Disaster Management in the Acute Phase

Today I would like to talk about disaster medical management just after the impact of the disaster, especially in the acute phase or sub-acute phase.

Complicated factors of disasters
These are the kinds of factors that cause complications in disasters these days (Slide 1). Even in the case of natural disasters, we often complain that disasters are very complicated or compounded nowadays. We have three keywords for these complications of disasters: social complications, international development, and information deluge. The first is the social complications. People’s lifestyles are completely changing year by year and chronic and/or mental diseases are increasing very rapidly. This is a reflection of environmental changes, such as pollution and many other different issues. And this is the reason why natural disasters nowadays are becoming more frequent or wider ranging. Another international development, of course, is that manmade disasters are increasing right now; for example, NBC (Nuclear, Biomedical and Chemical weapons) terror and complex emergencies. Also in another way, emerging or reemerging infectious diseases are causing great anxiety globally, not only VHF (Viral Hemorrhagic Fever) but also other infectious diseases which doctors will be discussing this afternoon.

Great Hanshin-Awaji Earthquake
After the Great Hanshin Earthquake, the Japanese Government informed Japanese people that such disasters must be managed by the government from the perspective of protecting the public; and citizens from the perspective of strengthening autonomy (Slide 2). These are very important things for citizens. “Disclosure and sharing of high-quality disaster information” is also important nowadays—information is getting more and more delayed—but high-quality information and the sharing of it for the benefit of Japanese people or people around the globe are very important. The “need for support-oriented communities” and “medical support is the highest basic requisite in the order of citizens’ priorities” are also important. After the Hanshin Earthquake, medical support was the greatest basic requisite for people in the affected area.

These are pictures of the Great Hanshin Earthquake which occurred on January 17, 1995 (Slide 3).

In the Great Hanshin Earthquake, the weaknesses of medical care in Japan were revealed because before the Great Hanshin Earthquake, that area, the Kansai region, had been regarded as relatively safe from earthquakes (Slide 4). As a result, medical institutions in and around the Kansai area were not adequately prepared for a disaster due to an earthquake because that
area is mostly in a zone that is frequently hit by typhoons, so they are better prepared for typhoons than for earthquakes. The Great Hanshin Earthquake occurred in an urban area with a population of more than one million people. This is also the reason why such great damage was caused. Following this earthquake, Japan’s medical systems for dealing with disaster underwent dramatic change.

This is the damage caused by the earthquake—6,500 people were killed and 40,000 were injured, and 100,000 homes were totally destroyed (Slide 5).

This was taken on the day that the earthquake struck (Slide 6). Interruption of water supplies was 73%; interruption of telephone lines was 60%; interruption of gas supply was approximately 50%; and there was a lack of manpower. These kinds of deficiencies were damaging also to medical functions, of course, as well as to medical facilities. So approximately 60% to 70% of those kinds of lifelines were destroyed on the day of the earthquake (Slide 7).

This is the hospital itself (Slide 8). And this is the first-aid and rescue in the disaster area immediately following the disaster (Slide 9). On the first day, fire occurred in 58 locations. However, in the 10 days after the earthquake, 176 fires occurred in Kobe city, approximately three times more than on the first day of the earthquake, because after restoring electricity and gas, the number of fires increased very rapidly. Not only that, the fire engines had difficulty reaching the fire sites.

**Medical aid activities**

This slide describes the medical aid activities that occurred, especially in the evacuation shelters (Slide 10). The maximum number of evacuees in shelters was approximately 310,000 people. Medical care providers were mainly the Japan Medical Association, local medical associations, other medical associations of specialists in acute medicine or disaster medicine, and so on.

This was a very popular evacuation shelter in Kobe city (Slide 11). Approximately 300,000 people were evacuated to this type of shelter.

Fortunately in this winter season, only influenza occurred in Kobe city or in the shelters. However, previously, big earthquakes in a global setting have been followed by outbreaks of malaria, tuberculosis, salmonella, typhus, cholera, dysentery, tetanus, malaria—such as in the case of the Sumatra earthquake. These kinds of infectious outbreaks were outbreaks of major diseases following on directly from the occurrence of earthquakes (Slide 12).

This slide shows the changes in the living environments of disaster victims (Slide 13). First, they experience extreme stress and changes in food intake. And then there is discord or reserve in communal living. The sanitary conditions deteriorate, there are privacy issues, and also toilet issues. Those kinds of problems arise from the beginning, and people in the affected area suffer very great stress.

