes among die casting male workers.

**Methodology:** A cross sectional study was carried out on 61 respondents. 33 respondents who performed task in die casting process were chosen as the exposed group while 28 workers who performed task in the administrative division considered as the comparative group. Questionnaires were administered to obtain the sociodemography information of respondents. Early shift urine sample was taken from respondents to determine urine cadmium (UCd) concentration using Graphite Furnace Atomic Absorption Spectrometry (GFAAS) and blood sample was taken to determine the blood cadmium (BCd) concentration using GFAAS and MT gene expression level using RT-PCR.

**Results:** The mean±SD for UCd level was 0.037±0.047μg/g creatinine for exposed group and 0.025±0.031 μg/g creatinine for comparative group and the difference was not statistically significant (Z=1.369, p=0.863). The mean±SD for BCd concentration was 0.729±0.11 μg/dL for exposed group and 0.323±0.156 μg/dL for comparative group and the difference were statistically significant (t=9.95, p=0.001). The mean±SD MT basal expression was 1.91±0.28 for exposed group and 1.69±0.28 for comparative group and the difference was statistical significant (t=2.391, p=0.02). The mean±SD MT induction expression was 2.62±0.54 for exposed group and 2.11±0.36 for comparative group and the difference was statistically significant (t=3.56, p=0.001). The relationship between MT basal expression and BCd in exposed group showed a significant moderate positive correlation between the two variables(r = 0.487, p=0.004) and the relationship between MT induction expression and BCd in exposed group showed a significant weak positive correlation between two variables (r=0.167, p=0.035). Both MT basal expression and MT induction expression showed no significant relationship with UCd in exposed group with r=0.09, p=0.067 and r=-0.199, p=0.763 respectively.

**Conclusion:** There was a significant correlation between BCd level and MT gene expression. BCd and MT basal expression in appears to be a strong biomarkers for Cd recent exposure.
COMPARISON OF DIAGNOSTIC METHOD IN SCREENING VIBRATION INDUCED SENSORINEURAL IMPAIRMENT AMONG SHIPYARD’S GRINDERS

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Introduction: This study investigate the diagnostic value of 2 different tests; Semmes Weinstein Monofilament (SWM) and Purdue Pegboard (PP) tests in determining the sensitivity and specificity of the rapid test as compared to the use of vibrotactile perception threshold (VPT) test.

Methodology: A total of 67 grinders in a shipyard’s fabrication company participated in this study. Self-administered questionnaire was used to collect information on socio-demographic background, occupational exposure histories, medical histories, signs and symptoms of HAVS from respondents. The three quantitative sensorineural testing were subsequently administered to all respondents.

Results: Analyses of sensitivity and specificity found that monofilament at 0.16g force best discriminate HAVS from healthy while Purdue Pegboard test shows best diagnostic value of indicating HAVS at minimum insert of 16 pin and 14 pin respectively for dominant and non-dominant hand.

Conclusion: Both Semmes Weinstein Monofilament and Purdue Pegboard tests has limited diagnostic value to be used as screening tools for early detection of HAVS.
POSTERS
IN VITRO COMPARISON OF PULMONARY EXPOSURE TO ARSENIC IN CEMENT AIR AND SETTLED DUST

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Introduction: Science and technology advancement increases the number of threatening factors of health and those of occupational hazards and diseases day by day. Today, people speak of many cases of pollution each of which has its own cause. Workplace air pollution can have undesirable effects on man’s health over time. Access to healthy workplace is not possible without identifying and neutralizing those factors that endanger the health and safety of man’s job. The present study was done aiming to determine the rate of solubility of arsenic in pulmonary exposure for toxicology investigations.

Methodology: In the present cross-sectional study, samples were collected from air and settled dust according to OSHA standard. Leaching tests were conducted in similar conditions of the lungs (PH approx. 7.4, temp. 37, and CO2=5%) to determine the rate of solubility. An atomic absorption apparatus model Spect AA220 with graphite furnace model GAT110 were used to determine the solubility rate. The data were processed by means of SPSS software.

Results: The amount of this metal ion in air dust was $57.36 \pm 4.68 \, \mu g/g \text{ air dust}$ and that extracted from simulated alveolar fluid was $0.013 \pm 0.0046 \, \mu g/g \text{ air dust}$. Spearman correlation coefficient test didn’t show any significant relationship between them ($P<0.05$). Also the amount of metal ion in the settled dust of cement was $0.69 \pm 0.11 \, \mu g/g \text{ air dust}$ and that extracted from simulated alveolar fluid was $0.11 \pm 0.0018 \, \mu g/g \text{ air dust}$. However, Spearman correlation coefficient test showed a significant relationship between them ($P=0.01$). Comparison between the amounts of metal ion from airborne particles and that of settled revealed that there was a significant relationship between the amounts of the metal ion of arsenic from the air and settled samples.

Discussions: The significant relationship between the amounts of the metal ion from the air and settled samples can be attributed to the particular chemical properties and conditions of this metal ion regarding to its location relating to the center of the particle. Results show that the sizes of particles play an important role in the solubility and release of the studied metal ion. Small particles (aerosol), due to this wider contact surface than bigger ones (deposited), can solve greater amount of the relevant metal ion.

EVALUATION OF NOISE POLLUTION IN SMALL INDUSTRIAL WORKSHOPS IN BIRJAND CITY (iran)

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Introduction: Noise pollution is one of the work problems and its reduction is to be considered in most industrial units. Actually, one of the damaging factors affecting workers’ health is the noise pollution that exists in workplace and small industrial units are not an exception and because of several reasons are less investigated. Regarding that there are a great number of various small industrial units in Iran and they are approaching many damaging factors, therefore, the present study was conduct to determine and investigate the noise pollution level in different parts workshops, to determine allowable areas and to identify the source of sound generation.
Methodology: In this cross-sectional study, 14 small industrial workshops with less than 50 workers from 6 different craft unions were randomly selected and investigated. To measure the sound pressure level in the above mentioned workshops we used a sound level meter model cirrus according to ISO 9612: 7997 standards in the selected station and before each measurement, the sound level meter was calibrated by calibrator Model CR: 513A which generates 114dB (decibel) in one KHz. The time of measurement and other interfering factors were also considered.

