sure was associated with bone pain, and dust exposure with eye strain and viral exposure. Based on these results, a proposed chemical exposure rating was performed. For example, an exposure rating estimate of zero means no exposure either through dermal contact or inhalation. Moderate exposure is given an estimate of 2 which means that the subject is exposed for <50% of the total 8-hour workday. Very high exposure is above the TLV, which varies per chemical, and the exposure time >8 hours.
Conclusion: This is a significant study that looked into the actual amount of worker exposure to chemical, which may result in a chemical disaster.
Keywords: chemicals; exposure; hazards; health; occupational setting
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(247) Multidisciplinary Approach in Environmental Assessment of Chemical Spill Due to Mining in the Philippines

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Objective: The purpose of this study was to determine the health epidemiology associated with chemical spills in mining industries.
Methods: This was a preliminary study to establish a framework on how to investigate and manage chemical spills in the metallic mining industry in The Philippines. Consultations with experts from other disciplines such as sociology, epidemiology, occupational and environmental health, engineering, applied chemistry, and social work were obtained.

Chemical spills from mining industries are not uncommon in The Philippines. When such events arise, there is a need for a standard procedure for the proper investigation, gathering of data, and overall management of the situation. The basic elements of this process should include investigations of the workplace, of the immediate environment, and the community health in order to establish parameters of emergency management. Investigation of the workplace involves a detailed account of the industrial accident, the causes of leaks or spillage into the river system, and the breakdown of the work process, machines, and other facilities. Samples of water and soil are taken on a spatial basis in order to establish distance of affectation. Air sampling during chemical exposures provides data on concentrations.
Conclusions: This is a significant study that developed a standard management procedure on how to investigate chemical spills and contaminations from mining industries.
Keywords: chemical spills; consultation; management procedure; mining industries; The Phillipines
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Oral Presentations—Theme 16: Types of Disasters

Session 1: Chemical, Biological, Radiological, and Nuclear 1

Chairs: Victor Koscheyev; M. Ruijten

Standardization of Mobile Analytical Equipment for Chemical, Biological, Radiological, and Nuclear Agents in a European Country

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Background: Tactical hazardous materials (HAZMAT) response, medical treatment, and logistics are highly dependent on early identification of the chemical, biological, radiological, and nuclear (CBRN) agents involved.
Discussion: In 1998, the German federal government modernized its fleet of CBRN detection vehicles. By 2001, 371 vehicles were delivered to local fire stations. These "CBRN explorers" have been placed in strategic, geographically important locations in the country in order to assure shorter response times by rapid deployment of high-tech analytic capabilities. These vehicles are equipped with comprehensive CBRN analysis and measurement technology, telecommunication, geopositioning, meteorological, and personal protective equipment. The German government distributed these uniformly equipped CBRN explorers to assure more timely and consistent analytic capabilities in all geographic areas during HAZMAT disasters. In the United States, the fire departments' HAZMAT teams and other agencies own a variety of non-standardized analytical CBRN tools. The national standardization of analytical CBRN equipment for all US HAZMAT teams should be considered seriously.
Conclusions: The rapid and precise chemical and physical identification of HAZMAT is essential in order to adjust and optimize tactical, medical, and public safety responses. The German federal government has delivered standardized, high-tech analytic CBRN equipment throughout the county. This model of equipement standardization and widespread distribution of mobile CBRN units could serve as an international model.
Keywords: chemical, biological, radiological, and nuclear; Germany; hazardous materials; standardization; vehicles
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Dirty Bomb or Radiological Dispersion Device: Preparedness and Management Priorities

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Background: The detonation of a radiological dispersion device (RDD) has become a realistic scenario. The presence of radionuclides at an explosion site, along with triage, medical management, and logstics, will be made more difficult and complex by the unfamiliarity of rescue and medical personnel with how to prioritize exposed bomb victims.

