

involvement, and inter-sectorial planning; (2) health communication and promotion policies that facilitate both vertical and horizontal communication and share information among government agencies, non-governmental organizations (NGOs), and local communities; (3) coordination of aid at local, regional, and global levels, among private and public inter-institutional relief groups, and identification of local contexts and international providers; and (4) creation of a global culture of health and hazard mitigation planning that is dynamic, ongoing, culturally appropriate, and that fosters comprehensive medical/public health training programs.

**Keywords:** communication; coordination; disaster; Ecuador; global culture; hazard; mitigation; model; planning; public health; training; volcano

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### **Arsenicosis: A Public Health Challenge**

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A large part of West Bengal, India and Bangladesh are located in the Gangetic delta. Nearly 76 blocks in nine districts of West Bengal and two-thirds of Bangladesh are contaminated by arsenic. New areas in other states of India have been identified as having arsenic contamination in ground water tables. Due to possible toxicity in humans from this contamination, corrective/preventative actions are needed on an emergency basis.

The World Health Organization (WHO) has identified the safe limit of arsenic contamination in drinking water as 0.01 mg/l. The safe limit of arsenic contamination in drinking water tables has been identified by the Indian Government's Department of Public Health Engineering as 0.05 mg/l. Nine districts are identified as being contaminated by arsenic, including the city of Kolkata. In total, approximately 38,677 km<sup>2</sup> are affected, and place 13 million people at risk for arsenic toxicity. A conservative estimate places six million people as consumers of arsenic-rich water, causing health problems in >300,000 people.

People living in arsenic-risk zones, who have not tested their drinking and cooking water using a shallow tube well (50–180 feet) are at the greatest risk for arsenicosis. Also at risk for developing arsenicosis are people in communities in which: (1) any kind of arsenic removal plants were developed, but the plant no longer is operative; (2) the people are not using filtered water from the plant for drinking or cooking; and (3) any kind of arsenicosis symptoms have been identified in even a single person. People at risk for arsenicosis include: (1) poor people whose nutritional intake capacity is low; and (2) those <12 years of age and the elderly, due to their low body defense mechanisms. In addition, women are more vulnerable than men because women usually spend more time in the home, and are more likely to drink contaminated water, while men usually consume water outside the home, leading to reduced toxicity.

There are several medical/research/engineering institutions in the state of West Bengal that are working on different aspects of arsenicosis, including treatment, research, and engineering. Their clinical inputs can be separated into

four stages: (1) pre-clinical; (2) clinical; (3) complications; and (4) malignancy.

Arsenic is a major public health problem, especially in developing countries like India and Bangladesh. All of the stakeholders working in different dimensions must share information and work together for the public interest. The scientific information must be shared with the community, and some non-governmental organizations (NGOs) potentially could be partners.

**Keywords:** arsenic; Bangladesh; contamination; India; risk; treatment; water; West Bengal

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### **Free Papers Theme 3: Children in Disasters**

#### **Orthopedic Injuries in Children Following the Bam Earthquake**

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**Introduction:** Children are one of the most vulnerable age groups in natural disasters, in terms of both physical and psychological injuries. In this paper, pediatric orthopedic injuries following the earthquake in Bam, Iran, in December 2003 are assessed. Such an assessment helps determine the general preparedness necessary in a referral hospital that should admit pediatric patients in the aftermath of a natural disaster.

**Methods:** All patients <16 years old who were referred from Bam to three hospitals in Tehran (Milad, Imam Hossein, and Baqiyatallah Hospital) within one week of the earthquake were included. Questionnaires containing items about demographic data, types of injury, and operative/non-operative treatment were completed by visiting the cases and using their medical records. Injuries of limbs and the pelvis are discussed as orthopedic injuries, and classified in two groups: (1) joint/bone injury; and (2) soft tissue injury. Patients also are classified in three age groups: (1) <6 years old; (2) 6–10 years old; and (3) 11–16 years old.

**Results:** A total of 119 patients <16 years old were admitted in the hospitals during the period of the study. Thirty-three patients (27.7%) were <6 years old, 26 (21.8%) were 6–10 years old, and 60 (50.4%) were 11–16 years old. Of these, nine patients (7.4%) had only soft tissue injury, 25 patients (21.0%) had only bone/joint injury, and 49 patients (41.1%) had both kinds of injuries. In total, 83 patients (69.7%) had orthopedic injury. Both kinds of injury were much more common in the lower extremities than the upper. Of patients who had orthopedic injuries, 52 (62.6%) underwent surgery. The frequency of bone/joint injury and soft tissue injury was not significantly different among different age groups. Also, the need for surgery has not been correlated with a specific age group. The need for surgery was highest in patients suffering from both kinds of injury.