Results: The results showed that the lowest noise level belonged to car mechanic workshops with 85.3 (decibel) and the highest belonged to Iron door-and-window and Iron tanker workshops with 103.7 and 104.7 dB respectively (noise level generated by hacksaw). Noise level that were measured in the workshops were higher than the TLV of 85 dBA that this is significant with p<0.05.

Discussions: The sounds, generated by hacksaws in iron tanker and iron door-and-window workshops, that are highest among other sound generating devices, can be reduced by sharpening the hacksaws and correct lubricating of the machineries. Regarding that sound pressure levels in the studied workshops are higher than the allowed limit, it is necessary that required training about personal protective equipment and how to select them be provided considering that the workers who work in those workshops have little knowledge about damaging effects of noise pollution.

COMPARATIVE STUDY OF THE QUALITY OF LIFE AND GENERAL HEALTH OF THE WORKERS OF FARZAD TILE FACTORY IN BIRJAND 2010

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Introduction: Health is one of man’s essential needs that have a crucial role in sustained development. Although, at first only physical health was considered as “health”, reaching to an acceptable level of physical health and fight against many diseases man has paid attention to other aspects of health such as mental health. Various mental and social problems cause disorder in normal process and quality of life. Quality of life has a multi dimension and complex concept and is often considered as a specific understanding of life satisfaction, physical health, family and social health, hope, and mental health. Workers state of health and quality of life is to a great extent influenced by their work situation and type of job (occupation). The present study was done aiming to compare the quality of life and general health of the workers of Birjand tile factory in 2010.

Methodology: In this cross-sectional-descriptive-analytical study, all the qualified workers that could participate in the study were selected by census method. Data was collected using a three sectional questionnaire that included demographic characteristics (age, marital status, number of children, education...), standard questionnaire (SF36) of the quality of life and standard questionnaire (GHQ28) of general health. The 36 item questionnaire of the quality of life included 8 scales or concepts involving physical function, limitation in role playing due to physical and emotional problems, bodily pain, social activities, mental health, feeling of joy and understanding of general health.

Results: The results showed that the workers' mean age was 26.18 ± 4.6. 46.7 % of them were single, 66.7 % did not have children, and 25 % had a second job. In the present study it was revealed that 81.7 % of them were in desirable state of health; the results showed that there was a significant relationship between their health and shift work. Also, there was a significant relationship between aspects of the quality of life (physical function (PF), bodily pain (Bp), and mental health (MH)) and workers state of health. There was no significant relationship between state of health with marital status, second job and the number of children. Also, a significant relationship was observed between different health areas such as anxiety, sleep disorder, and social activities with shift work.

Discussions: Anxiety, sleep disorder, and change of social activities in shift work can overshadow the workers' health.
INDOOR AIR QUALITY AND PREVALENCE OF SICK BUILDING SYNDROME AMONG OFFICE WORKERS IN TWO DIFFERENT OFFICES IN SELANGOR

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A cross sectional study involved 170 office workers consists of 85 office workers for each building; new and old building, in Selangor. The selection was based on the inclusive criteria to determine the relationship between the IAQ and SBS. IAQ was measured using specific instruments recommended by IAQ Code of Practice, DOSH, Malaysia while the prevalence of SBS was determined by using questionnaire based on Indoor Air Quality and Work Symptoms Survey, NIOSH, Indoor Environmental Quality Survey (1991). IAQ supplied air was significantly higher in the new building with the median 22.49 cfm/person while 15.79 cfm/person in the old building (z = -6.23, p < 0.001). The prevalence of SBS in the old building was significantly higher compared to the new building (x² = 30.6, p < 0.001). Mann Whitney U test showed that the levels of indoor air pollutants in the old building were significantly higher compared to the new building for: CO₂ (z = -4.62, p < 0.001); TVOC (z = -2.71, p < 0.05); PM10 (z = -2.11, p < 0.05); PM2.5 (z = -2.35, p < 0.05), meanwhile for UFP (z = 4.72, p < 0.001) and THI value (z = -4.57, p < 0.001), the new building showed significantly higher compared to the old building. There were no significant associations between the IAQ level and the prevalence of SBS in the old building (OR = 0.99, 95% CI = 0.399 - 2.481) and the new building (OR = 1.23, 95% CI = 0.468 - 3.28). Moreover, there was significant association between the prevalence of SBS and the indoor air pollutants in the old building namely CO₂ (OR = 3.56, 95% CI = 1.327 - 9.548); CO (OR = 4.95, 95% CI = 1.740 - 14.127); TVOC (OR = 4.71, 95% CI = 1.571 - 14.151); PM10 (OR = 6.23, 95% CI = 2.278 - 17.065) and PM2.5 (OR = 4.18, 95% CI = 1.564 - 11.199), while in the new building, the prevalence of SBS showed significant association with an indoor air pollutant namely UFP (OR = 6.53, 95% CI = 1.757 - 24.327). After controlling the co-founders; age, medical condition, smoking and having pet at home, the results showed that CO₂, CO, TVOC, PM10, PM2.5 influenced SBS in the old building while UFP influenced SBS in the new building. As a conclusion, high level of indoor air pollutants, temperature and humidity may influence the prevalence of SBS among office workers.

