DISASTER MEDICINE IN EUROPE – ORGANISATION AND TRENDS

Foreword

The objective of medical preparedness for emergencies is to be able to meet the imbalances that arise between needs and available resources in the event of a major accident or disaster. One prerequisite in the planning of preparedness for emergencies is knowledge of actual risks in the community.

The predominant risks for emergencies in Europe are associated with accidents in communications, fires, chemical accidents and accidents due to severe weather conditions. The picture of risks and threats is continuously changing. One tendency of recent years has been that disasters have involved several nations – due to the magnitude of the disaster, the size of the disaster area, or the fact that people in several nations were affected. Examples of disasters of this kind are the Chernobyl disaster of 1986, the Estonian disaster of 1994, the earthquakes in Turkey in 1999 and the tunnel accident in Kaprun in 2000.

With advanced risk inventories as their point of departure, preventive measures can be taken and appropriate conditions created for good levels preparedness to deal with disasters. In this respect the importance of international cooperation has become increasingly evident. With better knowledge of the risk scenarios and levels of preparedness of different countries, it will be possible to deal with disasters more effectively and safely. International guidelines and standards for risk analyses, and for prevention and preparedness, are becoming increasingly important.

The purpose of this publication is to acquire knowledge about risks and threats, plans and levels of preparedness, and the operational principles being used to meet disasters in different countries in Europe. The publication is limited to peacetime disaster scenarios, in which hospitals have to play an important role, and does not take up the wars that have affected Europe in recent years.

The publication has been compiled by Associate Professor Bo Brismar, Sweden, on behalf of Landstingsförbundet (Federation of Swedish County Councils) and the Standing Committee of the Hospitals of the European Union (HOPE. The text is based on documents and material obtained from authorities and national organisations in the countries concerned.

It is intended the publication shall be regarded as a living document. Contributions from the countries shall be added continuously. The objective is to publish an updated version every second year, thus making the publication an up-to-date source of knowledge.

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Background

Objectives of preparedness for disasters

The objective of medical preparedness for emergencies is to be able to meet the imbalances that arise between needs and available resources in the event of a major accident or disaster. One prerequisite in the planning of preparedness for emergencies is knowledge of actual risks in the community.

The planning of preparedness for emergencies is based on an inventory of actual risks and available resources. Even if the total quantity of available resources may cover most conceivable risk scenarios, this is no guarantee that a particular emergency can be handled in an acceptable way. The capability to activate, mobilise and allocate resources rapidly in cases of emergencies is of decisive importance if satisfactory medical results are to be achieved, i.e. if the resources, which are made available at the scene of the incident, meet the needs, which have arisen.

Definitions

A distinction is made between major accidents and disasters.

A major accident is a situation in which available resources are insufficient in relation to the immediate needs of medical care but with the aid of a reallocation of resources and modified procedures it is possible to maintain normal standards of quality for medical treatment.

A disaster is a situation in which the load on medical facilities is so great that normal standards of quality for medical treatment cannot be maintained. A similar situation can arise when the load is normal but a sudden shortage of resources occurs.

The definition of a major accident or disaster emphasises that the incident shall be critical (not anticipated) and that resources are not available. An accident which occurs in a built-up area in which there are a great number of resources available for rescue purposes and which is coped with successfully without the need of extraordinary actions is accordingly not defined as a major accident or disaster. On the other hand the same accident could be regarded as a major accident if it were to occur in a rural area with few resources and long transportation distances.

Risk analyses and risk inventories

Potential risks and threats

Potential risks and threats vary continuously. New risks arise in the form of ionised radiation, emissions of chemical and biological poisons, threats of sabotage and terrorism. Major sports and music events with related risks are also increasingly common and make new demands on the preparedness of the medical services to meet emergencies.

At the same time it is difficult to assess the risks and consequences of serious disruptions in Western society due to the growing dependence on technology. This was particularly apparent prior to the new millennium.

The predominant risks for emergencies in Europe are associated with accidents in communications (ferries, trains, and aircraft), fires, chemical accidents and accidents due to severe weather conditions (landslides, avalanches and storms). Each year several hundred million tons of inflammable chemical and/or toxic substances are transported by road or rail through Sweden and many hundred million people travel on ferries to and from the European countries. A number of major accidents have occurred as well as several serious near-accidents in which the risk of a disaster has been imminent.

Major accidents and disasters

Each disaster is unique in its character. This is related to when and where it occurs. The factor that triggers off the disaster is also of great importance since it can lead to special types of injuries and special problems in the rescue operations.

Natural disasters

When natural disasters such as earthquakes and floods occur, the vital functions and infrastructure of society (electricity, telephones, water, sewage) are often put out of action and there are usually considerable difficulties in reaching the injured with assistance. Since local management, rescue and medical resources can also be put out of action, the areas affected are made dependent on external help.

Each year several thousand earthquakes of varying intensity occur around the world. The largest earthquake disasters in modern time occurred in China in 1976 in which 700,000 people died and in Turkey 1999 when more than 15,000 people died.

Where earthquakes are concerned, it is assumed that there is a critical period of one to two days during which the injured must be rescued if they are to have a reasonable chance of survival. The rescue work is often extremely difficult and time-consuming due to fires, landslides and damage to infrastructure.

Fires

Each year a great number of people are exposed to fires. As an example, in total 20,000 persons suffer from burn injuries in Sweden each year and some 15 per cent of these persons need hospital treatment. The limited number of specialised units where burn injuries can be treated in Sweden and other countries makes international co-operation necessary where disasters involving fires are concerned.

When fires occur, in addition to burns smoke and toxic gases cause considerable medical problems. In several fire disasters more than half of those who have died have done so as a result of asphyxiation and not as a result of burns.

During the 1900s fires in places of entertainment and hotels have been responsible for the largest number of deaths and injuries. Examples of fire disasters that have occurred during recent years are the fire on the Scandinavian Star in 1990 in which 160 people were burnt to death on the ship and the fire in a discotheque in Gothenburg in 1998 in which 63 died and 150 suffered serious burns.

Forest fires, mainly in USA and Australia but also in Europe (e.g. French Riviera), have caused great damage and resulted in a number of fatalities among the population and the rescue personnel.

On several occasions exploding fuel tanks have been the cause of the disaster (tanker accident in Los Alfaques in 1978, aircraft crash in Ramstein in 1988).

Ionised radiation

When a nuclear charge detonates, considerable amounts of energy are released in the form of shock waves, thermal energy and radiation. The proportions of the various types of energy released vary on account of the size of the charge and the height above the ground at which the detonation takes place. The larger the force of the charge, the more thermal radiation dominates, while ionised radiation dominates in smaller charges.

At the disaster in Chernobyl in 1986, 309 people were injured, of whom 203 seriously. There were 31 fatalities within 3 months as a direct consequence of the disaster. Of these fatalities, two persons died immediately in the fire that broke out in the power station. Acute radiation sickness, which occurs after doses in excess of 2000-4000 mSv, affected several hundred persons.

Chemical disasters

The biological properties of the substance in question are of decisive importance for the medical effects in an accident involving chemicals. The substance in gas form constitutes the greatest risk to causing mass injuries to people. In addition to the substance’s chemical and physical properties and the size of the emission, the prevailing climatic situation is of importance for the dimensions of the accident.

When an analysis was made of disasters involving chemicals, three typical cases were found - accidents in the handling of toxic substances, fires with emissions of toxic gases, and sabotage with the use of chemical substances. The toxic substances in the accidents were phenol, dioxin, chlorine and methyl isocyanate; in the case of fires toxic gas fumes predominated, while the toxic substances in cases of sabotage were sarin, zinc chloride, and toxic gas fumes. The number of injuries and fatalities varied from a few persons up to several thousand.

The largest toxic gas disaster hitherto occurred in 1984 in Bhopal where discharges of a toxic gas (methyl isocyanate) from a chemical factory resulted in 3,000 fatalities on the first day. A further 16,000 persons showed serious medical symptoms. Of these persons, 2,000 died later. When a chemical plant exploded in Seveso in northern Italy in 1976, a cloud of gas was formed which contained dioxin. Only a few people died directly as a result of the accident but a large number were taken ill later with blood diseases and skin diseases.

Explosions

During the 1990s a large number of accidents have occurred in connection with manufacturing activities, transport and the use of explosives. Injuries occur as a result of explosions due to the shock wave. People in the vicinity of explosions are struck by objects, which are cast around by the force of the explosion. Burns can also affect individuals close to the point of explosion. The injuries can thus be complex and those affected often receive multiple injuries.

