

an analyses of social adaptability for the disabled child; and 6) an estimation of need for prosthetics and subsidiary means. The database is used for guiding long-term, national programs, and for estimating the expenses of the material resources required for their use.

The database is designed for IBM-compatible, personal computers. The software is written in FoxPro 2.6 for Windows and operates under MS DOS. Transmission of information is provided to the Russian Centers for Disaster Medicine System for consultative purposes about children, victims in disasters using the INTERNET. Subsequent development will allow members of a co-operative network an opportunity of teleconsultations and teleconferences (presently done off-line).

**Key Words:** disaster medicine; database; disabled children

### Treatment of Children with Severe Compression Trauma

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During earthquakes (Armenia, 1988; Georgia, 1989; Sakhalin Island, 1995) and following apartment block explosions (Svetogorsk, 1995; Kaspiysk 1996), the incidence of compression trauma among hospitalized children was 24%. The prevailing cases suffered injuries of the extremities (>90%) accompanied by ischemic neuritis. There were 3–4 times more injuries of the lower extremities than those of the upper extremities, and 15.6% of the injured had fractures of long tubular bones.

The most common surgical procedure performed was fasciotomy (32.9%). After fasciotomy, 11% of the children had purulent wound complications. The best results were achieved using the so-called "subcutaneous" technique. The rate of amputations in the children with compression trauma ranged from 2.1% in Annenia to 10.7% on the Sakhalin Island.

Both conservative and surgical methods were used in the treatment of the patients with bone fractures and compression injuries. The most appropriate methods used were continuous skeletal traction and extra-focal and closed intramedullar osteosynthesis.

According to our experience, multi-organ failure (MOF) as a manifestation of "crush-syndrome" complicated treatment in 21.6% of the total cases. In the most severe cases, extracorporeal blood purification was used in 10% of the children with "crush-syndrome." Mortality in this group was 10.7%.

Therefore, the compression injuries in children caused by disasters are characterized by a high incidence of post-traumatic disabilities and high mortality rates.

**Key Words:** blood purification; children; crush-syndrome; disaster; multi-organ failure (MOF); treatment

### Intensive Treatment Administered to Children with Crush Syndrome (CRS) after the 1995 Sakhalin Earthquake

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The earthquake in Sakhalin in May 1995 resulted in almost 3,500 deaths. Sanitary losses among children made 269 persons that died. Medical institutions in Khabarovsk admitted 27 children within the first four days. The severity of the condition of victims who were extricated from under collapsed buildings where they had been for 8 to 48 hours was related mainly to traumatic shock, crush syndrome (CRS), and hypothermia. The main types of injury were: CRS of extremities, 17; fractures of extremities, 6; and brain injury, 4 cases. Eleven children were admitted in a traumatic shock condition and 7 children with hypothermia. All of the patients were at different stages of dehydration and hypovolemia. Acute renal failure developed in 22 of these patients.

All of the children received complex intensive therapy consisting of: anti-shock treatment; post-syndromic intensive therapy; active detoxification techniques; and surgical treatment. The complex of methods used made it possible to withdraw 25 patients from the critical condition; two of the children died.

Treatment results enable us to arrive at the following conclusions:

- 1) Patients suffering from CRS should undergo medical treatment only at top-quality medical institutions with mandatory attendance of resuscitators, nephrologists, traumatologists, surgeons, immunologists, and functional diagnosticians;
- 2) An adequate, unbiased estimate of each patient's condition is necessary at an every stage of medical treatment;
- 3) Intensive therapy for CRS should be complex and inclusive of infusion therapy, inotropic support, extracorporeal methods of detoxification, and syndromic therapy;
- 4) The best results of CRS treatment are attained using carefully selected detoxification methods based on individual clinical picture and laboratory findings; and
- 5) Surgical intervention may be dangerous for fear of uncontrollable fatal bleeding and should be undertaken for vital indications only.