ASSOCIATION BETWEEN THERMAL COMFORT AND WORK-RELATED SYMPTOMS IN LOW ENERGY OFFICE BUILDINGS, PUTRAJAYA

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Ministry of Energy, Water and Green Technology, Malaysia have raised their important concern regarding the issues of workers comfort and workspace quality in a Low Energy Office (LEO) building. New energy efficient building concepts and technologies require a revision of comfort standards, to create suitable thermal condition in avoiding occupants’ dissatisfaction, adverse effect on their productivity and overall building performance. A quantitative assessment was conducted in a LEO building, in Putrajaya using Babuc-A (Portable air quality monitor) and a qualitative assessment using set of questionnaire adapted from ASHRAE and IEQ survey questionnaire. Total of 99 respondents were chosen using a stratified random sampling and based on the worker preferences, the results showed that sinusitis (x²=7.50, p<0.05), eczema (x²=8.60, p<0.05) and fatigue (x²=10.24, p<0.05) was reported for the last four weeks and stuffy nose (x²=8.59, p<0.05) was a current reported symptoms on the studied day. However, statistical study showed no significant association between work-related symptoms and PMV for LEO building suggesting that the current thermal environment did not cause the work-related symptoms in the office. The thermal comfort zone for this building was in the temperature range of 21.6°C to 23.6°C and relative humidity of between 42 to 54 percent. The results suggested the thermal condition was in the acceptable range of ISO 7730 (calculation of PMV and PPD) and that a lower room temperature was preferred by Malaysian in office environment compared with the temperature criteria cited in ASHRAE Standard-55.
NURSES' PROFESSIONAL BURNOUT AND SOME PREDISPOSING FACTORS

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Introduction: Nurses are exposed to different types of stresses during their work. As a stressor, "burnout" is the decrease of personal adjustment with chronic stress leading to physical and emotional discomfort, negative attitude towards the profession while on duty. According to Maslach's theory organizational factors, interpersonal relationships, and intra-personal factors are the major causes of burnout. This condition brings about a lot of complications in one's family, personal and social life, and organization. This survey was designed to evaluate burnout rate among nursing staff in teaching hospitals in Birjand.

Methodology: This descriptive- cross sectional study was performed on all nursing staff of teaching hospitals in Birjand, who were selected through census sampling. Data gathering means were a multisegmental questionnaire including demographic characteristics, and Maslach burnout inventory (MBI); to evaluate emotional exhaustion, depersonalization, and lack of personal accomplishment. In order to analyze the data, statistical tests including x2, Pearson's correlation coefficient, and independent t-test at the significant level P≤0.05 were used.

Results: More than third (35.5%) of the individuals, reported weak emotional exhaustion, 54.2% intense depersonalization, and 37.5% intense lack of personal accomplishment. The nurses' professional burnout rate between male and female in the domain of emotional exhaustion (P=0.02) and in depersonalization (P=0.034) were significant. Lack of personal accomplishment mean score was also varied between married and unmarried subjects (P=0.028). There was also a significant difference in the frequency of depersonalization in different working shifts (P=0.029).

Discussion: Job burnout is a common phenomenon among nurses. It is related to a number of factors such as working condition, work experience, high workload, stresses, job satisfaction, gender and hardships of working condition. Therefore it is suggested that these factors be surveyed more precisely and find ways to reduce job burnout.

EVALUATION OF THINNER EXPOSURE, KNOWLEDGE AND PRACTICE AMONG FURNITURE WORKERS IN BANGKOK

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Introduction: Toluene and acetone are classified as one of the demolishing organic solvent that the workers are risky to sickness from their work from exposing to thinner. As for the development of toxin it may be both acute and chronic. Thinner can enter into the body in 3 ways, i.e. respiration, eating and skin at low temperature and moisture. When it enters into the body it quickly disperses into the blood system and passes to central nerves system, liver, kidney, heart and muscle, etc. The study group who is working as the furniture workers using exposed thinner in their work is risky to easily this substance which may get sick and are dangerous to their health. With these reasons, we has researched the title “Evaluation of Thinner Exposure, Knowledge and Practice among furniture workers in Bangkok” in order to know the risk and helpful in looking for the way to adjust and remedy inclusive of promoting health. Objectives: 1. To measure the concentration of thinner (toluene and acetone) in the atmosphere of the working place and its metabolites in the urine; 2. To evaluate the knowledge and practice when exposing to thinner of the furniture workers in Bangkok.

Methodology: 1. The type of this research is a cross-sectional study; 2. Population studied and size of the sample: - A total of 193 subject samples- Subject samples are male: (1) Case = 97 persons who are furniture workers and exposed with thinner and (2) Control = 96 persons who are not furniture workers and not exposed with thinner; (3) Data collection: 3.1 To general interview by using questionnaire (after the work); 3.2 To collect urine sample
(after the work) for analysis hippuric acid level and acetone level; 3.3 To collect air sampling (personal sampling) for analysis the concentration of toluene and acetone by using 3M Organic Vapor Monitors 3500.

**Results:** 1. The total study groups are 193 persons: case = 97 and control = 96, 100% are male and most of their average are 34.3 years and control is 33.5 years; 2. Most of their main daily work (furniture workers) of the case last for 4 hours (41.2 %), while the control has the main duty last for 4 hours (25.0 %) for each week; 3. 42.3% of case use respiration protection equipment while the control does not use PPE (94.8%) and the case use cloth mask to cover their nose; 4. The case (more than 80.0 %) group has knowledge correctly about the danger of thinner; 6. The average of the concentration of toluene levels in atmosphere of the work place for case (n= 97) is X + SD = 11.99 + 14.85 ppm and the control group (n=48) is X + SD = 0.23 + 0.17 ppm. There is statistic significant difference at level of 0.001. For the average of the concentration of acetone levels in atmosphere of the work place for case is X + SD = 9.25 + 7.40 ppm and the control group is X + SD = 0.40 + 0.29 ppm. There is statistic significant difference at level of 0.001.

**Discussion:** The party concerned should arrange to publicize and set up a campaign for the knowledge of the danger and the way to protect when working with chemicals and should provide personal protective equipment suitable for the type of work inclusive of correct maintenance and usage of them for the case or the operator of furniture workers. This is done in order to add and promote the knowledge and understanding for the protection of personal health and provide more safety in the future. Furthermore, Occupational health surveillance should be conducted in order to improve workers’ health. Furniture workers should be given training so they understand the reasons for using protective equipment and learn how to use it properly.

