

ties, injury severity (by AIS 90), and impact on rescue structures were abstracted.

**Results:** Ten motorways accidents were studied. There were 433 vehicles involved, 156 wounded, and 20 dead motor-vehicle users. These accidents were related mostly to sudden changes in visibility and to variability of light and heavy traffic, and usually were triggered by sudden alterations in traffic flow; it was possible to identify some "black spots" at particular risk.

A motorway disaster frequently is configured with masses of impacted vehicles, separated by a few vehicles that did not crash. The worst consequences to vehicle occupants are often those situated in the middle or in the terminal sub-units of the accident. Therefore, it is difficult for rescue teams to recognize and acquire access to some severe impact zones within the main accident, and the narrow contact of deformed vehicles creates a dangerous situation in case of fire.

**Conclusion:** Motorway "disasters" are rare events (less than 1% of all motorway accidents), but dramatically severe in their economic and human consequences. A correct real-time information system for drivers and a greater distance between vehicles and vehicles in good repair could reduce their prevalence. Moreover, rescue organization must be planned accurately in order to overcome trouble in acquiring access to the scene and in triage of casualties.

### 309 Major Railroad Accidents in Japan in Last 30 Years

Ukai T, \* Ohta M, \* Tabuse H\*\*

\* Senri Critical Care Medical Center  
Osaka, Japan

\*\* Nara Medical College  
Nara, Japan

Trains have been accepted by the Japanese as the safest and most reliable means of mass transportation. However, 83 major railroad accidents occurred in the past 30 years, killing 339 and injuring 10,313 people. Causes of these accidents can be classified into several categories: 1) human errors by drivers or conductors; 2) combination of human errors and mechanical troubles; 3) mechanical troubles; 4) obstacles on the tracks; and 5) natural phenomena like floods and landslides.

As to rescue and emergency medical activities, several problems were pointed out repeatedly: 1) lack of command and coordination among the personnel from different organizations; 2) inappropriate triage; and 3) confusion of communications, especially those made by telephone.

Safety measures, such as Automatic Train Control and Automatic Train Stop (ATC/ATS), Obstacle-Detecting Devices, etc., have contributed to reducing railroad accidents. Yet, counter-measures to the problems of rescue and emergency medical activities have made little progress.

### 311 Lesson from the Gulf War

Ammar AS

King Fahd University Hospital  
Al-Kobar, Saudi Arabia

The Gulf War taught many valuable lessons about disaster planning and war injuries. The time interval between the invasion of Kuwait and the actual war gave sufficient time to revise and rehearse the local disaster plan. The plan was activated by a SCUD attack 500 meters from the hospital, where the American military personnel site was hit. This event demonstrated the disparity between rehearsal and actuality. Problems with the disaster plan, unexpected emergency cases, and the unusual types of injuries incurred are discussed.

**Conclusions:** 1) Disaster plans must be rehearsed frequently without warning; 2) Triage must be a continuous process, with follow-up assessment of the patient's changing condition; and 3) There is a need for constant updating of knowledge regarding the different types of injuries caused by weapons of mass destruction.

### 312 Prehospital Deaths in Three Earthquakes

Pretto EA, Angus DC, Abrams JJ, Klain M, Kirimli B, Safar P,  
and the Disaster Reanimatology Study Group

International Resuscitation Research Center  
University of Pittsburgh  
Pittsburgh, Pennsylvania, USA

**Objective:** To study the causes of death and mechanism of dying among a population of earthquake victims who were observed to have survived the initial impact, but who died prior to definitive treatment.

**Methods:** A retrospective, structured interview format<sup>1</sup> was employed that was aimed at eliciting responses from lay survivors, rescuers, health care providers, and disaster managers concerning first-aid of the critically injured, slowly dying victims they encountered after earthquakes in Armenia (Richter Scale magnitude [R] = 6.8), Costa Rica (R = 7.2), and Turkey (R = 6.8). In each case, a review of a sample of medical records also was conducted. Earthquake related deaths were classified as instant or protracted.

**Results:** The crude death rate (number of deaths/10,000 of total affected population) in these events was 424 in Armenia, four in Costa Rica, and 74 in Turkey. The wide variability in death rate can be explained on the basis of differences in population density, building type, and intensity and location of epicenter relative to population centers. The protracted death rate (number of victims who died slowly/total deaths x 100) was unknown in Armenia, 17% in Costa Rica and 53% in Turkey. The principal cause of death in both groups of victims was crush injury.