**Key Words:** acute renal failure; children; crush syndrome; disaster; earthquake; hypothermia; hypovolemic shock; injuries

### The Organization of Micro and Reconstructive Surgery in Conditions of War—The Chechen Experience

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The specifics of war trauma are evident. Limb salvage procedures find their utmost application in a war scene. Employment of microsurgical procedures would help

decrease post-war disablement of people greatly. Our experience in Chechnya points out that among the victims of war, the people who suffer most are those living in a war-ridden city. It's not possible for them to get transported to central clinics in case of a medical emergency, and the city hospital facilities don't meet the demands of a microsurgical unit. This is due to unavailability of equipment and personnel. Moreover, there is a constant necessity for the war-surgeons to work on a make-shift basis.

We have shown that microsurgery can be performed with a minimum of portable equipment. During our one month mission to Chechnya, we performed 17 microsurgical operations and 12 reconstructive procedures. All other procedures were successful. The post-op care of patients undergoing micro and reconstructive procedures on extremities is not as complex as those after surgery of internal organs of similar duration and extent. This justifies the performance of microsurgery in conditions of catastrophe.

#### Conclusions:

- 1) In today's catastrophe surgery practice, we should include a micro and reconstructive surgery team. This would help prevent post-catastrophe disablement;
- 2) Microsurgery can be performed effectively on a make-shift basis, even though the county hospital may lack the facilities; and
- 3) Modeling of a light-weight, portable, surgical microscope that could be used in the place of a stationary microscope, will be helpful for the catastrophe microsurgeon.

**Key Words:** children; microsurgery; wars

#### Session 7A: Miscellaneous

Chairpersons:

J. Jakubaszko (Poland)

E. Soneide (Norway)

#### The Tokyo Subway Sarin Attack from the Disaster Control Viewpoint

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St. Luke's International Hospital experienced the aftermath of the Tokyo Subway sarin attack. We investigated what prehospital care was provided and how St. Luke's Hospital dealt with this disaster from the viewpoint of disaster control. We divided problems into five categories: 1) Prehospital care; 2) Decontamination; 3) Accommodation; 4) Triage; and 5) Medical information transmission.

Because of legal restrictions in Japan, paramedics could not act effectively during the Tokyo Subway Sarin Attack. As a result, the immaturity of the Japanese prehospital care system was exposed. The law should be

improved. An emergency medical system suitable for ordinary times cannot be applied for disasters. Disaster management not only is a medical issue, but also a social issue involving government, regional communities, hospitals, and citizens. Disaster planning for hospitals and citizens that is more open must be established. Public organizations should have mobile facilities for mass casualty decontamination. This not only applies to disasters involving Chemical Warfare Agents, but also to chemical disasters and nuclear disasters. Gas masks also are necessary for prehospital treatment. One systematic stream from registration to treatment is the principle of disaster deployment at hospitals. Establishment of communications that are strong enough to endure disaster is necessary. Concentration of information at one place is dangerous and a weakness in a disaster.

**Key Words:** communications; decontamination; disaster control; emergency medical services (EMS); laws; Sarin

#### Information Disorder in Hospitals During the Tokyo Sarin Attack in 1995

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More than 5,000 people were affected by the terrorist attack with nerve gas on 20 March, 1995 in Tokyo. Since it was unprecedented and unexpected, there was a severe lack of relevant information during the initial several hours in the involved hospitals. We investigated 210 hospitals/clinics by employing a set of questionnaires about collecting/providing poison information at the event.

The terrorists attacked subway passengers at about 08:00 hours (h) and the name of poison, sarin, was announced officially on television at 11:00 h by the Chief of the Metropolitan Police. This television announcement was the first information of the poison name for 145 (73%) hospitals/clinics, although treatments for acute organophosphate poisoning already had been initiated in these facilities. Only 19 (9%) hospitals had available medical documents on sarin poisoning at the time of the event. In half of the hospitals to which more than 50 casualties were admitted, only a few cases of acute organophosphate poisoning had been experienced previously. A specific antidote, PAM was out of stock in 156 hospitals/clinics (74%).

A variety of organizations provided therapeutic information about sarin poisoning to 157 hospitals/clinics (75%), mainly by facsimile transmission. The most important provider was Japan Poison Information Center (JPIC), and the second was a number of medical colleges. 73 (35%) hospitals/clinics requested advice from JPIC on the day of the attack. However, its telephone lines were constantly busy for several hours after the event.

One of the painful lessons of this terrorist attack is that more specific and effective information systems for medical facilities are necessary in a chemical disaster,