In a bomb attack in the central station in Bologna in 1980, 73 people died immediately and 218 were injured. Almost three-quarters of the injured received multiple injuries. In the four bomb attacks in Jerusalem in 1996 a total of 301 people were injured of whom 63 died. Experience of these four attacks, of which two took place in buses and two outdoors, showed that bomb explosions in closed spaces result in more fatalities and more life-threatening injuries.

The specific injuries resulting from explosions in the manufacture of chemical products depend on the properties of the chemical substances concerned.

Transport accidents

Tram and train accidents

After fires, tram and train accidents are the most common causes of disasters in several Western European countries. The increase in the number of high-speed trains involves a greater risk of major accidents due to derailments and collisions. The most recent major accidents occurred in London 1999 when a train collision claimed a large number of fatalities and in Norway in 2000 when there was an accident in which some 30 passengers were unable to escape from the carriages and were burnt to death when the carriages caught fire. In train accidents the injured often suffer from contusions and crush injuries. Rescue work can be time-consuming and many of the injured can be squeezed and unable to escape from the carriages, which have been tipped over, on the side.

Air crashes

Aircraft crashes are not so common but often have considerable consequences with a large number of fatalities. The greatest risk of an accident is at take off and landing. When an aircraft crashes the crew and passengers are usually killed and persons on the ground can be injured. However, there are exceptions, for example the case of Gottröra in 1991 when a SAS aircraft made an emergency landing after taking off from Arlanda airport. The majority of the passengers survived and only a small number were injured.

In an air display at Ramstein in Germany in 1988, three aircraft collided in the air and one crashed among the spectators. The plane exploded and a cloud of burning fuel swept over the ground. During the first minutes after the crash some 40 persons died. A total of 418 injured were taken to hospital. In an air crash in Amsterdam in 1982 a jumbo jet crashed into a housing area just after take off. The crew of four died and 38 people on the ground were killed.

Accidents at sea

In the case of accidents at sea the picture is much the same as that for air accidents: either there is a large number of fatalities or just a few persons are injured. Those who are rescued at sea usually have

minor injuries or hypothermia problems. In cases of fires on ships the same picture emerges as in the case of fires in public buildings.

The Estonia disaster in 1994 was the largest peacetime disaster in Western Europe in modern time. Of the 1000 persons on board, 137 survived.

Road traffic

Although they do not fall under the definition of disasters, road traffic accidents result each year in a vast number of fatalities and injuries. During the 1900s road traffic killed more than 30 million people in Europe and USA and 400 million people have been hospitalised due to their injuries. It is estimated that traffic accidents will be the third most common cause of death in the world by the year 2020.

Acts of terror

Where acts of terror directed at individuals, organisations or society are concerned, explosives (Bologna, Northern Ireland) or poisonous substances, biological or chemical, (Japan) have been used. On some occasions rescue personnel (police and even medical staff) have been the targets of attacks when taking care of the injured, and hospitals have also been attacked.

Complex disasters and refugee situations

So-called "complex disasters" can occur in countries affected by conflicts. In addition to war-related injuries, malnutrition, deficient hygiene and polluted water lead to infectious diseases and infections resulting in sickness and a large number of deaths, particularly among infants and old people.

Risk analysis

Risk in this context means the probability that an event will occur and the consequences of the event. In risk analyses a systematic review is made of conceivable sources of risks and an evaluation and quantification of the risks that are associated with these sources. Risk analyses can partly be based on statistics of major accidents and disasters and partly on an analysis of conceivable threats. Systematic risk analyses in the area of emergency medical care are uncommon. One attempt has been made in Sweden by Stockholm County Council. A number of typical events in the region were defined in respect of their probability and consequences on the basis of historical data. In this connection the consequences were defined from a regional (county council) perspective - i.e. how the region, by mobilising and reallocating its resources, can deal with the event in question while maintaining normal standards of quality in the medical services. Estimates were made of the need of resources at the scene of the incident, for medical transport, and at the hospital with emergency facilities.

With the aid of risk analyses a simulation program is now being developed within the framework of a computerised disaster management system. In the system the needs calculated for various disaster scenarios will be compared with available resources. Data for the planning, organisation and management of preparedness to meet different emergencies can then be provided. Political decisions on the levels of risk which society must reasonably accept can be made with the aid of the simulation studies.

Medical preparedness for disasters

Austria

National

The ambulance and rescue service is regulated in government directives. Activities are organised by the local authorities but Vienna is the only municipality, which operates its own services. As in Germany, voluntary organisations (the Austrian Red Cross, the Workers' Samaritan Confederation of Austria, St John's Ambulance Service, the Maltese Cross Hospital) have the main responsibility for services. The Austrian Mountain Rescue Service is responsible for rescue services in the Alps. In cases of major accidents and disasters the Federal Austrian Army can also provide assistance in the form of resources and personnel. Since the personnel in the rescue services are volunteers (except in Vienna) many lack both education and regular training in rescue operations and in taking care of the injured. However, under new legislation the education and training of volunteers will be regulated and made obligatory.

The Red Cross is responsible for the alarm centres in most of the regions. There is a total of 120 ambulance stations and 14 emergency helicopters manned by doctors. While the medical equipment in the helicopters is uniform, there are great variations between the ambulance services in respect of medical and technical resources.

Medical preparedness for disasters

Baltic States

In the Baltic States the Soviet defence forces were previously responsible for preparedness in cases of disasters. However, when the Baltic States became independent, it was necessary to build up a completely new organisation to meet medical emergencies. This is now taking place with the support of Sweden, among others.

Estonia

Disaster plans are now being drawn up in Estonia. These plans correspond to a great extent to the Swedish plans. An operations management group is formed at the scene of the incident. This group consists of the chief officer of the rescue service, the chief police officer for the rescue operations and the medical director. The division of responsibilities in the management group is well defined. The most senior fire-fighting officer is the chief rescue officer. The police are responsible for cordoning off the area, the registration of those affected by the incident, and traffic control. The medical director leads the medical activities. Special scene-of-the-accident doctors are appointed as well as a local officer who directs ambulance transports. Assembly points for the injured, the uninjured and the dead are organised.

The need of communication between the operations management group and the alarm and command centre and with the emergency hospitals is emphasised, as is information to the media.

Lithuania

Lithuania also lacks national and regional disaster plans. However such plans are being developed and are expected to enter into force in the year 2001. Planning will be based on the principles applied in Sweden and Germany and, to a certain extent, the Netherlands.

Medical preparedness for disasters

Germany

In Germany, Switzerland and Austria rescue operations in cases of major accidents and disasters often take place in co-operation between the public health services and voluntary organisations.

National

In Germany the rescue organisation is built up to a large extent on the voluntary work of individual citizens and organisations such as the Red Cross and the St John Ambulance. Each federal state has its own legislation that regulates how medical services and rescue services shall be organised.

Rescue work at major accidents and disasters is the responsibility of two different organisations. The fire-fighting service (Feuerwehr) is responsible for fire-protection and rescue operations in cases of fires while the rescue service (Rettungsdienst) works with all other accidents, for example road accidents and chemical accidents. Co-operation between the two organisations varies. In some places they share the same premises or have been merged into one organisation.

Rescue operations are mainly performed by voluntary personnel. It is only in the large towns that the fire brigade has permanent full-time personnel. The permanently employed fire-fighting personnel are often trained as, and can serve as, ambulance paramedics.

In addition to the fire-fighting service and the rescue service the "Technisches Hilfswerk" and the "Katastrophenschutz" also participate in disasters. To some extent these two organisations correspond to the former civil defence in Sweden. Technisches Hilfswerk provides technical assistance in the form of mobile electricity supplies, lighting, fuel, food etc and Katastrophenschutz offers liaison and management resources.

Pre-hospital care is also often provided by voluntary organisations such as the Red Cross and St John Ambulance. Three types of ambulances are used: well-equipped ambulances manned by doctors (Notarztwagen), ambulances with well-trained ambulance personnel (Rettungswagen) and normal ambulances (Krankenwagen) manned by ambulance staff who have undergone a short period of medical training.

In Germany there is also a well built-out ambulance helicopter organisation with some 50 helicopters. Ninety per cent of the surface area of Germany can be reached by helicopter within 15 minutes.

