Disaster Medicine in the 21st Century

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Disasters used to be accepted as inevitable in days of old when more often than not, natural disasters, except for wars, were the order of the day. However, as man's ability to self-destruct increased with what also was called "progress", and man-made disasters due to human carelessness became more common, technological disasters became a common occurrence. The last few years have seen the rise, in geometric fashion, of intentional disasters caused by vicious, publicity-seeking groups and individuals resulting in the production of numbers of casualties far greater than imagined not so many years ago. Disasters have been brought closer to home also by the advent of easier mass communications. With all of these occurring, our ability to cope does not appear to have improved proportionally.

The main reason for the lack of an improved coping strategy has been the general unavailability of a systematic and scientific method of the study of disasters. Until just a few years ago, most reports of disasters had been anecdotal. Publications were descriptive, rather than analytical. Factors leading to improved outcomes after occurrence of disaster-producing events were not appreciated.

However, the last two-and-a-half decades have seen multiple determined efforts to understand the mechanisms, management systems, and outcome determinants of various types of disasters. Perhaps, one of the most important events that initiated these international efforts was the founding of the Club of Mainz 25 years ago — the forerunner of the World Association for Disaster and Emergency Medicine (WADEM), and also the International Society for Disaster Medicine (ISDM), and the congregation of interested parties from all corners of our planet at least once every two years to share experiences and brainstorm together. Out of these grew a variety of documents, the most important of which were structured educational curricula for the teaching of medical care in disasters, and a template for the study, evaluation, and reporting of disaster events. The new science of Disaster Medicine has been born, not by the sudden popping of champagne bottles or any flurry of activity, but by the gradual realization that we now have available some scientific bases and methods for its study, evaluation, documentation, and determination of causation of outcomes, and therefore, the mechanism to employ the scientific method to apply interventions and study outcomes.

What form will Disaster Medicine take in the 21st century? With wisdom of hindsight, use of massive resources available in much of the learned world, medical leaders with foresight and an everlasting commitment to sharing of knowledge, we may expect at least some of the following:

1. Focused study of different types of disasters by students of Disaster Medicine, and the orderly reporting of these so as to gather the mass of evidence that is required to influence future practice.
2. More universal ability to initiate the study of the medical consequences of disasters in timely fashion, and then to promptly share these lessons with our medical colleagues in all areas of the world.
3. Identification of a set of basic and advanced medical skills that can be taught and be brought to bear in the earliest possible phase of disasters on the potential victims of the disaster.
4. Development of guiding principles for the organization of medical support in the initial phase of disaster management — the phase that traditionally results in the greatest loss and damage to life and limb.
5. Increased ability to work with other disaster workers so as to improve the mitigation effort in disasters.
6. Increased capacity to more reliably predict the medium and long-term health outcomes of less than optimal initial management of the disaster, and therefore, to take the necessary steps to minimize such undesirable outcomes.
7. Much greater capacity to study the needs for medical support in disasters, and very rapidly achieve international co-operative strategies to provide co-ordinated, focused, and appropriate medical and social assistance to communities affected by disasters.

Keywords: assistance; consequence; disasters; Disaster Medicine; evaluations; ISDM; research; service; WADEM
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Disaster Preparedness

Effect of Emergency Medical Services System Design on Initial Response and Treatment of Disaster Patients

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Objective: Disasters present multiple challenges to the medical response agency. The purpose of this study was to identify factors of Emergency Medical Services (EMS) system design that reduce morbidity and mortality immediately following the event.
Method: System designs from seven countries were identified for inclusion. Demographics from each site were collected as a baseline. Structural characteristics studied included dispatch sophistication, response methodology, resource deployment and redeployment strategies, communication capabilities, staffing requirements, and level of training.
Results: Surveys were completed by 18 systems on 25 structural characteristics. Results identified specific system design determinates that establish and effect level of performance. Comparison with defined performance indicators then was made to determine system components that impact medical response. Clear patterns emerged that provide strategies for the development of a system design best able to manage the disaster that incorporates existing political, cultural, and economic variables.
Conclusion: Of the factors impacting the ability to rapidly respond, treat, and transport patients from a disaster, the

design of the EMS system is the most influential. The dynamic use of performance indicators to analyze, modify, and refine structural characteristics will optimize system design and enhance organizational capabilities for a successful disaster medical response.
Keywords: disaster; EMS; organization; system design
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Establishing Health Epidemiology for Chemical Spills in Mining Industries

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Objectives: To look into health epidemiology of investigating and handling chemical spills in mining industries.
Methods: The research study was a preliminary study for a framework on how to investigate and handle chemical spills from a 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 done.