### STUDY OF THE QUALITY OF LIFE IN SHIFT AND FIXED WORKERS OF TILE FACTORY

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**Introduction:** The quality of life has a multi dimensional and complex concept and involves objective and subjective factors and is often considered as specific understanding of life sat is faction, physical health, family and social health, hopefulness, socialization and mental health. Working in industrial occupations with social processes and require mints of 24 hour work is health threatening for workers. The present study was done in order to determine the quality of life shift and fixed workers of tile factory.

**Methodology:** In this descriptive analytical study, 30 shift and 30 fixed workers were investigated. Data collecting tool was a questionnaire consisting of two parts. Part contained demographic characteristics (age, state of marriage, number of children, and level of education...). And the second part was a SF36 standard questionnaire of quality of life. The former included 8 scales or concepts relating to body function, limitation in role playing because of physical and emotional problems, body pain, social function, mental health, feeling of joy and understanding of general health. The collected data were processed by means of statistical tests and using a SPSS software (with P<0/05).

**Results:** The results showed that 43.3% of morning fixed shift and 50% of shift workers were single (unmarried). 46.7% of fixed and 60% of shift workers had no former employment record; 36.7% of fixed and 13.2% of shift workers had a second job. The findings of the study showed that 13.3% of fixed and also 26.7% of shift workers believed that the state of health was worse than that of last year. Also, there was no significant relationship between the quality of life and level of education. Among different aspects of the quality of life, only mental health (MH) had a weak relationship with shift working of the workers. There was no significant relationship between workers age and the quality of life and shift working. In addition, no significant relationship was observed between the number of children and the quality of life.

**Discussions:** Regarding the results of the study, shift working had no considerable effect on different aspects of the workers quality of life and conducting further studies in this filed is recommended.
STUDYING THE RATE OF THE PREVALENCE OF DOMESTIC VIOLENCE AND BIRJAND EMPLOYED AND HOUSEWIVES WOMEN’S ATTITUDE TOWARD THIS PHENOMENON

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Introduction: Domestic violence is the most common form of violence against women in the world with the greatest social, psychological and economic consequences. The main aim of the present study is to determine the rate of the prevalence against women.

Methodology: To achieve this goal the present descriptive-analytical study was conducted. 414 women, employed and housewives, from Birjand were selected by multi-stage and simple-no probability method and self-made questionnaire was used. After questionnaire was gathered, primary data were coding, and then data files in spss software were formed and compiled and analyzed. The data were stated by means of analytical tests (x2 and one-way and T-Test with P<0.05) in the form of tables.

Results: The findings of the study showed that 42.3% of the studied women believed that they were subjected to domestic violence. 45.7% of the subjects stated the violence to be verbal, 20.6% of them affective and the most common reasons for violence were: “the laws being biased in favor of men”, “family education”, and “mental disorders”. Due to the findings of the study 79.4% of the domestic violence’s were done by husbands. There was a significant relationship between age of marriage and physical violence (P<0.001). Also, there was a significant relationship between women’s unemployment and domestic violence (P<0.001). In addition, a significant relationship was seen between women’s attitude and their job (P=0.002).

Discussion: Regarding the high rate of the prevalence of domestic violence against women it is suggested that instructional courses on living skills be held and the spouses get informed about men and women’s rights. Also, it is recommended that women’s rights be respected by the society for the benefit of families, especially new young couples. In addition, by promoting communicative skills these women are supported.

PESTICIDES MANAGEMENT AND CHEMICAL HANDLING PRACTICES AMONG FEMALE WORKERS IN SEVERAL ESTATES IN PENINSULAR MALAYSIA

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Introduction: In the last few decades bad working practices among female pesticides sprayers were observed in a few estates in Malaysia. Malaysian government has demonstrated a significant shift in the improvement of the safety and health of its workers. This awareness warrants an assessment of the working practices and pesticide management programmes in the estates that pose health risk to female pesticides sprayers.

Methodology: The assessment was conducted among 102 female pesticide sprayers and consisted of completion of questionnaires and standardized checklist forms regarding working practices, pesticide management and personal protective equipment (PPE) provision and compliance based on the guideline by Department of Occupational Safety and Health (DOSH), Malaysia.

Results: Twenty-six types of pesticides were identified as being used in the estates. Types of pesticides used ranged from Class 1b to Class IV. The workers were exposed to pesticides approximately 24 to 30-hrs per week. In all estates, a “cocktail preparation” involving the mixing of herbicides, insecticides and fungicides in one spraying
preparation was often practiced. A total of 13(13.7%) workers reported experiences with pesticide tank leakage and 22(23.4%) workers reported accidental contact of the pesticides on their faces. A quarter of female pesticides sprayers ate and drank whilst handling pesticides. Most workers did not change clothes 66(64.7%) and wash 82(80.4%) after completing the spraying activities. All workers were provided with complete DOSH certified PPE. The obvious problems with the management were providing inappropriate PPE, and lack of proper toxic waste disposal systems.

**Discussions:** Pesticide Class 1b is highly hazardous and should be banned or its usage severely restricted. Mixing pesticides contribute to the possible higher health risks faced by the female pesticides sprayers. The pesticides exposure duration rating was 4 and thus high according to the 1-5 scale duration rating provided by DOSH. The female pesticides sprayers were likely to be at risk of exposure through inhalation when pesticides waft into their own faces and dermal absorption from tank leakages. Workers with poor personal hygiene were likely to be exposed to pesticides through dermal and ingestion routes. The usage of PPE in this study was much better than the conditions in some estates in Malaysia in the 1990s. Currently, employers of estates in Peninsular Malaysia show better commitment in providing PPE to their workers. However, improvement of safety and health measures are still essential as the female sprayers were still found to be at high health risk due to the types of pesticides used and their working practices. Medium to certify training and ensure that workers have at least a minimum level of knowledge on pesticides handling practices before they start working should be developed. PPE management could be reformed by detailing the selection and distribution of appropriate PPE to the individual workers, replacing the old and damaged PPE with new ones, as well as the storage and disposal of PPE through proper procedures.

