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. Aland 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 Garnison 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,

large fasciotomies, extensive removal of necrotic and infected soft tissue, and also removal of loose bone fragments—is necessary, but wounds always should be left open for delayed closure.

II.1
The Use of Satellite and Ground-Based Telemedicine Systems in Urgent and Emergency Health Care (Telemedicine)

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The support of emergency health care in nonurban, remote, and isolated areas always has been a challenge for health-care providers. The mainstay of such services, until recent years, has been communication by two-way radio, and, where available, the telephone. There is now a wide range of telecommunications and information technologies that can do much to bridge the gap between those needing services and providers. A number of telemedicine projects using ground-based and/or satellite technology have shown that medical resources and expertise now can be made available at acceptable costs in emergency situations and to meet routine remote health needs.

This presentation, using case studies, described telemedicine systems for urgent and emergency care, including reliable voice links, slow-scan television, tele-electrocardiography (ECG), tele-electroencephalography (EEG), tele-imaging (radiology, nuclear medicine, ultrasound), and consultations using compressed video. Satellite technology use in disaster relief, peacekeeping operations, and the support of health care in the offshore petroleum and marine industries were included.

Current and emerging low-earth-orbit satellite systems coupled with innovative geostationary satellite applications, will be described. Guidelines for telemedicine projects will be suggested.

II.2
Telemedicine in Northern Norway

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The geographical characteristics of Norway, the lack of medical expertise in rural areas, and the pattern of settling guided Norwegian Telecom Research (NTR) to initiate the Norwegian Telemedicine Project in 1988. An expert group that came into being through a close relationship between NTR and the medical experts at The University Hospital of TromsØ (UiTØ), Norway, has developed telemedical applications within many fields of medicine. Based on a broad-band network at 2 Mbps, the video conference system is the basis for a regular contact between remotely situated general practitioners and doctors at UiTØ in the fields of dermatology, otorhinolaryngology, and psychiatry. In the fields of echocardiology, radiology, and pathology, there is a regular contact between county hospitals in rural areas in the northern part of Norway and the medical experts at UiTØ.

Promising trials have been done within the fields of microbiology, gastroenterology, and neurosurgery. Remote teaching is used regularly to educate students in remote areas. Trials are being done for broadcasting lectures for the medical students.

The different technical solutions seems to produce satisfying results. The quality of the images from the remote medical examination has been studied and found to be good enough to secure a qualified medical diagnosis. The patients are content with being diagnosed in this way.

Payment and the laws for such services are suggested.

It is the health-care system's organization that mainly hinders capitalizing on modern communications enormous potential to provide the best for both the patients and society as a whole.

II.3
The Role of Telemedicine in Disasters

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It is well-recognized that the prompt transmission of data from the site of the disaster to emergency medical services is of paramount importance. Remote transmission of biomedical signals and, more generally, of clinical data represents the more classic application of telemedicine. In fact, it enables a first-level examination of the patient, even when he or she is not physically present at the hospital. Therefore, under the condition of an emergency, assistants can use the telemedicine systems for primary diagnostic categorization of specific pathologies, even in the absence of competent specialists.

At the top of these systems, we find teleconsulting service equipment, which, thanks to the integration of different devices, allows for a complete exchange of information between the first-aid structures and the highly specialized hospitals. However, despite the great potential of telemedicine, its regular application still is limited to a few interesting experiences. The main reason is probably the minimal competence of the health-care professional in this field, coupled with a failure in organizing research programs aimed at the use of the available means of telemedicine.

The Center for Study and Training in Telemedicine, promoted by the Telemed Consortium in Rome, is a pilot center for whoever desires to acquire specific high-level knowledge in the theory and application of telemedicine. The center organizes teaching and research programs and encourages, at a national level, all research activities related to the topic.

III.1
Chemical Disasters: Special Features (An Overview)

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In comparison with mechanical trauma or the thermal burns that result from an accident involving many victims—as can be the case in earthquakes, airplane or train crashes, fires, etc.—disas-