# JANUARY 1994

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
						1
				6	7	8
2	3	4	5	12	13	14
9	10	11	18	19	20	21
16	17	18	25	26	27	28
23	24	25	26	27	28	29

**NAEMSP  
Winter Meeting**  
January 6–9, 1994  
*Naples, Florida*

Focus on EMS Technology and Ethics

**Mark Your  
Calendars!**

# AUGUST 1994

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

For more information about  
NAEMSP conference and membership,  
please call 412/578-3222

**NAEMSP Annual  
Meeting and  
Scientific Assembly**  
August 11–14, 1994  
*Portland, Oregon*

**Conclusion:** A significant population of earthquake victims die prior to hospitalization as a direct result of crush injuries. This fact warrants improved disaster planning for prehospital emergency medical services and a better understanding of the pathophysiology and early management of crush injury.

**Reference:**

1. Ricci E, Pretto E, et al: *Prehospital and Disaster Medicine* 1991;6:159-166.

### 314

#### Impact of the 1989 Loma Prieta Earthquake on EMS Personnel and EMS Activities

Saunders C, Isaacs S, Pointer J, Martchenko J

Department of Public Health

San Francisco, California, USA

**Objective:** To characterize the activities of EMS personnel during the 1989 Loma Prieta earthquake.

**Methods:** Researchers sent a retrospective questionnaire to all prehospital care personnel in the San Francisco Bay area [California, USA]. Researchers interviewed selected personnel based on involvement in earthquake response activities.

**Results:** A total of 622 (41%) of the 1,508 personnel surveyed responded. Of the respondents, 35% indicated involvement in earthquake-related activities. Although most respondents felt resources were adequate and EMS activities sufficient and effective, numerous problems occurred. These included difficulties in reporting for duty, depletion of critical medical supplies, communications problems, coordination and control problems, jurisdictional conflicts, and incident-related stress.

**Conclusion:** Overall, emergency medical services (EMS) response was ample and effective although problems were identified. An examination of these problems has resulted in a number of vital considerations for future EMS disaster planning.

### 315

#### Sociopolitical Aspects of Disaster Management

Housepian EM

Columbia University

New York, New York, USA

Worldwide attention was focused instantly on the devastating earthquake in Armenia in 1988 and the nuclear disaster in Chernobyl in 1989 as a result of the glasnost policies pursued by President Gorbachev, prior to which numerous major natural and technological disasters were unknown. Media attention facilitated international response in both instances.

The vital process of recovery and reconstruction in Armenia, however, has been halted entirely by a total blockade of the Republic as a result of political turmoil in the region.

## PREHOSPITAL MEDICINE

### 320

#### Clinical Evaluation of Left Ventricular Asynergy Accompanied by Subarachnoid Hemorrhage

Ikeda Y,\* Masuola T,\*\* Kurosawa T,\*\* Kitahara T,\*\*

Akiyama H,\* Tsutsumi K,\*\* Soma K,\*\* Ohwada T\*\*

\* Internal Medicine, Kitasato University School of Medicine

\*\* Emergency and Critical Care

Kitasato University School of Medicine

Kanagawa, Japan

**Objective:** To clarify the mechanisms of occurrence of myocardial damage in patients with subarachnoid hemorrhage (SAH).

**Methods:** A two-dimensional echocardiogram was performed in 494 patients with SAH who were admitted within 24 hours of the onset. Forty-eight patients (Group A) had left ventricular asynergy (LV asyn) and were compared to 446 patients without LV asynergy (Group B). The levels of plasma catecholamines and serum CPK were measured and the hemodynamics were assessed using a Swan-Ganz catheter.

**Results:** Left ventricular asynergy (LV asyn) was detected in 9.7% of all patients. In Group A, pulmonary wedge pressure was  $18 \pm 5$  mmHg and cardiac index was  $2.6 \pm 0.5$  l/min/m<sup>2</sup>. Left ventricular ejection fraction was  $37 \pm 13\%$  on admission and improved to  $65 \pm 9\%$  within 15 days ( $6 \pm 4$  days) after admission.

	Group A (n=48)	Group B (n=446)
Age (yrs)	57±2	55±1
Blood pressure (mmHg)	147±6**/ 97±4	170±3 /96±2
Heart rate (/min)	95±4**	83±2
Serum CK (IU)	550±110*	340±20
Serum MBCK (%)	6.4±0.7**	1.9±0.3
Noradrenaline (pg/ml)	2,300±780*	850±120
Adrenaline (pg/ml)	1,700±480**	400±90

Data are expressed as the mean±SEM. \**p*<.05, \*\**p*<.01

**Conclusions:** Myocardial dysfunction and damage with necrosis were found in SAH patients with LV asyn. Increases of plasma adrenaline and noradrenaline levels may play an important role in their etiology.

### 321

#### Prehospital Treatment of Intravenous Heroin Overdose

Pedersen CB, Stentoft A, Worm K, Sprehn M,

Mogensen T, Sørensen MB

Mobile Intensive Care Unit, Kommunehospitalet-Villa 1

Copenhagen, Denmark

**Objective:** To investigate if patients treated for intravenous (IV) heroin overdose combine their abuse with other forms of stimulants, and to relate this to the results of the antidote treatment.