**A CURRENT SITUATION OF FIRST AID FACILITIES AT WORK PLACES IN BRUNEI**

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**Introduction:** Based on Workplace Safety and Health Order 2009 Constitution Brunei Darussalam, ILO Convention (No. 161), Article 5 in 1985 and Title 29 CFR 1910.151(b) by Occupational Safety and Health Administration(OSHA) United States; a team from Occupational Health Division (OHD), Ministry of Health, assesses First aid facilities at worksites while doing routine workplace surveillance activities. This study reviewed the annual reports from 2007 to 2009 to know the current status of first aid facilities at work places in Brunei.

**Methodology:** A review of three successive Annual reports of 2007, 2008 and 2009 and worksite inspection reports was carried out. The parameters used during the assessment of First Aid facilities were provision of first aid boxes, the availability of first aid rooms and first aiders.

**Results:** It was observed in three successive annual reports that majority of workplaces did not comply with the regulations of first aid stated in Workplace Safety and Health Order 2009. The 2007, 2008 and 2009 reports showed percentage of satisfactory first aid boxes at 19 %, 28% and 37 % respectively. Many workplaces without any first aid boxes were observed: 14% in 2007, 33 % in 2008 and 39 % in 2009. At some work sites, even though a first aid box was available, contents were incomplete or with expired date (67%, 46 % and 24 % in 2007, 2008 and 2009 respectively). Only a few industries had a first aid room at14 %, 19 % and 10% for three successive years (2007, 2008 and 2009). Only a few workplaces had sufficient trained first aiders from 2007 to 2009 at 22 %, 38% and 20% respectively. A few worksites with first aiders present had insufficient numbers in the two years, 6 % in 2008 and 5 % in 2009. Majority of work sites were without first aiders at all and it was consistently seen in all three years studied: 78 %, 63% and 76 % in 2007, 2008 and 2009 respectively.

**Discussions:** From the reports, it is concluded that majority of industries did not comply well with the Health and Safety order 2009 which stated the mandatory provision of first aid facilities at workplaces. However, more first aid boxes availability was seen in 2008 and 2009, which might have been resulted due to visits of OHD team. Moreover, worksites seemed to pay more attention with the contents of the first aid box as the percentage of incomplete or expired contents in first aid box became reduced in 2008 and 2009.Industries need to be trained regarding first aid facilities to provide immediate first aid treatment at times of worksite injuries and accidents.
THE SURFACE COLOR EFFECT ON REFLECTION OF RADIANT HEAT FROM HEAT SOURCES

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Introduction: Many workers encounter with heat from thermal systems in workplaces. Heat sources can transit heat in different forms to workplaces that radiant heat is a heat transiting way that can be affected by several agents, for example, the effect of surface colors in absorption or reflection of radiant heat. Because of application heat sources in most of industries and encountering workers with radiant heat, evaluation of effect of surface colors on reflection of radiant heat in workplaces can be an important way to control and reduce encountering workers with it. The aim of this study is evaluation of effect of surface colors on reflection of radiant heat in the special condition in the lab.

Methodology: The present study indicates effect of surface colors on the reflection radiant heat. This study was done under the special condition in the lab (size of room 1.20 ×2.60 m with black walls). An obstacle was settled in middle of length of room, that it was connected to one of lengthy walls. A heat sources and two thermometers were settled in 50 cm of two slides of obstacle. Color surfaces were settled in front of obstacle in 40 cm. Color surfaces (49 ×45) were connected on white surfaces (64 ×59.5). Evaluated colors were white, yellow, red, blue, violet and green. After that ambient condition was ready, air velocity was measured by Kata thermometer, and it was controlled in the study. GTR, BBT and WBT were measured in the study to evaluate effect of color in heat radiant.

Results: Reflective heat of white surface was the most quantity and reflective heat of red surface was the least quantity. The results of this study show that color is an important and effective factor in reflective heat.

Discussion: Surface color should be considered as an important factor in workplaces. Because of limitation in this study, a small source and surface was used and for evaluating these results, researcher proposes that extensive study in real condition should be done.

INDOOR AIR QUALITY AND PREVALENCE OF SICK BUILDING SYNDROME AMONG STAFF IN GOVERNMENT HOSPITAL WARDS

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Introduction: This cross sectional study was conducted in five naturally ventilated wards and five mechanically ventilated wards in Hospital Kuala Lumpur. This study aims to determine the association between indoor air quality (IAQ) and prevalence of sick building syndrome (SBS) among nurses in hospital wards.

Methodology: A total of 110 female nurses between 24-29 years old were selected based on predetermined inclusive criteria. IAQ parameters (ventilation rate, temperature, and relative humidity) and indoor air pollutants (IAP) such as CO2, CO, TVOC (total volatile organic compounds), UFP (ultrafine particles), PM_{2.5}, and PM_{10} were measured by using specific instruments. A set of questionnaire was administered to the study population to determine SBS.

Results: The results showed that ventilation rate (z = -2.611, p = 0.009) and temperature (z = -2.611, p = 0.009) in naturally ventilated wards were significantly higher than in mechanically ventilated wards. For IAP, mechanically
ventilated wards showed significantly higher concentration of CO\textsubscript{2} than in naturally ventilated wards ($z = 2.514$, $p = 0.012$). UFP level in naturally ventilated wards were significantly higher than in mechanically ventilated wards ($z = -2.611$, $p = 0.009$). However, there were no significant differences of CO, TVOC, PM\textsubscript{2.5} and PM\textsubscript{10} between these 2 types of wards. This study found that 43.43% from total of nurses had SBS. There was no significant difference of SBS between nurses in naturally ventilated wards and mechanically ventilated wards. No significant associations of IAQ parameters and IAP with SBS in both types of wards.

**Discussions:** Difference exposure level of IAQ parameters and IAP between wards may contribute to different SBS symptoms among nurses. The findings of the lack of associations between these parameters with SBS in this study may not entirely exclude their possible link with SBS. Further study in low ventilation rate and high UFP level in hospital ward is required to determine its relation with SBS.