The ambulances are directed by alarm centres which work for the federal states. The alarm centres, which are often located at fire stations (rescue stations), are also run by voluntary organisations. At the rescue stations there are call-out lists for different types of accidents and emergencies, and stores that contain the materials needed for rescue operations. In several federal states there are different numbers to the alarm centres for fire fighting, police and medical operations.

Despite the fact that the rescue service and pre-hospital care is based to a great extent on voluntary work and voluntary organisations, considerable resources are normally mobilised very rapidly when accidents and disasters occur. The reason for this is partly that the country is densely populated and that there are a large number of rescue stations.

Regional

Every municipality has its own responsibility for disaster planning and preparedness. In cases of emergencies a command centre in a Landkreis (large municipality) takes over the overall management responsibility if there is a need to co-ordinate the direction of the work. The management of operations is organised in the same way as in the case of disasters in Sweden. Personnel are summoned to the command centre from the medical services, rescue service, army etc depending on the character and extent of the disaster.

In Germany there are a large number of chemical industries. The municipalities (Landkreis) have operational plans, which can be put into action in the event of an emergency. The rescue service is also very familiar with the chemical plants and holds regular operational exercises. If a toxic emission is suspected, a so-called "sanitation alarm" is set off. This means that a large number of ambulances and specially trained personnel are alerted.

Many industries still lack their own disaster plans, risk analyses and impact assessments for major accidents or disasters.

In the event of a major accident, a person is made responsible for information and sometimes a person responsible for liaison activities is sent to the scene of the accident to report to the command centre. In order to meet the need for information when disasters occur, the post of chief press officer has also been introduced. The chief press officer is responsible for arranging press conferences and ensuring that correct information is provided. The objective in this respect is to meet the media’s need of information so well that, if possible, journalists can be kept away from the scene of the accident and thus do not disrupt rescue work and the care of the injured.

Local

The scene of the accident

At most places in Germany the work at the scene of the accident is led by a medical director with the responsibility for directing the work of all medical and rescue service personnel. The medical directors are specially trained and have preparedness to make themselves available within 30 minutes of being called in. The medical work is done by doctors who travel to the accident in the Notarztwagen, ambulance para-medics and first-aid volunteers from the Red Cross. The doctors recruited to the emergency services have specialised in surgery, anaesthetics or paediatrics and have undergone special training and exercises in order to be able to take part in major accidents and disasters.

An assembly point is arranged for the injured close to the scene of the accident. This point is manned by doctors and volunteers from the Red Cross or one of the other voluntary organisations.

To support them in their work at the scene of the accident the doctors have a rescue officer from the ambulance service (experienced ambulance para-medic) and some fire-fighting officers. On the instructions of the medical director, the rescue officer from the ambulance service allocates ambulance transport to different hospitals depending on their available capacity. The injured are normally distributed to several hospitals to avoid overloading at one individual hospital. In cases of serious fires the co-ordination centre in Hamburg is called in. This centre has up-to-date information on available capacity for the treatment of burns.

In cases of fires the chief fire officer has the ultimate responsibility for the rescue operations.

The responsibility of the police in cases of major accidents and disasters is mainly traffic control and cordoning off the area in question, while the registration of the injured is done by medical personnel.

Hospitals

The hospitals have emergency plans, which are activated when the alarm is raised. An emergency management group is assembled and beds are made available in the emergency ward and nursing wards, in accordance with the plan, for the reception of a large number of injured persons. At the same time doctors, nurses and other key persons are called to the hospital in accordance with emergency call-out lists.

There are no medical groups in the organisation as there are in the Swedish model but, at large hospitals, emergency doctors with special training can be sent to major accidents and disasters. Nurses are not included in this system since it is felt that the ambulances have adequately trained personnel at their disposal.

Medical preparedness for disasters

Denmark

National

In Denmark there is no central agency with the overall responsibility for the rescue service. The division of responsibilities is determined on the basis of the character of the accident. The rescue service can be divided into two main areas: general rescue services and special rescue services.

The following agencies are engaged in the general rescue service: the police, the ambulance service, the hospital system and the Danish defence forces.

The special rescue service is divided into three areas: SAR (search and rescue service), discharges of oil and chemicals, and nuclear power plants. The SAR service, which is organised as a sea rescue and air rescue service, is led by the defence command under the Ministry of Defence. Its resources are limited and material and personnel are made available from other agencies in the event of an emergency. The navy is responsible for rescue operations at sea and the air force for rescue operations in connection with air crashes.

The energy committee in the Ministry of Energy co-ordinates the emergency and rescue plans of the different agencies where offshore installations are concerned. The offshore industry also has its own management organisation and rescue resources in connection with the various installations at sea.

The Danish Environmental Protection Agency is responsible for combating discharges of chemicals and oil at sea. This work is done in co-operation with the regional alarm centres (governmental) and the defence. The Danish Emergency Management Agency, which is subordinate to the Ministry of the Interior, is responsible for the preparedness for accidents in nuclear plants. This is based on existing organisations, mainly the regional alarm centres, police and defence, and emergency plans.

The fire-fighting service is responsible for the Copenhagen area’s alarm centre while the local police forces are responsible for the country’s other 40 alarm centres. Ambulances and rescue services are alerted by the local alarm centres.

Regional

Under the Danish Preparedness Act it is the responsibility of every municipality to have their preparedness for rescue and fire-fighting operations adapted to the structure of the municipality. The fire-fighting services also have the primary responsibility on land when discharges of dangerous substances are feared. The municipal officer in charge of operations leads the tactical work at the scene of the accident. In the case of major accidents, which require contributions from several agencies, the police are responsible for co-ordination.

The regional preparedness includes six emergency centres with the preparedness to reinforce the local rescue service in the case of special disasters (fires, discharges of oil and chemicals, peacetime accidents involving radioactive material and major rescue operations).

It is the responsibility of the 14 state counties in Denmark to maintain effective ambulance services. The ambulance service is either run under private management as the result of a procurement process, or through contracts with the municipalities which have ambulance services in their rescue services.

The police, rescue service and other agencies can, when necessary, requisition emergency assistance in the form of aircraft, heavy-duty vehicles and material from the defence and the home guard.

Local

Scene of the accident

The police are responsible at the scene of the accident for cordoning off the area, supervisory duties, traffic control and directing the ambulance service. The police shall also co-ordinate the operations of other agencies to permit the rescue work to be pursued as efficiently as possible.

Hospitals

At the hospitals there are emergency plans for receiving a large number of injured persons in the event of disasters. It shall also be possible for hospitals to send a medical team to the scene of the accident.

Medical preparedness for disasters

Finland

National

The rescue organisation in Finland is regulated in the legislation. Preparedness for disasters, both during normal situations and crises of various origins, includes disaster plans for national, regional and municipality level. District hospitals and health centres have their own plans. Preparedness includes planning the storage of necessary material and training the personnel in question. The Finnish rescue organisation includes both preventive operations - the prevention of fires and other accidents - and protection of the population as well as the rescue services. The purpose of preparedness in Finland is to prevent crises from arising and to manage situations of crisis as well as their consequences. Should a disaster occur, the Government assumes leadership and the ministries co-operate with each other. The principle is that each organisation shall continue to work normally, discharging its normal responsibilities. Changes to organisations are avoided as far as possible. Each ministry has a nominated chief officer for preparedness who is in charge of operations for the entire sector. The rescue department in the Ministry of the Interior organises and leads rescue operations. The police department in the Ministry is responsible for order and safety at the scene of the accident and for looking for missing persons, and the frontier surveillance department is responsible for rescue services at sea.

The health care agencies are responsible, under the Ministry of Social Affairs and Health, for emergency care and transportation of the injured, and the social care agencies for social support to those affected by accidents. The radiation safety centre of the Ministry of Social Affairs and Health is responsible for supervising radiation protection activities.

The Ministry of Transport and Communications has the responsibility for planning and maintaining telecommunications links and transport routes in the event of an emergency and the civil aviation authorities for the command and co-ordination of the air rescue service. The defence contributes equipment, personnel and expertise in the event of major accidents.

On Åland, the county council is responsible for the rescue service which, in all other respects, is organised on the same principles as in the rest of Finland.

Regional

At the regional level, the provincial government leads activities relating to preparedness activities. At the municipality level, the municipal executive committee and the municipal director are responsible for these activities. The chief rescue officer, who is usually head of the municipal fire-fighting service, leads rescue operations. However, depending on the nature of the disaster, the leader can come from another sector. Where major rescue operations are concerned, the head of the regional fire-fighting service or another person appointed by the county council or Ministry of the Interior can be the chief rescue officer. If agencies from several operational areas participate in rescue operations, the chief rescue officer is the co-ordinator and another agency than the fire-fighting service can lead operations. This can be the case, for example, when looking for missing persons, rescue operations on ships, and in aircraft crashes or when environmental consequences must be given priority. Preparedness for disasters is based on the normal organisation of the emergency care services and the responsibility for operations should, as far as possible, remain with the normal members of staff in these services.

