Public Health Impact of Disaster on Children

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Abstract
Disasters have the greatest affect on the most vulnerable groups—especially children. Children are particular at risk because they are developing in both physical and psychological aspects. Most young children depend on routine and consistency in the environment, home life and in relationships with their family. Disasters have affects on public health such as infectious diseases including diarrhea, acute respiratory infection, measles and malaria. Psychosocial support to children and their family is essential from the viewpoint of mental health. In refugee camps, playgrounds for children are set up even in the emergency phase.

Japan has developed good practice from its lessons learned in disaster medicine, and should contribute to international cooperation for children in disasters.

Key words Public health, Disaster, Children, Refugee, Mental health, Psychosocial support

Introduction

It is a myth that disasters are random killers: “Disasters strike hardest at the most vulnerable groups—the poor, and especially women, children and the elderly.”

Because children are in the process of physical and mental development, they are at particularly high risk of harm from a disaster. As compared with adults, children depend more strongly on stability in their daily lives and environment, and they are more vulnerable to the direct consequences of a disaster, including shortage of food and potable water, coldness due to poor sheltering, and a loss of protection in the family.

Natural disasters, as well as political turmoil and conflicts, affect people all over the world every year, resulting in the generation of international refugees and internally displaced persons. The situations requiring disaster health care can be divided into natural disasters (storm, flood, earthquake and tsunami, volcanic eruption, etc.), man-made disasters (fire, chemical explosion, train accident, etc.), and the presence of refugees. Different types of disasters pose different needs in the provision of health care support for children with different degrees of urgency. The common fact is that disasters affect the lives and physical, mental, and psychological health of numerous children every year worldwide.

This article analyzes the issues of children’s health following disasters, both in Japan and overseas, chiefly from the standpoint of public health. The discussion is based on the lessons learned from my experience in the Hanshin Awaji Earthquake, as well as the experience in humanitarian assistance provided in overseas refugee camps and disaster relief activities. In concluding, I make recommendations concerning disaster health care for children.

General Characteristics and Public Health Effects of Disaster on Children

A major disaster hits the entire group of victims at the same time. For example, all people in the affected area experience the earthquake simulta-
neously and become victims. This equality is a characteristic of large earthquakes. However, there are differences reflecting socioeconomic strata, such as that a reinforced concrete condominium may remain intact after a large earthquake next to wooden flat that collapses. In addition, infants and children suffer qualitatively different effects as compared with adults.

In the case of the Hanshin Awaji Earthquake in January 1995, victims had to look after themselves immediately after the disaster. Some people who lost their houses left temporary refuges opting to receive support from their relatives, companies, and friends. My colleagues and I examined the health of children living in refuges 2 weeks after the earthquake. On this occasion, many severely affected children had evacuated using personal connections, while many of those staying in refuges (elementary school buildings) had problems in finding temporary shelters. The presence or absence of a private support network directly affected their standard of living following the earthquake.

This section outlines the characteristics of health care for children following disasters. The issues regarding mental care and psychosocial support are detailed in the next section.

1. Death of children

The causes of death among children vary greatly depending on the type of disaster, such as earthquake, flood, etc. Following the Hanshin Awaji Earthquake, an overwhelming majority of the children under the age of 15 who died lost their lives due to suffocation (55.7%), crushing (12.3%), and contusion (15.3%). Nearly all of these cases were reported to have been almost instantaneous death.

2. Health care for children following disaster

A major disaster also causes serious damage to medical institutions. Physical damage including collapse and destruction of hospitals and clinics, as well as death and injury of personnel, may be considerable. Disruption of transportation systems may prevent physicians and nurses in the disaster area from going to work. Damage to the operational aspects may also be serious, such as the breakdown of information systems interrupting communication needed for the transportation of patients. Following the Hanshin Awaji Earthquake, we encountered a number of problems with emergency facilities depending on the supply of water and electricity, such as that the emergency power source did not operate because it was water-cooled, the pumps sending water to rooftop cisterns did not work, etc.

According to the experience in the Hanshin Awaji Earthquake, the medical services provided during the 2 days following the disaster mainly consisted of emergency surgical care. Because many hospitals were keeping a lean inventory, there was a significant shortage of supplies for surgical treatment, such as bandages, gauze, and injection fluids. In the later periods, the focus moved to the treatment of infections (acute respiratory infection, diarrhea, etc.) and acute post-disaster stress arising from lack of sleep and abnormal excitation. At least in the case of disasters in Japan, many of the families with infants and children evacuate relatively early after a disaster occurs, and the number of patients visiting pediatric outpatient departments tends to decrease over time.