**THE AMOUNT OF HEAVY METALS OF CHROMIUM AND COPPER IN DRINKING WATER AND DISTRIBUTION NETWORK OF BIRJAND**

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**Introduction:** Today, natural resources management is one of the most essential prerequisites of sustained development in every country and underground water resources management, as the most vital water resources in a country like Iran, whose share of annual rainfall is considerably lower than the global level, is dramatically critical. Regarding the destructive effects of copper and tri and hexa valent chromium compounds contained in water, researchers conducted the present study aiming to determine the amount of heavy metals of copper and chromium in drinking water.

**Methodology:** In this study, first, samples were collected from drinking water wells (28 samples) and distribution network (39 samples) of Birjand by census method. The samples were transferred to water laboratory of health faculty under standard conditions. The samples were analyzed by an atomic absorption apparatus and standard method. The data were analyzed by using spss software and descriptive and analytical tests.

**Results:** The mean amount of chromium in drinking water resources or wells and distribution network of Birjand was 0.09164 and 0.05146 mg/l respectively. In drinking water resources, 7.1% of samples lacked chromium (desirable), 25% contained the maximum allowable rate of chromium (0.05 mg/l) and 67.9% were unallowable ($>$0.05 mg/l). In the distribution network of Birjand all the samples were undesirable due to chromium, 48.7% of the samples with the maximum permissible cream and 51.3% of illegal samples were unallowable. As to copper, all the samples were desirable.

**Discussions:** Regarding copper element there was nothing to be concerned about resources and network of drinking water of the city. However, in many cases, the amount of chromium was higher than allowable rate. This contamination is likely to have geological cause. Therefore, considering the carcinogenic behavior of hexa valent chromium and genetic damages of trivalent chromium, it is necessary to take appropriate actions.
THE RATE OF KNOWLEDGE OF THE WORKERS OF DAIRY WORKERS OF BIRJAND ABOUT BRUCELLOSIS

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Introduction: Brucellosis, as a common disease of men and animals is still a great problem in most parts of the world and from the point of health and economy view, it is of special importance. The present study was conducted in order to measure the rate of the knowledge of dairy factories workers of Birjand.

Methodology: In The present descriptive analytical study, all workers of dairy factories of Birjand were studied by simple census method. To collect data, we used a self-made questionnaire. The questionnaire was designed by library studies and review of seven faculty members. The data were obtained by completing the questionnaire or face-to-face interview (for illiterate of semiliterate workers) by three trained interviewers. Then, the data were put into computer after coding and analyzed by using SPSS software and descriptive analytical tests.

Results: The findings of the study showed that the mean age and job background of the subjects were 29±6.5 and 5.4 ±3.6 respectively. Among workers, 65% were married, 80% urban, 42.5% high school graduate. 92.5% of The workers had not passed educational courses of infectious diseases, and 45% of Then had The certificate of occupational health courses, and 5% of The subjects had The history of brucellosis infection, but only 10% of Then had good knowledge of brucellosis. The findings revealed a significant relationship between the level of knowledge and job background but no significant relationship was observed between the level of knowledge and variables of gender, marriage, place of residence and level of education.

Discussions: Regarding the low level of knowledge of the workers as an at risk population, it seems very important to provide relevant educational courses.

EVALUATION OF THE INTERFERING EFFECT OF USING MILK ON THE AMOUNT OF LIVER ENZYMES IN THE WORKERS OF COLOUR-MAKING INDUSTRY

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Introduction: In this study the amount of liver enzymes and the interfering effect of using milk on its reduction are studied.

Methodology: This study is done empirically and by a self-observing method on 62 workers of colour-making hall. Then it compares the amount of liver enzymes before and after using milk. Demographic information is collected by using questionnaire and the liver enzymes AST, ALT, in workers are measured. Drinking 200 cc of milk daily during 3 shifts of work begins among the workers, and after a year the liver enzymes again are studied.

Results: The average age of people under study is 31.5 ±8.84. And the average index of body mass is 24 ± 3.04(BMI). The amount of liver enzymes in workers reduce significantly after drinking milk and the percentage of people with an unnatural amount of ALT , AST , after a year of using milk is reduced respectively form 22.6% and 11.3% to 1.6%.

Discussions: As using milk is effective in reducing the liver enzymes of the workers in question, this interference can have an effective role on prevention or reduction of liver damage in people exposed to danger.
OCCUPATIONAL HEALTH SERVICES IN BRUNEI DARUSSALAM

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Introduction: Occupational Health Services in developing countries are, not yet, up to the levels seen in developed countries. There are many reasons for this status, some of them being lack of funds, lesser priority given and lack of human resources. In developing countries the workforce is mostly employed in agriculture and other types of primary production. Heavy physical work often combined with heat stress, occupational accidents, pesticide poisoning, and exposure to organic dusts and to biological agents are the principal causes of occupational ill health. In the least developed countries such occupational factors are aggravated by poor hygiene and sanitation, poor nutrition, and poverty. Brunei differs, somewhat, in some regards with more emphasis being given to oil industry. However, agriculture is on an upward trend and construction work too goes on in many areas. An important issue is that Brunei employs many expatriates in their workforce. This study looked at occupational health services provision.

Methodology: Meetings, interviews and personal communication with stakeholders and publications were used to obtain information.

Results: Comparatively, in relation to most developing countries, Brunei provides a good occupational health service through the Ministry of Health. Further, Oil companies have their own medical services providing good services. Training of doctors and nurses is done at the Ministry of Health and the University of Brunei. A very efficient surveillance system, managed by the Ministry of Health, is in place.

Discussion: Brunei can be said to be having a comparatively efficient occupational health services provision system than most countries in Asia. More occupational Health training to General Practitioners will further boost the status.

PREVALENCE OF METABOLIC SYNDROME AND ITS RELATION WITH SLEEP QUALITY IN PROFESSIONAL TRUCK DRIVERS

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Introduction: Recent studies suggest that poor sleep quality is associated with metabolic syndrome in the general population. The population of truck drivers is of particular interest, because they frequently work irregular shifts that in turn are associated with short-sleep duration and poor sleep quality. In addition, truck drivers have a high prevalence of sedentary habits, poor diet, and obesity. The present study aimed at verifying the prevalence of metabolic syndrome and its relation with sleep quality in this population.