The county medical officer or his deputy leads the regional medical work in a disaster. The hospital districts co-operate with each other as well as with the primary health care agencies (health centres) and the social centres. The regions' (counties') disaster plans include alerting the emergency medical services as well as local health centres (primary care) and long-term care hospitals**.** The hospital districts and the health centres draw up plans for disasters. The plans include local risk analyses and reallocations of resources. As in Sweden there are three levels of preparedness. A network of experts is consulted for preparedness for ABC-disasters (radiation, biological and chemical threats).

Local

The scene of the accident

A command centre is established at the scene of the accident from which the chief rescue officer leads operations. The alarm centres function as liaison centres for rescue operations. They receive calls and call out the resources that are requested by the chief rescue officer. The police are responsible for the registration of the injured and identification of the dead. If there is no specially trained medical director available, the responsibility for leading the medical work rests with the medical officer at the scene of the accident who has the most appropriate qualifications and experience. When the medical director arrives at the scene of the accident, he assumes responsibility. The medical team(s) sent from the hospital(s) (and from the health centre(s)) start working and work in the same way as in Sweden. Outside the risk area assembly points are established for the injured, the uninjured and the dead. Information on developments and the number of injured etc. is transmitted continuously between the scene of the accident, the alarm centre and the receiving hospital(s) and health centre(s). A forensic medicine expert group starts working at the scene of the accident in co-operation with the police and the doctor from the local health centre.

Hospitals

Hospitals, health centres (and social centres) with emergency facilities have disaster plans that are built up on the same model as the Swedish plans. The plans are in outline form and permit a great deal of flexibility. Under the plans medical personnel are alerted and beds and other emergency resources are mobilised to permit those affected to be looked after. It is possible to send medical teams of doctors and nurses with requisite equipment to the scene of the incident. The chief medical officer at the hospital leads the activities in the hospital district, using all the resources available. The information services department of the hospital assists the chief medical officer by providing press releases and other information to the public on medical issues and patients. Preparedness planning includes also debriefing activities for the persons and personnel involved. Co-operation with non-governmental organisations, for example the church and the Red Cross, is included in the plans.

Medical preparedness for disasters

France

National

Organisation of disaster medicine in France is based on 3 pillars:

- Medical rescue at the scene of the disaster
- setting up a "rescue medical chain"
- integration of the medical chain into the whole rescue plan.

The central government is responsible for the organisation of rescues. At a national level, it is the responsibility of the Minister for Home Affairs, and at the local level (region or county), it is the responsibility of the "Prefet" (prefect). When necessary, the Prime Minister and the cabinet can set up and manage a rescue management unit to co-ordinate the actions of ministries.

At the operational level, the Ministry of Home Affairs (Department of Civil Defence) leads the actions of all the emergency public services involved in the aid (primarily the fire brigade). When necessary, the army can also join the process.

The organisation of a rescue is based on a "rescue plan". The plan is established beforehand, including an analysis of potential risks (such as chemical, nuclear radiation, natural disasters etc.) and areas at risk (such as cities, mountains, railways, railroads etc.)

Regional

In cases of disasters, SAMU (Service d'aide médicale urgente) is responsible for co-ordination and operational management, and mobilises the resources considered necessary when an alarm is received.

SAMU are hospital-based services, normally responsible for answering emergency calls and implementing the operational response. There is one SAMU in each French county (département). The switchboards for calls reception and regulation (Centres de reception et de régulation des appels) of SAMU are responsible for allocating victims of accidents and disasters to hospitals.

In cases of major accidents and disasters the medical chain of rescue is implemented.

It starts at the scene of the disaster, and ends up at the hospitals which have been selected to admit victims. It includes several operations:

- a medical evaluation of the disaster: from quantitative and qualitative points of view (main injuries, psychological impact).
- organisation of the assistance in the area of the disaster: search for victims, picking up victims, first aid (front medicine).
- setting up more sophisticated care structures: Forward medical post (PMA - Poste médical avancé), Medical assessment centre (CME - Centre médical d'évaluation).

Implementation can take place on national territory as well as abroad, as part of international emergency assistance, when a major catastrophe occurs.

In the case of international aid, a disaster detachment (Détachement catastrophe) is set up, composed of units from SAMU, civil defence, fire brigades, and from the rapid military medical intervention unit (EMMIR). The detachment uses standardised devices and drugs, and a pre-established routine for sorting and taking care of victims.

Local

The scene of the accident

Medical rescue is carried out by medical teams (doctors and nurses) from different emergency public services: hospitals (SAMU-SMUR: emergency mobile medical units), fire brigades, civil defence units, and the army.

The medical rescue teams operate systematically as a team, never individually. They have appropriate devices and equipment at their disposal. Quantities, nature and packaging of this equipment have been determined in advance, and may vary according to the conditions and circumstances of the disaster.

The co-ordination of medical teams is the responsibility of a director for medical rescue (Directeur des secours médicaux - DSM), appointed by the prefect (usually, the DSM is the head of SAMU or head of the fire brigade).

A university education programme is provided for professional staff. The medical techniques implemented are based on experience and the practices used daily in the emergency medicine carried out by the hospital. The techniques are adapted to the disaster situation (risks, number of victims, developments). Their selection and implementation are based on the principle of "sorting out of victims"**.**

Hospitals

Each hospital has a pre-established plan for a massive influx of victims, including summoning staff, making extra beds available, additional supplies of equipment and medicine. The resources and manning of emergency hospitals, which admit injured persons, are regulated in law. At the hospitals there are mobile teams consisting of doctors and nurses who can accompany ambulances to the site of a major accident or disaster.

The hospitals which admit victims are organised on the basis of population and their specific type of competence: in general, two types can be identified:

- high technical reference centres, which include a department for emergency admission and treatment (SATU - Service d'accueil et de traitement des urgences), with round-the-clock surgical, resuscitation, paediatrics, maternity and radiology departments.
- local centres with no continuous surgical activity; they merely include a local unit for emergency admission, treatment and referral (UPATOU - Unité de proximité, d'accueil, de traitement et d'orientation des urgences).

Medical preparedness for disasters

Iceland

National

The Ministry of Justice is responsible for the rescue service, which is led operatively by different bodies for land, air and sea rescue. The country's civil defence is responsible for preparedness to meet disasters and provides assistance in the event of disasters. The local civil defence is led by the chief police officer in each district. The 27 chief police officers are responsible for rescue operations on land. In practice voluntary rescue forces are responsible for most of the rescue work under the leadership of their own management but under the supervision of the government agencies concerned.

Where rescue operations at sea are concerned, the responsibility is divided between a life-saving association, Landsbjörg, for operations near the coast, and the coast guard for operations farther than 12 nautical miles from the coast. The coast guard and the life-saving association, which is in fact an association of voluntary rescue organisations, run a number of rescue stations on Iceland.

The Ministry for Public Health and Social Security Affairs has the overall responsibility for fire-fighting services and ambulance transports.

In Reykjavik there is a nation-wide alarm centre that alerts rescue groups according to predetermined emergency plans in the event of major accidents.

Medical preparedness for disasters

Ireland

National

The lead government department for emergency planning in Ireland is the Department of the Environment. One of the most significant developments occurred in 1984, when the Department issued a "Framework Plan" for a co-ordinated response to major emergencies. This plan provided a framework for local authorities, health boards and the Garda (police force) in the preparation of their Emergency Plans. In 1994 an Interdepartmental Committee on Peace-time Emergency Planning initiated a review of the guidelines contained in the 1984 document. This review resulted in recommendations and guidelines to improve co-ordination between the main emergency services, both at the planning stage and during the course of an emergency.

This framework document deals with a number of critical issues. The area of operation for each plan and activation of the plan are defined, as are the functions and principal duties of each of the services. There is an integrated approach for on-site management at the scene of an incident. The duties and responsibilities of each service controller of operations – ambulance, fire and police service are regulated. The Fire Service is responsible for overall control at the "Danger Area" when there is potential danger to the emergency services.

