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-

ters expose many people to toxic substances have special features.

Initially, in such disasters, it is not clear which substances people may have been exposed to, and to what extent. And, even in cases when it is known which agents are involved, it may be difficult to know if pyrolysis or combustion products are formed with toxicological properties that are different from those of the original agents. When a rescue operation starts at the site of an accident, several questions will arise immediately and must be solved before rescue workers can enter the site. These questions concern the possibility of ongoing exposure, definition of the area of exposure (often also dependent on expected weather conditions), and the need for protective clothes and airway protection.

Possible contamination of victims is another feature that needs attention. In acute exposure—for example, in transport accidents or in cases of leakage of stored chemicals due to a crash or explosion—the route of exposure will be dermal, by inhalation, or through the eyes. Especially with inhalation (depending on the nature and concentration of the agents involved), vital functions may be impaired acutely or may be delayed. Low-grade exposure can arise in cases of chemical spills over longer periods of time with contamination of the environment and possible entrance into the food chain. In the latter case, exposure will occur in a low-grade fashion, and may have a chronic intermittent character over an extended period of time. Data collection with reference to possible exposure, contamination of environment, animals and humans, body burden, and the effects of exposed people, is important not only for the immediate actions to be taken, but also to evaluate the accident after some time, and to take actions to avoid future accidents of the same sort.

Reliable information, not only to the public, but also to medical professionals who will supply their patients with answers, has to be disseminated as soon as possible, with regular updates as the situation of the accident develops.

III.2
Triage of Victims in Chemical Disasters

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Triage is a continuous process of evaluation of the trauma severity of victims of mass accidents, and is aimed at prioritizing transport and medical facilities in the face of limited resources. Often a classification will be used producing four categories of patients:

1) Victims with *life-threatening* injuries who are in immediate need of transport and/or treatment;
2) Victims with *moderate* and *severe* injuries who need treatment, but can wait for transport or treatment;
3) Patients with *mild* or *no* injuries who are not in need of any substantial treatment; and
4) Severely injured victims with poor chances of survival even with adequate treatment, and primarily in need of *palliative support.*

In chemical accidents, a fifth category of victims is needed:

5) Those people who may have been exposed, and who do not experience any symptoms, but in whom delayed symptoms are to be expected. They are in need of observation, possible immediate treatment, and transport to treatment facilities.

Exposure to toxic substances can result in local and/or systemic effects. In the triage process, it is important to be aware of the possibility that certain substances may interact with cells and tissues with the development of severe symptoms as a sign of vital organ disturbances that need immediate treatment. The inhalation of certain gases, e.g., phosgene and nitrogen oxides, are especially notorious for producing such disturbances.

Information about the results of measurements of the substances in the environment have to be interpreted in connection with the symptoms of victims. For each individual, the time between onset of exposure and development of symptoms has to be recorded. The symptoms expected from this exposure data then can be compared with the symptoms encountered. In the hospital classification of certain special types of injuries, e.g., corrosive burns, irritant gases can be added.

III.3
Preparation for HAZMAT Incidents in Israel

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Foreword: The development of chemical industries and the increasing amount of hazardous materials (HAZMAT) transported in densely populated areas pose an increasing risk to the population and environment. Most developed countries presently enforce strict control on the handling of dangerous substances, but, in many countries, the readiness of the emergency medical system still is deficient. The Gulf War lessons have had a strong impact on planning and preparations for chemical warfare incidents and disasters in Israel. During the last eight years, a standing interministerial committee has been actively developing policies and priorities for the establishment of a comprehensive HAZMAT response system in the country. The traffic law has been amended to prohibit transportation of HAZMAT through urban areas. The control and supervision of the chemical industry is much stricter, and a committee for developing a doctrine for hospital organization and treatment of HAZMAT casualties has been formed.

Lessons learned from the Gulf War: Preparations of the medical services in Israel before and during the days of the Gulf War in early 1991 have taught us some important lessons: 1) The threat of unconventional weapons and its implications have to be well-defined; 2) The establishment of a well-trained and equipped response system is not a simple matter and requires resources, budgets, and time; 3) The medical response system has to be ready constantly, as a warning period may be short; and 4) The extensive training effort of all components of the health system, during the months of preparation, made policy-makers aware of these facts. They established an infrastructure that may serve as a model for the HAZMAT Medical Response System.

The HAZMAT Medical Response System: This system is being implemented at two levels: 1) the prehospital EMS, operated mainly by MDA in Israel (the National Red Cross Organization), reinforced by army or civil-defense medical units, and 2) The hospital level, which includes the 24 general hospitals in the country.