After the Hanshin Earthquake, Japan was hit by another large earthquake, the Niigata-Chuetsu Earthquake, two years ago. At that time, people who lived in the area did not want to evacuate to the shelters and a lot of private vehicles were actually used as shelters. This resulted in cases of so-called “economy class syndrome”, pulmonary thromboembolism, that occurred in people who slept in small vehicles (Slide 14).

Medical aid activities within the evacuation shelter were carried out by one team, or one unit, comprising one doctor, two nurses, and one coordinator (Slide 15). Usually, the teams were doubled, and tripled at times, so at one shelter there were three doctors, six nurses, and three medical coordinators. This team would act as one unit to watch over the evacuation shelter together, so this is the reason that there were three shifts: eight hours under one team, then another eight hours with another team, and then another eight hours with the third team. So it was a very good aid team system.

**New actions taken after the Hanshin Earthquake**

After the Hanshin Earthquake, the Japanese Government announced nine new actions (Slide 16). These relate to information systems. Disaster base hospitals have already been increased to approximately 400 in Japan. Disaster medicine-related education and training for not only medical students but also young doctors or medical persons are to be implemented and spread. These nine actions, however, are still in progress.

I am quite proud of this information system (Slide 17). Before the Hanshin Earthquake, Japanese ministries were all independent, so it was relatively difficult for them to provide and share
information with each other. However, since the Hanshin Earthquake, within 30 minutes of a big disaster occurring the heads of the government ministries and agencies meet in an emergency room at the Prime Minister’s residence and consolidate information, and only then one unified announcement is released to the public. This is the so-called Japanese Alert System. Nowadays, only one uniform announcement is released to the public.

**Rescue efforts**

This shows the time course and needs in disaster situations (Slide 18). These are on a per second and per minute basis. The time course and needs in disaster situations in a global setting would be the same: “Think about self-rescue”; “Think about family and community members”. And on a daily basis, we need to think about “emergency medical care”, because each second, each minute, each hour, nobody will come and help our neighbors, so neighbors must help neighbors and family members save families—this is the keyword which we have to educate people about.

This is an example that Prof. Kawada and his associates at Kyoto University reported after the Hanshin Earthquake in which 150 people were asked how and when they escaped from their houses (Slide 19). Self-rescue comprised about 79%: they escaped by themselves. And 21% had difficulty in escaping.

Of this 21%, 35,000, or 77%, were rescued by family or neighbors—neighbors helped neighbors; neighbors rescued neighbors—and only 23% were rescued by public rescue teams (Slide 20). The reason for this is that at the initial time of the onset or impact of the earthquake, on a second or minute basis, neighbors helped neighbors and family members save families—this is the keyword which we have to educate people about.

**Three Ts**

We usually say there are three Ts at the site of disasters (Slide 21). The first is triage; the second is treatment; and the third is transportation. These three components are very necessary. In this country, there is now not only the usual triage track, but also the START triage which has already started. This START triage—which stands for Simple Triage And Rapid Treatment—is very simple. The DMAT (Disaster Medicine Assistance Team) and CSM (Confined Space Medicine) have also already been started because before the Hanshin earthquake, medical treatment was started at the rescue center or the hospital because doctors never went to the confined area of the disaster site. But in the United States or European countries, already there is onsite amputation, onsite surgery. Medical treatment has to start from the confined space at the site of the disaster. Transportation includes not only ambulance services but also helicopters, buses, ships, and other different methods have to be considered.

**Disaster medicine cycle**

Here we have a diagram of the disaster medicine cycle (Slide 22). We call the first week the acute phase, which is the rescue and emergency medical care phase; and the sub-acute phase is the following two to three weeks. This is the infection phase, and PTSD. And the chronic phase is the rehabilitation phase; the reconstruction and recovery phase. And now in the Kanto area we are in what we call the silent phase, and in this silent phase we have to organize prevention and preparedness, which involves planning, training, and stockpiling. And then there is the disaster impact. This is the cycle.

After the impact of the disaster, approximately 80% of the surgery or surgical procedures are carried out within the first one week, and then there is internal medicine, and then psychiatry—including all that is covered by this area (Slide 23). Nowadays this is the usual pattern, but from the beginning, stress disorders will occur, so psychiatrists or psychological specialists have to treat people from the beginning, a need which we are now considering.