From a pre-hospital perspective it is planned to develop the concept of MIMMS (Major Incident Medical Management & Support) among the Ambulance and Medical services. MIMMS is a multidisciplinary course, which provides a structured approach to the major incident scene and to dealing with multiple casualties.

Regional

The guidelines produced by the 1994 review for an integrated approach to emergency planning have been adapted by the emergency services. In some areas integration takes place at county level and in other areas at regional level. The trend is towards integration at regional level. Some regions are at a more advanced stage than others. The regions are based on the Health Board administrative areas, of which there are eight in the State. Major emergency plans are issued for the guidance of personnel and organisations that may be involved in a major emergency situation, with the aim of providing a basis for standard procedures and co-ordinated efforts. Each of the emergency services also has its own procedures in place to fulfil its allotted roles. These procedures complement the general procedures outlined in the regional plan.

When planning takes place at regional level, a "co-ordinating group" manages the strategic issues. Members of the committee include the chief executive officer from the Health Board, the city/county managers and the chief superintendents from the Garda Division (police force). The co-ordinating group is supported by an operational group representing the three emergency services – fire, ambulance and police – together with representatives of the local authorities and emergency hospitals in the region.

These operational groups meet on a regular basis and deal with issues such as:

- Drafting and review of the Major Emergency Plan
- On-site/off-site communications
- Medical management at scene i.e. triage, treatment
- Hazardous incidents – decontamination
- Exercises – table-top, seminars, live exercises etc.
- Updating of equipment
- Planning for large crowd events
- Inter-service training issues, seminars etc
- Media issues
- Critical Incident stress de-briefing, counselling of staff
- Liasing with neighbouring regions
- Researching best practice

It is standard practice to hold a debriefing session after each incident with key representatives of the participating agencies.

Local

Scene of the accident

From the Health Service perspective, the Ambulance Service has the primary responsibility for dealing with an emergency at the scene. In the event of a major incident the first ambulance at the scene assumes the role of ambulance incident office (AIO) and the crew reports back to Control with information on casualties, hazards and resources required. The AIO is responsible for the organisation and direction of all medical personnel on site and deals with the following critical issues

- Triage and treatment of casualties
- On-site communications
- Setting up of triage area and casualty collection point
- Liaison with medical personnel for the selection of most appropriate hospitals
- Liaison with other on-site controllers (Fire and Police)
- Ensuring co-ordinating group is updated on pre-hospital/medical management issues

Hospitals

Each designated hospital has its own major emergency plan. These plans are tested on a regular basis. Each hospital plan covers the following issues:

- Reception of casualties
- Treatment of casualties
- Calling in of off-duty staff
- Emergency equipment
- Activation of mobile medical teams
- Plans to decant to other hospitals
- Back up communications

Mobile medical teams are transported to the site of an incident by the ambulance service. Each Accident & Emergency department has protective, high visibility clothing for staff and medical kits that can be easily transferred to the site.

Medical preparedness for disasters

Malta

National

A comprehensive inventory of sources of hazards, with relevant risk assessments, was completed during the preparation of the Malta Civil Protection Master Plan.

Risk inventory

Major disasters are unlikely to occur on the Maltese islands. Nevertheless they may occur, for example, flash floods, earthquakes, major releases of hazardous chemicals, major fires and explosions, widespread pollution of sea water, widespread contamination of aquifer by uncontrolled land-filling; in other words all events whose probability is very low but is greater than zero. Major black-outs, water shortages, firework explosions (almost yearly), air crashes, accidents at sea have occurred. There is only a very remote possibility of terrorist attacks and nuclear emergencies, the latter due to nuclear fall-out from other countries, e.g. Eastern Europe, or from a ship or submarine near the Maltese coast.

Natural Disasters

Malta is not a country prone to natural disasters, but events such as flash floods can occur fairly frequently (once every five years). Earthquakes constitute a major problem in places close to Malta (e.g. Sicily) and cannot be completely excluded. The Mediterranean countries, including Malta, are periodically affected by extreme winds and rains. Drought and heat are not as devastating as in other continents, but their effects cannot be ignored when planning extreme scenarios.

Man-made disasters

Complex chemical processing facilities do not exist on Malta, yet a number of hazardous substances are stored and transported in the Maltese islands, for example chlorine, liquefied petroleum gases, oxygen, gasoline, pesticides, fireworks etc. Some of the installations containing hazardous substances are located in urban areas and the population at risk is quite large. Fireworks factories and stores are sometimes in the vicinity of inhabited areas; illegal factories possibly in the basements of private residences.

A lack of primary services, such as electricity and water, is a situation to which Malta is vulnerable. Electricity production depends on two main power stations, and both reverse osmosis facilities and boreholes depend on electrical energy for water production. The total amount of water stored on Malta is sufficient for only two days' consumption.

City fires are almost unheard of on Malta and Gozo, since the construction materials used are non-combustible. Nevertheless, tall structures, for example hotels, and crowded buildings, for example discotheques, are at greater risk of fire than the traditional Maltese residences.

Disaster management

The ultimate responsibility for coping with disasters lies with the National Government of Malta. Optimum use is made of existing resources through a common emergency response management structure, procedure and terminology. For each identified hazard, one ministry is named with primary responsibility for conducting response operations. Key ministries prepare response plans for each hazard in co-operation with the civil Protection Directorate, whose plans identify the supporting ministries required to help with particular emergencies, depending upon the type and scale of the emergency. The responsibility for the overall co-ordination and control of rescue operations remains with the Malta Civil Protection Directorate.

After a preliminary damage assessment report has been completed, the Secretary of the Civil Protection can request, if necessary, an Emergency Declaration from the Prime Minister. When the response operations are complex and involve a number of ministries and agencies working in close co-operation, the actions of the various ministries and agencies have to be co-ordinated to achieve common goals, priorities and economy of effort.

Once the Prime Minister issues the Declaration of Emergency, the Emergency Management Committee (EMC) assumes responsibility for the response operations.

Operations and action plans

Many emergency response operations are carried out by a single ministry with only limited assistance from one or two other ministries. These types of operations are based on fixed procedures and organisation. Other response operations, for example during floods, are more complex and involve a number of ministries/agencies working in close co-operation. In these circumstances, the actions of the various ministries and agencies are co-ordinated by the Secretary of the Civil Protection. Unified command is established at each management level so that each ministry or agency involved contributes to the decision-making process. The ministries/agencies concerned will determine how best to execute the responsibilities that they have been assigned and, if required, may request guidance on technical or functional matters from within their own ministry.

The role of the Department of Health in a Major Disaster may include any of the following:

- Providing public health measures, including epidemic control and immunisation programmes
- Providing and co-ordinating ambulance services and the sorting, treatment, transportation and care of mass casualties
- Co-ordinating the continuity of care for persons evacuated from hospitals or other health institutions
- Providing Standard Medical Units consisting of emergency hospitals, advanced treatment centres, casualty collection units and blood donor packs
- Inspecting and monitoring potable water supplies
- Providing coroner’s services including the operation of temporary morgues, identification of the dead and registration of death

Local

Scene of the accident

The Emergency Manager, i.e. the person in charge of the rescue operations from the key ministry, establishes a control post at the accident site. The Emergency Manager will also, among other things,

identify the nature and extent of the accident, identify the area for evacuation if necessary. The Emergency Officers of the Police and Armed Forces of Malta (AFM) are the officers directly in charge of police and AFM activities on site. A Transportation Officer and Officer in charge of the Civil Protection Operations Room are also appointed. The Medical Co-ordinator is directly in charge of the relief activities on site, communicates with the hospitals and controls the flow of the injured. Rescue Personnel Commanders are identified by their colour-coded vests. Reception centres are set up next to the accident site for uninjured persons and evacuees. Communication links are established between the various ministries and agencies. The Fire Service, or other personnel with the permission of the Fire Commander, carries out recovery of casualties. A collection area, triage area, care area and transportation area are identified. The injured are triaged on site by the first medically trained personnel to arrive on site, until relieved by more qualified personnel, or a designated triage officer. Casualties are classified into 4 categories (Priority I,II,II or 0), according to level of care required. The flow of the injured is controlled by the medical co-ordinator. The police and AFM are responsible for traffic and crowd control.

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Medical preparedness for disasters

The Netherlands

National

The rescue service is organised in accordance with principles similar to those in Sweden and is mainly based on permanent full-time employees. The fire-fighting service has its own alarm and command centre. The alarm and command centres have access to an extensive computerised system that makes it possible to give information about current operational plans and objects to the operational forces.

