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.

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Major Railroad Accidents in Japan in Last 30 Years

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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.

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Lesson from the Gulf War

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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.

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Prehospital Deaths in Three Earthquakes

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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[1] 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.

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