**Conclusion:** Following an earthquake, most of the referred pediatric patients, regardless of age, suffer from orthopedic

injuries. In such occasions, most of the orthopedic cases need surgery. Orthopedic surgery facilities and orthopedic surgeons are highly needed in referral hospitals after a disastrous earthquake. It should be noted that lower extremity injuries are much more to be expected than upper.

**Keywords:** Bam; children; earthquake; injuries; Iran; orthopedic; pediatric

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### Organization of Medical Help to Children and Victims of Terrorism in Beslan

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**Introduction:** On 01 September 2004, terrorists took over a secondary school in the city of Beslan, Nord Ossetia Republic. More than 600 of the hostages taken were children. **Methods:** On 02 September, the pediatric brigade of the All Russian Centre of Disaster Medicine, "Zaschita", flew to Beslan along with associates of the airmobile Hospital of the Ministry of Emergency of the Russian Federation. On the territory of a local hospital, modules of the children's field hospital (CFH) were constructed and medical equipment was mounted and tested. A training course for medical staff, which consisted of 20 doctors and nurses, was given. On 03 September, the admission of children wounded as a result of the terrorist take-over began at 13:15 hours. Adults were sent to a hospital admission division, and children were sent to the admission-triage module of the CFH. During the process of triage, children were divided into three groups: (1) in agony (5); (2) wounded—needed urgent medical help in vital indications (52); (3) wounded—must be evacuated to Vladikavkaz after receiving initial medical attention by a doctor (199).

**Results:** In the CFH, 311 children were admitted, including 256 wounded and 55 children who did not require medical assistance. A total of 47 surgical operations were performed, including seven surgical operations on the thorax and abdomen. In the hospital-evacuation module, reanimation was conducted until conditions were stabilized and evacuation to the Clinics of Vladikavkaz appeared possible.

A total of 385 children and adolescents, ranging in age from 1.8–18 years, were hospitalized in the Hospitals of Vladikavkaz and Beslan. Of those children, 146 required special methods of treatment and were transferred to Moscow (135) and Rostov (11). It should be noted that no children died during evacuation.

**Conclusion:** The efficacy of the medical-evacuation provision was determined by the timely planning and preparing of the system of medical provision, by cooperation between the Ministry of Health and the Russian Centre of Disaster Medicine, and by the unique accumulated work experience of pediatric formulations of the National Service of Disaster Medicine.

**Keywords:** children; evacuation; hostage; Russia; terrorism; triage

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### Are American Children Primary Targets of Al Qaeda Terrorism? Implications for Policy and Preparedness Planning

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Scholars and health practitioners have dedicated considerable thought to the physical and mental treatment of children in the aftermath of a terrorist attack. Likewise, education officials and others who oversee child-centered organizations have begun to develop plans for children in the event of terrorism affecting their facilities. However, most of the literature dealing with children and terrorism assumes children would be secondary or collateral victims as opposed to the intended targets. This latter possibility requires a different approach to preparedness planning on a number of levels.

While some have begun to consider the case of children as intended targets in foreign states, such as Israel and Russia, where terrorists have harmed children explicitly and successfully, little attention has been given to scenarios involving such threats in the United States. This is partly because there has not been an attack of this nature on American soil. However, a growing body of evidence suggests that international terror groups may well have such horrific scenarios in mind. American children, therefore, do face an explicit threat. Consequently, it is proposed that emergency responders be trained and preparedness models developed to protect and address the unique needs of children in the event of a terrorist attack, particularly those involving biological, chemical, or radiological weapons, which directly target children. This presentation considers the historical precedent of children as the intended targets of terrorism and the care for American children being explicitly targeted by Al Qaeda.

**Keywords:** chemical, biological, radiological (CBR); children; disasters; terrorism; United States

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### Pediatric Terrorism Preparedness: National Guidelines and Recommendations—Findings of an Evidenced-Based Consensus Process

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A cadre of experts and stakeholders from government agencies, professional organizations, emergency medicine and response, pediatrics, mental health, and disaster preparedness gathered to review and summarize the existing data on the needs of children in the planning, preparation, and responses to disasters or terrorism. This review was followed by the development of evidence-based, consensus guidelines and recommendations on the needs of children in events, including chemical, biological, and radiological terrorism. An evidence-based, consensus process was used in conjunction with a modified Delphi approach for the selection of topics and discussion points. These recommendations and