Regional

In Amsterdam the Ministry of the Interior is responsible for disaster organisation. In cases of disasters a central disaster management group is called to the town hall. This group consists of the mayor, the chief police office, the head of the fire-fighting service and the head of the public health and medical services. In addition a senior dispatcher responsible for directing ambulances and fire engines is also summoned. A special operations room with communications equipment is arranged. While the central disaster management group is responsible for information to the mass media, it is usually the case, particularly during the early stages of an emergency, that the head of the fire brigade or police deals with contacts with the mass media at the scene of the incident.

The RVHV is a voluntary organisation, which was founded in 1985 in connection with the winding up of the civil defence organisation in the Netherlands. The RVHV is organised under the regional fire-fighting agencies and assists the municipal fire brigades in their operations. The RVHV can be called in to assist with clearance and salvage work.

The Netherlands has been a leading country where psychosocial work in emergencies is concerned. An organisation has been built up which has specially trained groups to assist in rescue work and medical personnel to take care of those affected and their relatives.

In cases of disasters with a large number of fatalities, special identification teams are called to the scene of the disaster with the task of identifying the dead.

Relief workers from the Red Cross and Salvation Army often participate in relief work at the scene of the incident and, above all, in working with those affected by emergencies at a later stage.

Local

Scene of the accident

The rescue work at the scene of the accident is organised in the same way as in Sweden. The chief fire officer on duty is the chief rescue officer and establishes an operations centre close to the fire brigade’s liaison vehicle. The chief police officer involved in the rescue work is responsible for traffic control, cordoning off areas and the registration of injured and the identification of the dead. The police have their own liaison vehicle. The medical director is responsible for the medical activities and works at the scene of the incident with communications support from a liaison ambulance. The medical directors

who work with emergencies are recruited from among the district medical officers. There is always a medical director on duty who can be called in at short notice.

The chief rescue officer, the chief police officer involved and the medical director form the operational management group at the scene of the accident.

Hospitals

The major hospitals have trauma teams. These correspond to the medical teams in Sweden. A trauma team can be sent to the scene of a major accident. In this respect it is most often the case that two hospitals work together: one of the hospitals sends a trauma team to the scene of the incident while the other hospital receives the injured. The system in use is the same as that in England, i.e. the model of so-called "designated hospitals" is used. This means that maximum use is made of one hospital before the next hospital is called into service. The advantage of this principle is that fewer hospitals need to make adjustments to their planned medical activities. Information and media contacts are also facilitated and the co-ordination of psychosocial support to those affected can be implemented more easily.

Medical preparedness for disasters

Norway

National

The responsibility of the rescue service in Norway is to save people from injuries and death as a result of situations of extreme risk or accidents. Preserving the environment and material values is not part of the responsibility of the rescue service. The Ministry of Justice and the Police is responsible for the administrative co-ordination of the rescue services while the Ministry of Health and Social Affairs is responsible for ambulance services. The Ministry of Local Government and Regional Development has the overall responsibility for fire fighting and also has various responsibilities where providing assistance in cases of accidents and disasters is concerned.

Regional

Two main rescue centres - Stavanger HRS and Bodö HRS - have the overall operative management and co-ordination responsibility for all land, sea and air rescue operations in North Norway and South Norway respectively. The local rescue centres (LRS), which are linked to the country's 54 police districts, are subordinate to the two main rescue centres.

Each LRS has drawn up its own emergency plan based on a risk analysis and inventory of resources for the area in question and has plans for different disaster scenarios. The LRS comes into force in connection with major accidents or disasters. The chief police officer in the police district is responsible for ensuring that the LRS is given appropriate resources for the specific situation in question.

Local

Scene of the accident

At the scene of the accident a senior police officer is appointed as overall director of operations and is given the task of co-ordinating and leading the operations of the chief fire officer, the chief police officer and the chief medical officer. A special command centre is organised (most often in a house) from which the overall director leads operations via the three chief officers and makes continuous reports to the local rescue centre.

At the scene of the disaster an assembly point is arranged for injured persons while awaiting treatment, registration and transportation, and another assembly point is arranged for the dead. In addition an ambulance control point is marked out as the assembly point for ambulances. The ambulance control point is located in the vicinity of the assembly point for the injured. The person responsible for the ambulance control point is usually a police officer or a medical officer.

Medical preparedness for disasters

Russia

Russia is also reorganising its preparedness for disasters. There are considerable regional and local differences. After contacts between St Petersburg and Sweden a process is now taking place that is very similar to that in the Baltic States with, among other things, the Swedish system for disaster preparedness as a model.

Medical preparedness for disasters

Sweden

National

In Sweden the rescue service refers to the rescue operations that are the responsibility of central and local government. In the event of accidents or risk of accidents the rescue services have to prevent and limit injuries to persons and damage to property and the environment. The responsibility for rescue services does not include operations of a medical character. However the municipal rescue services shall be able to "prevent and limit injuries to people" and, whenever necessary, provide first aid to the injured until the responsibility can be taken over by the medical services.

Under the National Health Service Act it is the county councils that are responsible for the medical planning and preparedness for disasters and for medical undertakings in cases of major accidents or disasters. The county councils are also responsible for medical care provided by ambulances.

Where the central government rescue services are concerned, the police are responsible for mountain rescue services, the Civil Aviation Administration for air rescue services, and the National Maritime Administration for rescue services at sea.

The Government has reached an agreement with SOS Alarm for the provision of services relating to the reception, analysis and further transmission of alarms received on the emergency number for the country, 112. SOS Alarm is also responsible for alerting and directing medical transports.

It is assumed that there will be collaboration between the agencies concerned (the county council, municipal and central government rescue services, the police and the alarm centres) in the planning, management and implementation of rescue operations.

SOS International in Copenhagen is an organisation that is owned by the Nordic insurance companies. This organisation provides support and assistance to injured and sick Nordic citizens when outside the Nordic countries, and collaborates, in cases of major accidents, with the agencies concerned in the Nordic countries.

Regional

The peacetime preparedness for disasters is co-ordinated with the preparedness for serious crises and the preparedness to meet armed aggression. The preparedness for disasters is based on the normal organisation of emergency care services and the responsibility for operations should, if possible, remain with the normal members of staff concerned in these services. The plans shall mainly be regarded as a form of support for the mobilisation and re-allocation of resources in and between county councils.

Disaster committees draw up plans for disasters centrally in every county council/region and at hospitals with emergency services and primary care districts. The plans are based on available resources and conceivable risks of disasters. The disaster plans shall specify the responsibilities, management and organisation of the preparedness for disasters. There are three stages of preparedness for disasters. "Staff level" means that a central staff function is established. This follows the course of

events and takes necessary measures. "Reinforcement level" means that a disaster management function is established and that certain selective reinforcements are made to the medical services. "Disaster level" means that all available resources are mobilised and allocated to meet anticipated needs.

The planning, which is done in co-operation with the rescue services, takes geographical conditions and population density into consideration. It is necessary to reconcile the medical rescue capacity (medical groups) with the medical transport capacity (medical transports) and the medical treatment capacity (emergency hospital resources) to ensure that deficiencies and queues do not arise during the rescue operations. The objective is that it shall be possible to initiate medical treatment (first medical aid) at the scene of the incident. This treatment should continue during transportation to hospital where the injured would receive definitive treatment.

Since the objective is to be able to start the first medical aid at an early stage, the county councils are also responsible for ensuring that adequate medical equipment is available and that the personnel in question are trained and can be sent to the scene of the accident.

The county councils shall also organise psychosocial support groups that co-operate with the municipalities' groups for psychological and social care of those affected.

When a disaster occurs, the regional SOS centres (alarm centres) have a key role. The alarm centres receive the alarm via telephone number 112 and call out ambulances, the police, rescue services and medical units in accordance with predetermined plans.

In order to maintain the skills of medical personnel at a high level, most county councils in Sweden organise disaster exercises each year. These exercises often take place under realistic conditions and have the objective of training personnel in the work which takes place outside the hospital. Special emphasis is placed on co-operation with other units such as the police, the ambulance service and the rescue service.

Local

Scene of the accident

In cases of major accidents or disasters, operations are led by a rescue management group consisting of a chief rescue officer, a medical director and a chief police officer. The most senior officer in the rescue service leads the rescue operations at the scene of the accident. This officer is referred to as the chief rescue officer. The chief rescue officer is also responsible for giving information to the mass media and the general public together with the medical director and the chief police officer.