Methodology: An observational, cross-sectional study comparing sleep quality in truck drivers with presence or absence of the metabolic syndrome. Total of 110 truck drivers were assessed and the variables studied were: body mass index, waist circumference, blood pressure, triglycerides, total and fraction cholesterol, and fasting blood sugar. The metabolic syndrome was defined according to the criterion set by the National Cholesterol Education Panel. Quality of sleep was measured with the responses to the Pittsburg Sleep Quality Index (PSQI).

Results: The average age was of 34.8 ± 1.9. According to the anthropometric data, it was observed waist circumference >102 cm in 51%, HDL cholesterol< 40/dl in 23.6%, triglyceride >150mg/dl in 21.8%, glycemia >110mg/dl in 11.8%. Hypertension prevalence was 9%. The prevalence of metabolic syndrome was 21.8%. Metabolic syndrome was found to be higher in group with poor sleep quality (25.4% vs 21%, P>0.05).
Discussions: The findings suggest that poor sleep quality may be a cause for metabolic syndrome. In truck drivers, poor sleep quality may be responsible for increased some features of metabolic syndrome.

PHYSICAL VIOLENCE AND ITS CONSEQUENCES AMONG HEALTHCARE WORKERS IN EMERGENCY DEPARTMENT

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Introduction: Emergency departments (ED) by their very nature are high stress for both the patient and staff. The 24-hour accessibility of drugs and potential hostages makes ED particularly vulnerable to physical violence. A person experiencing drug withdrawal symptoms may seek drugs at an ED and become violent when denied. In addition, many ED today face overcrowding and prolonged waiting times for patients and visitors that add stress to those already having difficulty coping with their situations. The aim of this study is to determine the prevalence of physical violence and its consequences among healthcare workers in ED.

Methodology: A cross sectional study was conducted in July 2009 until September 2009 among all staff working in ED Hospital Kuala Lumpur. The ED is one of the largest departments in Hospital Kuala Lumpur and the largest ED in the Ministry of Health Malaysia. The source population for this study was the permanent staff of the department whom had worked more than one year in ED Hospital Kuala Lumpur as the questionnaires required the respondents to recall their experience on being a victim of physical violence 12 months prior to the study. The questionnaire was a self administered questionnaire based on the validated and translated in Malay version of questionnaire entitled 'Workplace Violence in the Healthcare Sector' developed by the 'Joint Programme on Workplace Violence in the Health Sector ILO/ICN/WHO/PSI'.

Results: In our study, the prevalence of respondents who experienced physical violence was 13 (8.7%) from a total of 150 respondents and among them, nine reported that the attacker used weapon in the incident. Most of our respondents who had been physically attacked claimed that their attackers were the patients (84.6%) followed by relative of patients (15.4%). The time when physical violence incident happened mostly during late evening and night shift (69.3%). From 13 cases of physical violence, only two cases (15.4%) were reported. In both cases, the management was informed and only one of the two cases was reported to the police. In majority of cases (69.2%), the victim was afraid to report because of negative consequences that may arise following the reporting.

Discussions: As a conclusion, about one ten of staffs in ED had become a victim of physical violence and most of the perpetrators were the patients but the prevalence of reporting was still low.
SICK BUILDING SYNDROME IN CENTRAL BUILDING OF SABZEVAR MEDICAL SCIENCES

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Introduction: Aim of this paper is survey of indoor air pollution effects on health of staffs in central building of medical science.

Methodology: For this purpose a questionnaire that validity has been approved by niosh, was completed for the staffs in the four floors were busy.

Results: According to the 86.6% employees work full-time, the results showed during the past year about 18.4% and 30% were suffering from dizziness and fatigue and 10.5% felt sleepy and nearly 95% of people stated that the symptoms disappear after leaving work.

Discussion: Therefore, can be concluded that indoor air quality (IAQ) don’t have very favorable condition and on health and performance can be a significant impact in the long run if not improving. Therefore, observed symptoms are signs of Sick Building Syndrome (SBS).

A CROSS-SECTIONAL STUDY ON OCULAR INJURY BY ITS ASSOCIATED FACTORS AMONG PATIENTS ADMITTED TO HOSPITAL SERDANG IN JANUARY 2007 - APRIL 2009

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Introduction: There are various factors associated with ocular injury such as age, gender, nationality, ethnicity, work related factors and alcohol intake. The aim of this study is to determine the proportion of ocular injury by its associated factors among patients admitted to Hospital Serdang in January 2007 to April 2009.

Methodology: A hospital-based cross-sectional study design and universal sampling method were used. Secondary data was obtained from Hospital Serdang as for data collection. The data were transferred into a proforma. The data analysis was done using Statistical Package for Social Sciences (SPSS) version 16. Chi square test was done to determine the relationship between the associated factors of ocular injury.

Results: There were 118 proforma collected. There were higher proportion of ocular injury in male (92.4%); age group of 20-39 (59.3%), Malaysian (65.3%) and Malay (47.5%), 88.1% of the cases is unilateral eye involvement. 80.5% of the patients sought immediate treatment after ocular injury. Most common place of incident and source of ocular injury were industrial premises (33.1%) and blunt object (28.0%) respectively. Injuries occurred unintentionally carried 94.9% of all cases. 52.5% of ocular injuries were of non penetrating diagnosis. There were high proportion of ocular injury due to work related factors (44.9%) and low proportion of ocular injury due to alcohol intake (2.5%). Besides, there are significant relationship between types of nationality with work related factors (p=0.001) and types with sources of injury (p=0.001). There is no relationship between length of duration taken before treatment with sources (p=0.118) and types of injury among patients with ocular injury (p=0.175).

Discussion: In short, ocular injury is more common in male, age group of 20-39, Malay and Malaysian. High proportion of ocular injury due to work related factors and also significant relationship between types of
nationality with work related factors and types of ocular injury with sources of injury among patients with ocular injury.