Discussion: A RDD is a conventional explosive device mixed with radionuclides. Upon detonation, is disperses radioactive material. A RDD is not a tactical nuclear weapon and does not produce a thermonuclear reaction by fission. The use of a RDD by terrorists has become a likely scenario, and the presence of radioactive material makes rescue operations more complex. The greatest risk of immediate morbidity and mortality stems from the blast component of the RDD and not from the nuclear exposure. Hence, triage and rescue efforts of RDD victims should focus primarily on the traumatic injuries, followed by management of exposure to radionuclides. The protection of rescue and medical staff, detection capabilities, and a specialized support staff are essential in order to minimize irradiation, contamination, and incorporation by radioactive material of victims and staff. Continuous education and a sufficient supply of equipment aid the successful management of victims of a RDD. Staffing problems after a RDD detonation may arise from absenteeism and refusal to care for victims exposed to radionuclides.
Conclusions: The presence of radionuclear material after the detonation of a RDD complicates the rescue operation and treatment of victims. Continuous education, risk communication, and early deployment of equipment will contribute to the successful management of a RDD detonation.
Keywords: dirty bomb; emergency response; explosive; radionuclides; terrorism
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Prehospital Use of a Mobile Decontamination Unit: Influence on Body Temperature and Discomfort Experienced by Healthy Volunteers

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Introduction: Decontamination is intended to reduce or remove chemical, biological, or radiactive elements from the skin and clothes. Several different commercial solutions are available for prehospital use but there are no scientific reports on the decontamination process or its efficiancy.
Methods: An outdoor training session was arranged by the Helsinki Fire Department, the Helsinki Emergency Medical Services (EMS) and the Finnish Defence Force. Thirty-six healthy volunteers were exposed to a talc powder simulating a potential biological agent. The decontamination was performed using a field decontamination unit and a hazardous materials team. The decontamination process included the removal of clothing, showering with water, and drying. The efficiency was estimated by inspection and judged to be insufficient if any residuals of the talc powder were found The volunteers were asked to rate the discomfort they felt during the decontamination on a scale of 1–5. The tympanic body temperature was measured before and after the exercise. Data collection did not interfere with the exercise, and all participants gave their consent for collecting and using the data.
Results: All 36 volunteers were male, 24–47 years of age. Twenty-eight were walking and eight were non-walking. The mean body temperature before the decontamination was 36.6° C before and 35.1° C after the decontamination (p <0.001). The decontamination was estimated to be sufficient in 35 of 36 cases. Only one of all the volunteers judged the decontamination procedure as unpleasant (numbers 4 and 5 on the scale).
Conclusions: There was a significant reduction in body temperature caused by the decontamination. Decontamination was effective and discomfort caused by the procedure was minor.
Keywords: body temperature; contamination; decontamination; Finland; mobile decontamination unit
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Into the Hot Zone: To Go or Not to Go, That is the Question

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Countermeasures to chemical terrorism consist principally of two different sources: (1) the military; and (2) the civilian hazardous material (HAZMAT) teams. In response to urban chemical terrorism, the most effective countermeasure is likely to be a compromise between these two options. Currently, there is no international consensus regarding whether medical teams, including physicians, should be sent into a Hot Zone. Some first responders insist that medical teams should not be sent into a Hot Zone because, unlike first-responder HAZMAT teams, medical teams generally are not as well prepared. Preventing an increase in the number of casualties is the principal aim of civilian first responders. In Japan, some doctors have recommended that medical teams should remain in the Cold Zone, while doctors elsewhere have advocated that more direct medical control by medical doctors in the Warm Zone during decontamination is necessary. Several doctors in western countries have proposed that medical teams in the Hot Zone can save more lives. For example, specialized US marine field doctors operate in the Hot Zone. However, untrained medical teams are vulnerable and may be hindered in performing their tasks by the need to wear level A or level B suits. This choice is relevant particularly given that medical observations can now be conducted remotely using information technology. While the outcome of this debate is likely to depend on the potential risk to which medical teams will be exposed, one thing is certain; untrained persons should not be permitted into the Hot Zone.
Keywords: civilian; chemical terrorism; Hot Zone; medical response; military
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