The police are responsible for cordoning off the area in which the accident has occurred, for traffic control, and for the registration and identification of the injured and the dead. The police are also responsible for contacts with relatives.

If there is no specially trained medical director available, the responsibility for leading the medical work rests with the medical officer at the scene of the accident who has the most appropriate medical qualifications and experience and is familiar with working at accidents. When the medical director arrives at the scene of the accident, he assumes responsibility.

Before the medical teams start work at the scene of the accident they shall contact the chief rescue officer who will inform them about what has happened, the estimated number of injured, where the injured are located, and any possible extension of the area at risk. Decisions on further rescue operations are made in consultations with the chief rescue officer.

The place at which the accident has occurred is referred to as the scene of the accident. There can be special risks (dangerous gases, chemicals, fires or risk of explosions) in the whole area or parts of it. The chief rescue officer may take the initiative to have an area of this type cordoned off. It is then referred to as a risk area. In order to work in a risk area, persons shall have special training and/or protective equipment.

Outside the risk area, assembly points are established for the injured, the uninjured, the dead and any property which has been collected. If the assembly point is located at a long distance from a trafficable road, cross-country transport must be arranged to take the injured to a point where ambulances can collect them. Whenever necessary a special landing site for helicopters shall be organised. This should be located at least 100 metres from the assembly point for the injured.

The assembly point for the injured should be situated as close as possible to the risk area, but should nonetheless be a safe place for medical staff and patients. The injured are given priority at the assembly point. The medical treatment considered necessary prior to transport to hospital shall be given here. Delays of transports to hospitals must be avoided. If the availability of transport resources is good and the distance to the medical establishment is short, early transport to hospital can be a better alternative than organising an assembly point. All injured persons shall be registered before they leave the scene of the accident.

The ambulance which arrives first at the scene of the accident stays there and functions as ambulance control. The crew of this ambulance has the initial medical responsibility and shall provide first medical aid. The medical director shall use the ambulance’s radio to keep the alarm centre continuously informed about the medical situation at the site of the accident (number of injured remaining at the scene of the accident, the character and extent of the injuries). This is essential in order to make it possible for adequate levels of preparedness to be maintained at alerted hospitals and assessments to be made of whether reinforcements need to be dispatched to the accident. Shortcomings in communications between the scene of the accident and the hospitals concerned are a problem which recurs constantly during disasters.

Hospitals

When the alarm is received, the hospitals’ emergency plans and measures to raise levels of preparedness are put into operation. At the "staff level" stage of preparedness, an emergency secretariat is convened which consists of medical and administrative management staff. The emergency secretariat follows the course of events and is responsible for the co-ordination of activities at the hospital and for the provision of information to the general public and the mass media.

At the "reinforcement level" stage of preparedness, certain resources in the hospital are made available as specified in the disaster plan and key persons are alerted.

At the "disaster level" all available resources are mobilised. Resources are allocated and reinforced as specified in the emergency plan. Personnel are summoned according to a special emergency list, planned operations are postponed and beds are made available in admission and nursing wards in order

to receive the injured. A local disaster officer is appointed and this person is given the overall medical responsibility for the care of the injured at the hospital.

At the emergency hospitals the psychosocial groups are responsible for providing support for those affected and their relatives, and for debriefing the staff members involved. The psychosocial groups consist of social workers, psychologists, psychiatrists and the hospital chaplain. The support groups of the fire brigade and police take care of their own personnel.

Most hospitals with emergency services shall be able to send medical teams to the scene of the accident at short notice in order to assist with the first medical aid. The medical teams consist of a doctor (an anaesthetist or specialist in intensive care or surgery) and a nurse (from the emergency ward or a nurse who has specialised in anaesthetics or intensive care). The medical teams have special protective clothing and emergency equipment packed in cases which are taken to the scene of the disaster.

Medical preparedness for disasters

United Kingdom

National

The lead government department for disaster preparedness in the United Kingdom is the Home Office which promotes the concept of Integrated Emergency Management (I.E.M.) across the ministries.

I.E.M. is applied at all levels in the Cabinet Office, Home Office and Department of Health. The L.E.M. philosophy is broken down into three elements, ‘gold’, ‘silver’ and ‘bronze’, which relate respectively to ‘strategic’, ‘tactical’ and ‘operational’ responses.

There are two aspects of applying I.E.M. In the first instance there is the application to the planning process, at the strategic level. The Chief Constable of each county police force leads the planning process as the police are responsible for co-ordinating the integrated reforms in respect of disaster preparedness in the United Kingdom. At county level the strategic management group also includes the Chief Fire Officer, Chief Ambulance Officer, Director of Public Health, County Emergency Planning Officer, Regional Health Emergency Planning Advisor, Environment Agency, British Transport Police and the lead Chief Executive of the Local Authority. The remit of this group is to apply strategies to identified risks, adapted to government ‘guidance’ and 'legislation'.

At the tactical planning level, the group mirrors the senior group but at a junior officer level. This group is responsible for producing integrated plans, for planning and for exercises under the direction of the senior group, which gives its final approval of the plans and exercises.

From the health perspective, the Department of Health has a specialist unit, the Health Emergency Planning Co-ordination Unit (EPCU), based in Whitehall, London. Its remit is to ensure a general standard of disaster preparedness across England. They also have a collaborative role with the Welsh, Scottish and Northern Ireland Health Ministries.

Regional

Linked to the EPCU there are Health Emergency Planning Advisors in eight English regions. Their role is to develop and implement the disaster preparedness policy regionally and at county level. The NHS Executive, Regional Office (usually through the Public Health Directorate) has the responsibility for ensuring that health services are fully prepared to make an effective contribution to the combined response of all emergency services, in the face of major incidents. When a major incident has either national or international ramifications or is instructed by the government, the regional office takes on an operational role, such as in the Kosovo crisis during 1999.

Local

On a day to day basis the Health Authorities are responsible for commissioning emergency planning activities as part of the disaster preparedness process. The Health Authority provides an analysis and assessment of the main major incident hazards.

The scene of the accident

When accidents occur, the ambulance staff are responsible for providing first aid but they can also summon general practitioners to the site of the accident. Where disasters are concerned, a specially appointed Ambulance Incident Officer (AIO) is responsible for the organisation and direction of operations while a Medical Incident Officer (MIO) leads the direct medical work. When necessary the AIO and MIO can requisition mobile medical and surgical teams from hospitals. The ambulance service also provides "at-scene" liaison with other emergency services and communications with the NHS.

The hospitals

The designated Hospital Trusts guarantee preparedness to respond to any major incident on a 24 hours a day, 7 days a week basis. This on average provides a minimum of one Major Hospital per Health District.

The Hospital Trusts also develop and maintain plans for the reception, emergency treatment and care of casualties involved in any major incident. Plans comply with national guidelines, and ensure an accident & emergency provision for the entire population. Plans should also include the integration of Community Trusts and Primary Care Groups during a major incident.

Hospital Trusts and Health Authorities must have individuals with the specific responsibility for major incident planning. Health authorities must be able to provide public health advice or have access to specialist expertise in the management of emergencies involving public health hazards, especially those caused by chemical and radiological accidents.

Health Authorities and trusts are responsible for ensuring that they have appropriate equipment, personnel and systems to enable them to respond to a major incident. For hospitals this would also include decontamination facilities and provision of mobile medical teams.

All hospitals provide a diverse number of training courses and exercises for all staff members on a regular basis and the hospitals are also required to test their communications every six months.

Experience gained

Disaster planning

The planning and implementation of medical activities in disasters vary between the countries in Europe. This is due to specific political, cultural and geographical conditions and to the structure of the medical services in question. In Sweden disaster planning is based on the organisation of emergency care services. Disaster plans are mainly seen as a form of support for political decisions on levels of preparedness (available resources to meet temporary peaks in workload). The plans shall also specify how resources can be mobilised and allocated in and/or between county councils.

Co-operation between agencies and organisations is necessary in order that disaster operations may be run successfully. This applies both during the planning stage and in the operative work. Co-operation is also needed between regions and with neighbouring countries and other countries in Europe in cases of extensive disasters and where international relief work is necessary. This type of help is often required in disasters involving fires since the highly specialised burn units in each country to deal with this type of disaster are often limited.

In order to make good co-operation possible, knowledge is required about the organisation and planning of the emergency medical services in the different countries. Good co-ordination and uniform concepts and terminology improve the effectiveness of rescue operations. With this purpose in mind a rescue service agreement has been signed between the Nordic countries on co-operation in cases of major accidents. This agreement includes, among other things, joint disaster medical services.

