

## I.10 Long Distance Mass-Casualty Evacuation and Reception

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Late at night on 09 January 1994, 27 French nationals became disaster victims when their tourist bus fell into a ravine in Bali, Indonesia. A total of 17 badly injured casualties were rescued and initially treated at a local clinic.

Asia Emergency Assistance (AEA), a medical evacuation company, arranged the 1,664-kilometer air evacuation of all 17 casualties to the Singapore General Hospital (SGH) in a single aircraft.

The emergency department (ED) at SGH organized for casualty reception. Regular feedback from AEA on casualty status and timing paid dividends. Staff, equipment, and disaster beds were mobilized.

From Singapore Airport, the stretcher-borne casualties were transported to the ED at SGH. After prompt triage at the ED entrance, surgically trained medical teams and radiological support (plain films and CT) were made immediately available at designated Priority 1 and Priority 2 areas. Linguistic support came from AEA and the French Embassy. The mass media was well-handled by SGH's communications department.

Of the 17 patients, 10 had polytrauma. Two were sent to the surgical intensive care unit after initial stabilization. The rest were admitted to high dependency and general surgical wards.

The efficient reception and handling of large numbers of long-distance major trauma victims required good control, communications, and information flow.

## I.11 Medical Rescuing Operations on the *M/S Estonia* Disaster

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Mayday from *M/S Estonia* was heard at 01:24 hours (h) on 28 September 1994. Coast Guard headquarters alarmed rescuing units and medical units according to the pre-established plan. Åland Central Hospital was notified at 02:22 h and the University Central Hospital, Turku at 03:05 h. Medical officers of the provincial government were alarmed to the headquarters between 03:10 and 03:20 h and arrived at the leading central in 15 minutes. The first ship, *M/S Mariella*, arrived at the disaster site at 02:30 h, and later the *M/S Europa*, the *M/S Silja Symphony*, and the *M/S Isabella*. The first rescue helicopter arrived at 03:05 h, and three more helicopters arrived between 03:50 and 04:40 h. By morning, the number of operating helicopters totaled 24. The last survivors were rescued at approximately 09:00 h. A total of 94 bodies were found. Survivors were rescued from floats.

**Headquarters operations:** Assessment of the situation; contacts with the units and alarming the units on Parainen and Hanko.

**First plan:** To use the ferries as first-aid bases. The capacity of each was approximately 2,000–3,000 passengers; the first-aid groups on each ferry consisted of their own staff plus one nurse. There were additional medical experts on some of the ships: *M/S Mariella*, two doctors and 29 nurses. However heavy sea, winds up to 35 m/s, waves up to 8 m high, and a temperature under 13° C made using the ships for rescue impractical.

**Second plan:** To use the helicopters to transport the victims to the Uto Garrison Hospital, which had a capacity of 200–250 patients and to further transport to Turku with a capacity for 300–500 patients. Refueling of the helicopters decreased the flying time and necessitated the distribution of the rescued patients to Hanko (13), Parainen (13), Stockholm (7), Mariehamn (8) in addition to the patients transferred from *M/S Mariella* to Turku, and the 27 patients transferred to Uto. Twenty victims on board the *Silja Symphony* together with 16 on board *M/S Isabella* were transferred to Helsinki. Six patients on board the *M/S Europa* together with 25 patients on board *M/S Mariella* were transported to Stockholm. One patient died during the transportation by helicopter to Stockholm. All 137 others survived the disaster. Medical problems arose in approximately 5–10% of the victims; serious problems occurred in only one instance.

**Conclusion:** In mass-casualty events, all forces should be committed to the field operations.

## I.12 Handling of Mass Casualties in War

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The International Committee of the Red Cross (ICRC) has a great deal of experience in treating war victims in different parts of the world. Despite security problems—logistic, as well as socioeconomic difficulties in many countries—the ICRC has developed an appropriate system that, with limited resources, is capable of handling a large number of casualties. At first-aid posts close to the battlefield, patients get first-aid treatment and undergo triage before further transport to the hospital. At the triage area in the hospital, the work is led by a triage officer with vast experience in war surgery. Whether he or she is a nurse or a doctor, the work has to be structured, and systematic decisions should not be questioned at the time. The advanced trauma life support course provides a good framework for handling these situations. The wounded are categorized into three groups according to the severity of the wounds, and the need and possibility of surgery. Documentation of what has been done and decided is essential. Direct marking on patients' foreheads, chests, and arms, often appropriate for category and patient numbers, is a good complement to the triage card. At present time, there are no trauma scores of real value for penetrating war injuries. The ICRC (Coupland) wound classification is used for further research in the ICRC database. A number of typical war injuries are presented and discussed. It is essential to follow the fundamental principles of war surgery. Thorough debridement of wounds—including careful excision of skin,