3. System of health care for children in refuges

In preparing for disasters, it is important to establish a system of health care for children in refuges. The systems for health care in refuges are operated mainly by administrative bodies and local hospitals. In many cases of recent disasters in Japan, medical care in refuges is often provided by medical volunteer groups, including Japanese Red Cross Society, volunteer organizations, and local administrative and hospitals in other areas. However, a lack of good coordination between refuge health care systems and volunteer activities has sometimes caused problems. In the Niigata Chuetsu Earthquake in 2004, volunteer physicians administered influenza vaccination to children in refuges, but this caused a problem in identifying who received a vaccination and who did not, because the volunteer physicians failed to keep vaccination records.

Medical activities in refugee camps in developing countries are conducted by clinics without the facilities for hospitalized care and the hospitals in the camps. Pediatric patients requiring major surgery or special treatment in ophthalmology, ENT, etc. need to be transported to regional hospitals outside the camps. Because some people are not in the habit of visiting hos-
hospitals or clinics in illness, pediatric patients may be cared for at home until the condition becomes severe. This underscores the importance of outreach activities. While some NGOs are staffed with many physicians and nurses and are equipped with simple operating rooms, others are small groups of several persons carrying limited medical instruments and drugs. In a refugee camp, medical NGOs of various sizes from various countries coexist and cooperate. Usually, regular meetings of health professionals are held in each camp to facilitate information exchange and work sharing among NGOs and international organizations.

4. Infections

The risk for the incidence of infectious diseases increases due to deteriorated hygiene and overcrowding within several days after a disaster. Thereafter, depending on the level of hygiene at the refugee camp, the risk for various infections has been shown to increase (Table 1). The most common types of infections observed in refugee camps include diarrhea, acute respiratory infection (ARI), measles, and malaria, which are called the 4 major killers. In addition, increases have been reported in various infections, such as the epidemic of tuberculosis due to crowded living conditions, tetanus arising from unsanitary treatment of injury and childbirth, various parasitic infections, and scabies due to the shortage of water.

(1) Diarrhea

The key to prevention is the supply of safe drinking water and food and the improvement of environmental hygiene. While the treatment of human wastes and garbage is important, attention should also be paid to the drainage facilities for gray water used in cooking and laundry. The causes of diarrhea include bacteria (pathogenic Escherichia coli, Campylobacter, Vibrio parahaemolyticus, Salmonella, dysentery, and cholera), viruses (Rotavirus), and parasites (dysentery ameba and Giardia). In principle, diarrhea is treated with oral rehydration salts (ORS). Cases with severe dehydration require intravenous fluid therapy.

The most important prevention measures are the provision of a safe water supply and sanitary toilets. The need for these measures is common to disasters in both Japan and refugee camps in developing countries.

(2) Acute respiratory infection (ARI)

The chance of contracting respiratory infections increases as a result of the high population density in refugee camps, poor ventilation in tents, and shortage of blankets and clothes. Persons in a state of malnutrition easily develop from simple cold and upper respiratory infections to lower respiratory infections, such as pneumonia and bronchitis. Effective treatment strategies are early detection and the use of antibiotics. The selection of antibiotics should comply with the first-choice agent specified in each country (co-trimoxazole is the first-choice antibiotic in many countries).

Prevention is achieved by the distribution of blankets and clothes and the provision of the minimal required space for living. According to UNHCR, each person requires the living space of 3.5 m² (in tropical areas) or 4.5–5.5 m² (in temperate and cold areas). However, provision of sufficient living space is difficult in practice. Very few of the refuge shelters following the Hanshin Awaji Earthquake satisfied this criterion.

<table>
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<tr>
<th>TABLE 1 Common infectious diseases in camps</th>
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<td><strong>DISEASES</strong></td>
</tr>
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<td>Diarrhea</td>
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<td>ARI</td>
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<td>Malaria</td>
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<td>Measles</td>
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<td>Tuberculosis</td>
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<td>Tetanus</td>
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<td>Parasite diseases</td>
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<td>Scab</td>
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(3) Measles
This disease is likely to occur in large-scale epidemics in group living conditions, and once an outbreak takes place, it threatens the lives of many infants and toddlers. The setting for an epidemic is created when people who had been living separately start to live in a group. In an immunization program for children, the highest priority should be placed on measles. Immunization against measles should be started as early as possible after the setting up of a camp.