Chemical spills in the country from mining industries are not uncommon. When such emergencies arise, there is a need to develop a standard procedure on the proper investigation, gathering of data, and handling of the situation. The basic elements should include primarily the following: investigation of the workplace; investigation of the immediate environment, and health investigations among community dwellers, and establishing parameters of emergency management. Investigation of the workplace involves a detailed account of the industrial accident, the causes of leaks or spillage into the external environment such as the river system, looking into the breakdown of work process, machines, and other facilities. It also is necessary to establish the chemical composition and amount of use. Then, profiling of the external environment can be done for the ambient air, river site maps, and soil (whichever is affected). Samples of water and soil should be done on a scale and spatial basis to establish distance of affectation. Air sampling of chemical exposures shall provide data on concentrations. Then, affectation on livestock and people also must be investigated. This can be done by sampling nearby residents and getting some biologic samples from blood or urine, whichever is more efficient to establish biologic determinants. From such data gathering, the researcher can establish rating systems which are the most affected and serious areas/people and the consequent appropriate management.
Conclusion: A standard management procedure was developed on how to investigate chemical spills from mining industries to control and arrest the adverse effects of chemical spillage into the health, property, and livelihood of community dwellers.
Keywords: ambient air; biological monitoring; chemical spills; epidemiology; mining industry; monitoring
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Controlling Environmental Pollution Disaster from Industrial Emissions

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Objectives: To identify control measures for a possible environmental pollution disaster from industrial emissions. The Philippine Environment and Natural Resources has identified industrial pollution as a major pollutant of the environment next to vehicle emissions. The industry as the target area uses solvents such as Ethyl Acetate (EAC), Methyl Ethyl Ketone (MEK), Ethanol, and Isopropyl Alcohol (IPA) for the printing and lamination of plastics. The consumption of solvents is categorized as high using as much as 40–60 tons of mixed solvents. Therefore, there is a need to identify a control device to clean the air prior to emission into the external environment.
Methods: The study was conducted in a manufacturing industry with about 400 employees and in a highly populated community. Monitoring of exhaust emissions for various solvents was done using detector tubes, sampling pumps, and charcoal tubes.
Results: Ambient concentrations in the work area and stack emission concentrations indicated the following measurements which all were above the limit thresholds value (LTV) set by OSHA. Both workers and community dwellers were exposed to high concentrations of solvents that may cause diseases such as cancer and problems with reproductive health. Both adsorbent tubes were effective in reducing the concentrations of solvent fumes. The activated alumna was more effective for both MEK and IPA.
Conclusion: Environmental disaster from solvents in factories can be reduced by using adsorbents in the ducting system as an air control device.
Keywords: adsorbents; chemicals; ducting system; exhaust; industrial emission; pollution; solvents
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Disaster Surveillance Approaches for Technological Hazards in Semiconductor Industries

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The 21st Century has witnessed the growth of semiconductor industries in the Philippines as a response to the call of the government to invite more multi-national investments needed to stimulate the Philippine economy. As a result of this, semiconductor plants have been accommodated in export processing zones that focus on the back-end processing of semiconductor manufacturing, particularly the soldering of microchips on frames. Other machineries brought to the country include washing and degreasing facilities for the microchips which emit acids such as hydrochloric and sulfuric acids. This study documented allergic reactions related to this exposure. Lead soldering also was associated with spontaneous abortion among the women, including some cases with that eventually may lead to the development of leukemia. The use of