So in the acute phase, within the first week, we focus on surgery and compensation for the damage to the local medical facilities (Slide 24). This is the reason why we have to send medical teams to the site to help local medical facilities. Then two to three weeks after the impact, the incidence of internal medicine needs and infectious diseases will increase. And in the chronic phase we will have to consider PTSD and rehabilitation and support for the mental care of the disaster-affected children.

**Summary**

In summary then, a disaster itself is an unantici-
pated and sudden occurrence that exceeds local capacities (Slide 25). This results in an imbalance between supply and demand, which we have to prepare for, but we need to “prepare for the worst” — preparations must be made with a worst-case scenario in mind. This is what I wanted to propose on the occasion of the World Medical Association’s regional conference. We have to cooperate in medical relief in disaster-prone countries such as those on the Asian-Pacific Rim. This is the reason why we are very happy to have educational training for young medical doctors and nurses and we’re very happy to work together with you.

**Factors that Complicate Disasters**

- Social Complications
- Falling birthrate
- Aging of society
- Chemical disasters
- Natural disasters
- Environmental change
- Immigration
- Tension
- Urban sprawl
- AIDS
- HIV Outbreak
- Information deluge
- Acceleration of communication
- Emerging/Reemerging infectious diseases
- International Developments

**Disaster Medical Management Perspectives**

- Government from the perspective of protecting the public; citizens from the perspective of strengthening autonomy
- Disclosure and sharing of high-quality disaster information
- Need for support-oriented communities
- Medical support is the highest basic requisite in the order of citizens’ priorities

**Great Hanshin-Awaji Earthquake**

January 17, 1995

Prior to the Great Hanshin-Awaji Earthquake, the Kansai region had been regarded as relatively safe from major earthquakes. As a result, medical institutions in and around the Kansai area were not adequately prepared for disaster when the earthquake struck.

The Great Hanshin-Awaji Earthquake occurred in an urban area with a population of more than one million people and a high concentration of medical institutions. Despite their large number, medical institutions struggled to cope with the disaster. Following this earthquake, Japan’s medical system for dealing with disasters underwent dramatic change.
Human Damage Inflicted by the Great Hanshin-Awaji Earthquake

At 5:45 am on January 17, 1995, a major earthquake with a magnitude of 7.3 struck southern Hyogo Prefecture.

**Human Damage**

- Deaths: 6,433 people
- Missing: 3 people
- Seriously injured: 10,683 people
- Slightly injured: 33,109 people
- Homes totally destroyed: 104,006 homes

Factors in the Decreased Medical Functioning of Hospitals on the Day of the Earthquake

- Water/wastewater supply interruption: 73%
- Telephone line interruption/congestion: 60.1%
- Gas supply interruption: 50.4%
- Lack of manpower
  - (staff in hospitals at time of earthquake)
  - Hospitals: Doctors 58%, nurses 44.2%
  - Clinics: Doctors 65.5%, nurses 39.3%

First-aid and Rescue in the Disaster Area

Immediately following the earthquake, fires occurred simultaneously in 58 locations throughout Kobe city.

Fire hydrants could not be used; fire-fighting operations were made extremely difficult by the collapse of buildings and dreadful road conditions including abandoned vehicles and sidden roads.

Number of fires in Kobe City in the 10 days after the earthquake: 176

Activities of Medical Aid Centers within Evacuation Shelters

- Number of evacuees within Hyogo Prefecture: 316,678 people in 1,153 evacuation centers (maximum number was on January 23)

**Medical Care Providers**

- Medical associations within the disaster area
- Medical associations outside the disaster area: Kinki Medical Association Liaison Committee, Japan Medical Association, prefectural medical associations throughout Japan, the Japanese Association for Acute Medicine, JMTDR, etc.
Outbreaks of Infectious Disease Following Major Earthquakes