(4) Malaria
This disease, transmitted by Anopheles mosquitoes (Anopheles), is a representative tropical infection distributed widely in tropical and subtropical regions. There are 4 types of malarial parasites affecting human beings: tropical malaria (Plasmodium falciparum), tertian malaria (P. vivax), ovale malaria (P. ovale), and quartan malaria (P. malariae). Symptoms vary considerably depending on the history (primary infection or reinfection), the age of patient, and the type of pathogen. In particular, children often do not show typical fever patterns. A massive epidemic can occur when a large number of inhabitants have moved into a malaria endemic area. In the case of the Rwanda refugees, 1 or 2 in 10 persons contracted malaria, and the mortality rate was reported to be as high as from 10 to 30%.8

The recommended prevention measures are elimination of water pools producing mosquitoes and the distribution of mosquito nets. Treatment is the administration of antimalarial agents, which should be selected considering the possibility of drug resistance.

Psychosocial Support to Children

Recently, the importance of psychosocial care for persons affected by disasters has been highlighted. Victims of a conflict do not easily recover from the sad experience of losing their close relatives, witnessing the killing of familiar persons, and being raped or nearly killed. The sense of material and mental loss may also be tremendous, when people have lost property, houses, and jobs, and have been forced to leave their beloved home behind. After experiencing life-threatening situations, some survivors and refugees develop the symptoms of post-traumatic stress disorder (PTSD).

Children are no exception. Pynoos described that a strong positive correlation was found between the proximity to the epicenter and the overall severity of post-traumatic stress reaction and indicated that after a catastrophic natural disaster post-traumatic reactions in children may reach epidemic proportions, remain high for a prolonged period, and jeopardize the well-being of the child population over a large region.9
Following the Hanshin Awaji Earthquake, many of the children who lost their parents were reported to have psychological problems for a prolonged period. On the other hand, better tendencies toward psychological recovery have been reported among the children who experienced the disaster but did not suffer psychological trauma such as the death of family members. Our questionnaire survey targeted mothers of preschoolers conducted 6 months after the Hanshin Awaji Earthquake produced the following results. Many children in Kobe city demonstrated regressive behavior, separation anxiety, the re-experience and the elevation of arousal level, which are categorized as the symptoms of PTSD. However, 61.0% of them helped parents with housekeeping and 78.3% willingly went to school or kindergarten (Fig. 1).

Recently, humanitarian relief organizations in Europe and the U.S. have begun improving the provision of mental care through various measures such as the inclusion of psychological counselors in emergency support teams. The importance of psychosocial support in disaster response is also recognized in Japan. However, it is in fact difficult to find appropriate workers such as psychological counselors for children. It is most important to provide the children with the normal environment of everyday living, as opposed to just having children draw pictures. To this end,
education and training concerning the importance of psychosocial support should be given to specialists maintaining regular contact with children, including school teachers, nursery teachers, and school nurses. It is also important to facilitate the alleviation of psychological stress of children by providing playgrounds and securing places for group play in schools and nursery schools.

In April 1999, the refugee camp for Kosovo people in Macedonia already had playgrounds constructed for children when minimal living conditions including the supply of food and drinking water had just been ensured. In a corner of the refugee camp, there were swings and a jungle gym made of whatever timber was available. Children laughed as they played, and adults around them were smiling brightly. I was very impressed by the fact that providing children with an environment similar to their everyday lives could make them look so cheerful. Understanding the importance of providing warm food and a restful environment is the starting point of psychosocial support.12

Recommendation for Child Health System of Disaster

The most urgent tasks in disaster response are life saving and searching for survivors. For surviving children, it is most important that basic human needs (BHN) are satisfied, including drinking water, food, and shelter. There are various needs within the care for children. Groups of children who are vulnerable to the impact of disaster, such as infants, disabled children, and children of different nationalities, need special responses. Psychosocial support following disaster is also necessary. The health care system for children in a disaster should be developed as part of the overall framework for disaster response and preparedness. In addition to general care and human care, the roles of families, communities, and administrative bodies are particularly important in the care for children. These roles are summarized in Table 2 according to the stage of disaster.