PREVALENCE OF CARPAL TUNNEL SYNDROME AMONG COMPUTERS USERS IN A GOVERNMENT AGENCY IN TERENGGANU

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Introduction: In the last few decades, widespread uses of mouse-use and modern technology have caused an increase prevalence of diseases of repetitive strain injuries such as Carpal Tunnel Syndrome (CTS). Studies have shown that CTS among computer users ranked second for major lost time diagnoses, second only to low back strain. Hence, a study was done to determine the prevalence of CTS and its associated factors among computer operator in a government agency in Terengganu.

Methodology: Respondents who fit the inclusion criteria were randomly sampled and data were collected through Standardized Nordic Questionnaire (SNQ) and physical assessment of the handgrip and finger grip strengths, Tinel’s as well as Phalen’s test. A CTS was suspected if respondent complains the symptoms of CTS coupled with a positive Tinel’s and Phalen’s tests. For description and association testing, data were analyzed using SPSS 13.0.

Results: The prevalence of CTS among respondent was 14.5% (12/83). Majority of respondents were male (54.2%), older (> 35 years; mean age 37.6 ± 9.936) and married. There were significant associations between CTS with BMI ($\chi^2=4.701; p=0.03$), duration of work ($\chi^2=6.012; p=0.01$) and hand grip strength ($t=-2.28; p=0.026$) where those who had CTS tend to be overweight, worked longer (>15 years) and have lesser hand grip strength. However there were no significant association between sosiodemographic factors ($p>0.05$) and finger grip strength ($t=-1.75; p=0.081$) with CTS.

Discussion: The study prevalence of CTS was consistent with previous studies which ranged between 1-15%. A significant factor such as weight was also similar to others that showed a unit increase in body weight increases the CTS risk by 8%. Longer work duration also predispose respondent to prolong repetitive motion which can worsen the condition. As hand grip strength is useful in assessing the hand function, those with CTS had significant lower strength and this may be due to the neuropathy effect. In conclusion, weight and work tenure were identified as the significant factors associated with CTS among computer users and those with CTS had weaker hand grip strength.

PREVALENCE OF NECK PAIN AND 1 ASSOCIATED FACTOR AMONG MALE RUBBER WORKERS IN FELDA SETTLEMENT MALAYSIA

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Introduction: Rubber tapping processes posed potential risk of various health problems among rubber workers. It ranges from simple musculoskeletal aches to more serious and complicated structural damage to bone, muscles, tendons and nerves of musculoskeletal system. These health problems might be linked directly to the arduous demands of farm labor.
Objectives: A cross sectional study was conducted to determine the prevalence of neck pain (NP) and musculoskeletal disorders (MSDs) among rubber workers.

Methods: Stratified random sampling method was adopted and a total of 419 rubber workers in FELDA’s scheme Malaysia participated in this study. Data was collected through face to face interview using modified Standardized Nordic Questionnaire (SNQ).

Results: The results revealed the prevalence of NP was 59.9% and had significant weak but inverse correlation with age ($\rho = -0.184$, $p = 0.001$) and a positive weak correlation between working hours per day ($\rho = 0.099$, $p = 0.043$). All physical workloads (neck flexion or rotation, awkward postures, repetitive motion and static postures) had significant weak to moderate positive correlation with NP ($p<0.05$). Job insecurity was found to have weak and positive correlation with NP ($p<0.05$). Multiple logistic regression analysis showed risk factors for NP were decreased with age (OR= 3.92, 95% CI 1.61 - 9.58), increase in neck flexion or rotation (OR= 9.52, 95% CI 5.55 - 16.32), awkward postures (OR=2.23, 95% CI 68.129 - 3.86) and static postures (OR= 1.86, 95% CI 1.10 - 3.14).

Conclusion: This study showed that high prevalence of NP and in order to understand the mechanism of NP and MSD among rubber workers, detail research on ergonomic factors with anthropometry and biomechanic measurement are required.

IMPACT OF ISONIAZID AS CHEMOPROPHYLAXIS FOR TUBERCULOSIS PREVENTION IN MALAYSIA: AN AGE-STRUCTURED MODEL

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Introduction: Tuberculosis remains as one of the highest unresolved disease burden among re-emerging diseases in Malaysia for the last twenty years. High risk latent tuberculosis infection groups mainly healthcare workers and contacts are often neglected and underestimated. With current treatment protocol emphasizing among the infectives, we seek to find if combination treatment of these active cases with Isoniazid Preventive Therapy for high risk latent tuberculosis infection groups among non-HIV population would give greater impact on reducing incidence.

Methods: Our study aims to apply the use of infectious disease modelling to study the progression of latent tuberculosis infection among non-HIV population in Malaysia, and to assess the impact of Isoniazid as preventive therapy on reducing incidence. We present a deterministic compartmental age-structured tuberculosis model which incorporates treatment of infectives as well as the preventive therapy. The model assumes that latently infected individuals develop active disease as a result of primary infection, endogenous reactivation and exogenous reinfection. We start by formulating and analyzing the model without any intervention strategy then, we extend to incorporate the preventive therapy and treatment of infectives. The epidemic thresholds known as reproduction numbers and equilibria for the model are determined, and stabilities analyzed. The reproduction numbers for the model are compared to assess the possible community benefits achieved by treatment of infectives, preventive therapy and a holistic approach of combination of both intervention strategies. The model then further quantifies the effectiveness of preventive therapy for early latent tuberculosis infection and demonstrates how effective the therapy has to be to eliminate tuberculosis, when use in conjunction with treatment for active tuberculosis.

Results: Our analyses show that treatment of infectives is more effective in the first years of implementation of preventive therapy as treatment results in clearing active tuberculosis immediately and there after preventive therapy will do better in controlling the number of infectives due to reduced progression to infectious state.

Conclusion: Our model suggests that Isoniazid Preventive Therapy which identify and treat persons recently infected may have a substantial effect on controlling tuberculosis epidemics in Malaysia.
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Acknowledgement: Acknowledge grants awarded in aid of the study case (state in number of the grant, name and location of the institution or organization) as well as person who have contributed significantly to the study.

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