<table>
<thead>
<tr>
<th>Year</th>
<th>Disaster Area</th>
<th>Disaster</th>
<th>Infectious Disease(s)</th>
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<tbody>
<tr>
<td>1906</td>
<td>San Francisco (California)</td>
<td>Fire</td>
<td>Black plague</td>
</tr>
<tr>
<td>1818</td>
<td>Baluch (J.S.E.U.)</td>
<td>Earthquake</td>
<td>Influenza</td>
</tr>
<tr>
<td>1933</td>
<td>Haiti</td>
<td>Hurricane</td>
<td>Malaria, typhoid</td>
</tr>
<tr>
<td>1936</td>
<td>Peru (Italy)</td>
<td>Earthquake</td>
<td>Scarlet fever</td>
</tr>
<tr>
<td>1939</td>
<td>Mexico</td>
<td>Earthquake</td>
<td>Typhoid, pneumonia, measles</td>
</tr>
<tr>
<td>1942</td>
<td>Sumatra</td>
<td>Flood</td>
<td>Malaria, cholera</td>
</tr>
<tr>
<td>1949</td>
<td>Java</td>
<td>Earthquake</td>
<td>Typhoid, pneumonia, typhus</td>
</tr>
<tr>
<td>1964</td>
<td>Hanshin-Awaji (Japan)</td>
<td>Earthquake</td>
<td>Influenza</td>
</tr>
</tbody>
</table>

Changes in Living Environment of Disaster Victims Following a Disaster

- Changes in Victims Themselves
  - Extreme disaster stress
  - Decrease in food intake
  - Discard or reserve in communal living

- Changes in Living Environment
  - Deterioration of sanitary conditions
  - Disruption of privacy
  - Live as evacuees
  - Destruction of privacy
  - Problem of toilet inconvenience

Activities of Medical Aid Centers within Evacuation Shelters

Composition of Medical Aid Teams

- Doctors: 1
- Nurses: 2-3
- Medical coordinator: 1

Medical aid teams were assembled based on the standard composition shown above. In addition to running emergency aid centers and first-aid stations around the clock, medical teams also visited evacuation shelters.
Disaster Responses that Advanced the Most in the Wake of the Great Hanshin-Awaji Earthquake

How fast can decisions be made and government action determined based on accurate information?

1. Prime Minister’s Residence Emergency Team
Within 30 minutes of a disaster occurring, the heads of all government ministries and agencies meet in an emergency room beneath the Prime Minister’s residence to determine what action the government will take, and the consolidated information is released.

2. J-Alert System
Alerts are sent to all prefectures based on the Law to Protect the People.

Time Course and Needs in Disaster Situations

- Per second/minute basis: Think about self-rescue
- Hourly basis: Think about rescuing family/community members
- Daily basis: Think about emergency medical care
- Weekly basis: Think about evacuees
- Monthly basis: Think about psychological care
- Yearly basis: Think about recovery and rebuilding

Escape and Rescue from Collapsed Houses After the Great Hanshin-Awaji Earthquake

3T’s of Disaster Sites

1. Tringe: Determining the order of priority for medical treatment of people injured at the disaster site based on urgency and severity of injuries
   - START triage: Physiological
   - Secondary triage: Physiological/anatomical
2. Treatment: Emergency treatment given at the disaster site
   - Urban Search and Rescue, CSM, DMAT
3. Transportation:
   - In addition to considering what nearby transportation is available, try to prevent transported patients being concentrated in one place
   - Consider transportation by unconventional means – helicopter, bus, ship, etc.
**DISASTER MANAGEMENT IN THE ACUTE PHASE**

### Relationship between Illness Patterns and Time Following Earthquake Damage

![Graph showing the relationship between illness patterns and time following earthquake damage.]

**Time in Weeks**
- 0 (Disaster)
- 1W
- 2W

### Summary
- Unanticipated situation
- Sudden occurrence
- Local coping capacity exceeded
- Emergency situation resulting from multiple casualties
- Imbalance between demand and supply; aid from outside disaster area necessary
- Impossible to meet all demands with even the best aid
- Preparations must be made with a worst-case scenario in mind

### Time Shifts in Disaster Medical Support

<table>
<thead>
<tr>
<th>Phase</th>
<th>Acute Phase</th>
<th>Subacute Phase</th>
<th>Chronic Phase</th>
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</thead>
<tbody>
<tr>
<td>- Self-management</td>
<td>- Focus on surgery</td>
<td>- Focus on internal medicine (breathing, digestive apparatus)</td>
<td>- PTSD psychological care</td>
</tr>
<tr>
<td>- Compensation for damaged local medical facilities</td>
<td>- Compensation for infectious disease</td>
<td>- Psychosocial support</td>
<td>- Rebuilding of medical system</td>
</tr>
<tr>
<td>- Early detection</td>
<td>- Early detection</td>
<td>- Healthcare support</td>
<td>- Support for disaster-affected children</td>
</tr>
<tr>
<td>- Role infectious disease monitoring</td>
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Emergency physicians are the most appropriate medical professionals for considering all three phases overall.