In the preparedness phase, disaster prevention/response plans and disaster drills targeted at children are important. Signs of evacuation routes should be illustrated so that children may clearly understand where to go. During the emergency phase, pediatric emergency care and hospitalized care are important. Care for children receiving artificial respiration and oxygen therapy at home is also important. During the relief phase, vaccination against measles, health examination of infants, and individualized care for children with chronic diseases and disability are important too. In addition, it is essential to provide psychosocial support to children, includ-

Table 3  The code of conduct for the International Red Cross and Red Crescent Movement and NGOs in disaster relief

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<th>Principle Commitments:</th>
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<td>1. The Humanitarian imperative comes first.</td>
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<td>2. Aid is given regardless of the race, creed or nationality of the recipients and without adverse distinction of any kind. Aid priorities are calculated on the basis of need alone.</td>
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<td>3. Aid will not be used to further a particular political or religious standpoint.</td>
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<td>4. We shall endeavour not to act as instruments of government foreign policy.</td>
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<td>5. We shall respect culture and custom.</td>
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<td>6. We shall attempt to build disaster response on local capacities.</td>
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<td>7. Ways shall be found to involve programme beneficiaries in the management of relief aid.</td>
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<td>8. Relief aid must strive to reduce future vulnerabilities to disaster as well as meeting basic needs.</td>
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<td>9. We hold ourselves accountable to both those we seek to assist and those from whom we accept resources.</td>
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<td>10. In our information, publicity and advertising activities, we shall recognise disaster victims as dignified human beings, not hopeless objects.</td>
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Source: International Federation of Red Cross and Red Crescent Societies: Code of conduct for the International Red Cross and Red Crescent Movement and Non-Governmental Organizations (NGOs) in disaster relief, International Federation of Red Cross and Red Crescent Societies, Geneva, 1994.
ing those staying in refuge shelters. As schools and nursery schools reopen, attention should be paid to the environment of the everyday life of children through the close cooperation of school teachers, nursery teachers, etc. Finally in the reconstruction phase, psychiatric care and psychological counseling should be given to children with severe psychological trauma and those showing the symptoms of PTSD, separately from the psychosocial support to children as general. Continuation of prolonged psychosocial support is needed during the redevelopment after the disaster.

As discussed above, humanitarian assistance following a disaster involves the participation of various organizations including volunteers, and hence many arrangements have been made internationally. These arrangements were made on the assumption that the acts of outsiders performed with good intentions do not necessarily benefit the victims of disaster. In 1994, the Code of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Relief was promulgated (Table 3). Furthermore, the Sphere Project was launched in 1997 for the purpose of defining the minimal standards concerning the various aspects of humanitarian assistance. A revision was published in 2004, including the minimal standards concerning water supply, hygiene, nutrition, food distribution, health care services, etc. In Japan also, administrative bodies, medical institutions, volunteers, and other relevant parties should share a code of conduct regarding disaster relief. In the present situation where much of the support comes from outside the disaster area, sharing of minimal standards and the code of conduct should be an effective means of protecting the human rights of children.

Summary

Shortly after the Hanshin Awaji Earthquake, children attending an elementary school in Kobe wrote essays.

“When I went out, I saw a collapsed house. A dog and an old man were under the house. The old man was dead, but the dog was alive.”

“Looking at my house, the second floor was now the ground floor, and the ground floor was a mess.”

Six months later, the same child had grown to write the following letter:

“I’m no longer afraid of aftershocks. I feel safe. I sometimes feel like forgetting the earthquake, but I should not forget, because I was helped by many people.

When we hear the news of the war in Rwanda, our first instinct is to think that it is nothing to do with us, although we too suffered hardship from that big earthquake. All right? No, it’s not all right at all.”

Six months after the personal experience of the earthquake, the child had sublimated the experience of disaster, and was thinking sympathetically about the refugee camps on a different continent. Many schools and communities in the disaster area had steadily been supporting children who suffered extreme harm. These efforts led to the rebuilding of the minds of children themselves.

Disasters do not strike suddenly. On a national or global scale, disasters are “repeated” regularly. Learning from experience of the many disasters in Japan, we should strive to develop disaster health care that helps children to survive strongly after the tragic experience of disasters. This is the most important contribution that Japan has to offer to the world.

References

11. Department of Pediatrics, Kobe University, TISCH. The report of physical and mental health of children affected by the Hanshin-Awaji Great Earthquake; 1996. (in Japanese)
13. International Federation of Red Cross and Red Crescent Societies: Code of Conduct for the International Red Cross and Red Crescent Movement and Non-Governmental Organizations (NGOs) in Disaster Relief. Geneva: International Federation of Red Cross and Red Crescent Societies; 1994.