Scene of the accident

In Sweden medical groups with specially trained doctors and nurses are sent to the scene of the accident in order to provide the first medical treatment. In many other countries the medical activities are based on the skills of the rescue personnel and ambulance personnel while doctors and nurses remain at the hospitals.

Forms of co-operation and divisions of responsibility between different agencies and organisations vary considerably between different countries. The person responsible for rescue operations in Sweden is an officer from the rescue service who co-operates, in a staff function, with the medical director and the police officer in charge of police operations at the incident. In other countries the rescue operations are led by a police officer or the responsibility for directing rescue operations varies depending on the character of the incident and the qualifications and experience of the personnel available. The latter method often leads to confusion and organisational disorder.

Hospitals

In Sweden the prevailing principle, which has been followed for a long time, has been that the injured should be distributed to several hospitals to avoid overloading and queue problems. However, the Swedish system has the effect that the ordinary activities of several hospitals are disrupted despite the fact that the additional load caused by the disaster can often be limited. The model of designated hospitals used in England and Holland, amongst others, which has the effect that one hospital is allocated the main responsibility until it no longer has the capacity to receive more cases, can be preferable since this leads to fewer disruptions in planned care activities.

Liaison and communications

Liaison and communications between the management and operations group at the scene of the accident and the alarm and command centre usually constitute one of the greatest problems in a disaster. The establishment of a local command centre with communications equipment, where the persons responsible for the rescue work can assemble, is often essential if management is to function optimally. While co-operation between those responsible is of great importance, the medical services, police and rescue services need separate lines of communication between their operational groups and central management functions.

The mobile telephone communications network, which is normally used, soon becomes overloaded when different agencies and the media start to ring. The national emergency networks can provide good reserve solutions. The risk that radio traffic may be listened to by the media must also be taken into consideration and other means of communications than radio should therefore be used in order to avoid information problems.

Since the media tend to arrive rapidly at the scene of the disaster, they can interact with the rescue work both through their contacts with those affected and the rescue personnel. In connection with the jumbo jet disaster in Amsterdam in 1992, the actions of politicians and the media at the scene of the disaster disrupted the management of the rescue work. The extraction of the dead was speeded up and later this had a negative effect on the quality of the subsequent medical care. In the case of the Estonia disaster, the media's uncritical publication of pictures and names of missing persons and the dead caused considerable information problems since the publication was based on booking lists and not on lists of passengers who were actually on board the ship.

Management systems

It is of great importance that the alarm and command centre makes a thorough needs analysis where the mobilisation of resources is concerned to permit a good balance to be struck between rescue resources, transport resources and capacity at the hospitals in question. The needs analysis should be based on risk analyses and disaster scenarios in which the specific needs arising from different types of disasters are taken into consideration. SWEDE is a management system of this type which is currently being produced by the National Board of Health and Welfare in Sweden and which provides the potential to strike a balance between information obtained from the needs analysis and the actual position with regard to resources. The system thus provides excellent support for the management and control of rescue operations in cases of major accidents and disasters.

When disasters occur in international waters or in areas close to national borders the need for co-ordinated plans and operations is of great importance. This should be taken into consideration in the national and regional disaster plans.

Voluntary contributions

In several countries voluntary organisations and other organisations participate spontaneously, or in organised forms, in the rescue work at major accidents or disasters. In this respect problems can arise due to shortcomings in training and a lack of knowledge of management systems, in organisation, and

in the work at the scene of the disaster. Better co-ordination and direction of this work is often necessary. In their work at the scene of the disaster all rescue workers must be clearly distinguishable (with helmets, protective clothing, armbands etc) so that there can be no doubt about their responsibilities and capabilities.

The new threat now being directed at rescue and medical personnel is acts of terror with delayed action secondary bombs. This threat increases demands in respect of professional management and well-trained personnel. This also applies to chemical disasters in which the dangers to rescue personnel are considerable.

Flexibility

Since all disasters have their own special characteristics, a great deal of flexibility is needed as well as a capacity to improvise. Special routines for disasters should be avoided. Operations should be based instead on the regular organisation and principles of the normal emergency medical services. Disaster plans should be given the character of outline plans which specify responsibilities, management and organisation of the medical activities and rescue operations and how personnel shall be alerted and resources mobilised to meet anticipated needs.

When there are long distances to definitive treatment, the assembly point for the injured has an important function. Skilled first aid shall be provided at the assembly point and the injured shall be prepared for transportation to hospitals. In other situations, for example short distances to hospitals and good transport resources, the purpose of an assembly point is limited. Rapid transportation to hospitals is usually preferable.

In accidents which involve a large number of persons with slight injuries, the assembly point can be of value to give the injured all the treatment they need and thus relieve the load on the hospitals. However this requires greater inputs on the part of the medical personnel and consideration should therefore be given to calling in primary health care personnel for this work in order not to drain the hospitals with emergency services of their doctors.

Trends

Changes in the structure of society

Economic growth in society has led to an increasingly sophisticated infrastructure. Dependence on technology has increased, as has the need of uninterrupted technical supplies. Meanwhile, demands for cost-effectiveness have led to diminishing margins and a reduction in the capacity to cope with temporary peaks in workload and operational breakdowns.

The need of risk analyses, that estimate the probability, and impact of different accident scenarios is becoming increasingly important as a basis for political decisions on disaster planning.

Changes in conditions in the medical services

The rapid developments and changes that have taken place in social structures are very evident in the emergency medical services. Dependence on information technology has increased and technical developments in the field of medicine, including telemedicine applications, have had the effect that the medical services are increasingly being run in the form of networks. Technical medical equipment is being digitised, minimal invasive technology is being developed and remote diagnosis and treatment is becoming increasingly common. With the aid of advanced transmission of information, complicated diagnostic and therapeutic activities can be decentralised. The highly specialised emergency services are concentrated to fewer units with extensive resources, and more hospitals with emergency services are specialising and being transformed into specialist hospitals for elective care or are being given the role of a local non-emergency hospital.

The objective is now that the patients shall not necessarily need to be referred between emergency hospitals at various levels but that they shall be given access to the professional skills and resources of the network as simply and rapidly as possible. The number of beds has therefore been reduced dramatically, the average time spent in care has decreased and an increasing number of patients undergo specialist examinations and treatment in out-patient clinics. The average time spent in care at the emergency hospitals now amounts to five days and some 70 per cent of the patients are persons who have come into the hospital via emergency wards. At the same time a large part of the medical responsibilities of the county councils have been transferred to the municipalities (care of the elderly).

Developments in the emergency care services have had the result that the margins needed to meet peaks in workload in cases, for example, of major accidents and disasters have become increasingly smaller and are sometimes totally lacking. The differentiation and specialisation of the emergency medical services has also reduced the possibilities of mobilising necessary resources (personnel, equipment and beds) and allocating patients between different medical establishments.

International co-operation

The rapid developments which have taken place in Europe in respect of growth in communications between and within countries, the emergence of new economic growth regions and political integration necessitate better co-ordination of medical planning for disasters, levels of preparedness, and the operational management of medical emergencies.

The risks of disasters are increasingly international and often involve several countries as was the case, for example, of Chernobyl and Estonia. Experience gained from these two disasters clearly shows the problems that can arise when warning systems, management functions and rescue forces are not jointly planned and jointly exercised by the countries concerned. In cases of social unrest in the world around us, flows of refugees can lead to great demands being made on the preparedness of the emergency medical services, particularly where protection against infectious diseases and preparedness for epidemics are concerned.

Where the EU is concerned, initiatives have been taken which require member states to make risk inventories, and to analyse the need of services and available resources for different disaster scenarios. Directives have also been produced for surveys of risks of industrial disasters and guidelines have been presented for preventive measures and disaster plans (Seveso Directives I and II).

In order to meet future needs, a virtual organisation for the Baltic Sea region, known as the Baltic Disaster Medicine Concept, has been discussed. The objective of this concept is to co-ordinate planning, preparedness and operative management. With the aid of more uniform organisational, management and responsibility structures and well-defined concepts, the possibility has been created for joint operations to be undertaken over national borders in cases of major accidents or disasters. Similar initiatives should be taken within the framework of the EU to make inventories of risks, to analyse the need of inputs and to survey available resources. At the same time co-ordinated activities for planning and preparedness should be undertaken for the population centres and the economic growth regions that are now spreading over national borders, for example the Öresund region, the English Channel region and the Mediterranean.

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