
EMERGENCY MANAGEMENT FROM INFECTIOUS DISEASES DURING AND AFTER VARIOUS NATURAL AND MAN-MADE DISASTERS

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Abstract: Natural or human-made disasters can create perfect conditions for the outbreak of infectious diseases transmitted through water, air, and other vector routes. In general, measles, diarrheal diseases, and respiratory infections are the etiologies responsible for most of the fatal deaths observed after natural disasters and complex emergencies. Conditions such as typhoid, cholera, and meningitis have been observed in post-catastrophic situations. Still, they have been more frequently identified in refugee camps in developing countries and war conflict areas. Impairment of regular and systematic control programs can lead to an increase in infectious diseases, especially in developing countries. Measures must be taken both before and after the disaster to prevent the spread of contagious diseases.

Contamination of drinking water may associate the disruption of the functioning of the public hygienic water distribution system and the possibility of mixing clean water with sewage during disasters. In such conditions is an emergent intervention of governmental health bodies if there is a natural disaster or International humanitarian organizations if there is a conflict zone.

Keywords: diseases, natural disasters, emergencies, typhus, cholera, meningitis

1. INTRODUCTION

The risk of mass epidemiological outbreaks in the immediate aftermath of natural disasters is relatively low, especially in the developed countries. Reports of health workers in most cases indicate that during the catastrophic emergency phase, although a slight increase in the transmission of infectious diseases is observed, outbreaks of epidemics in the full sense at this time are relatively rare. In most cases, outbreaks of contagious diseases occur at a later stage if immediate measures are not taken to remedy the post-catastrophic situation and thus create epidemics conditions, especially during periods of drought, floods, mass starvation, massive displacements of populations.

In general, measles, diarrheal diseases, and respiratory infections are the etiologies responsible for most deaths observed after natural disasters and complex emergencies. Conditions such as typhoid, cholera, hepatitis, and meningitis have also been observed in post-catastrophic situations. Still, they have been more frequently identified in refugee camps in developing countries, especially in war conflict zones. Acute respiratory infections are responsible for a significant morbidity and mortality percentage, which is observed during complex emergencies.

During various natural or human-made disasters, the conditions for the outbreak of infectious diseases transmitted through water, air, and other routes are created. Also, in the aftermath, various infections can start, or their intensity can increase, and the health conditions of the exposed population can quickly reach a critical stage. Contamination of potable water can associate with the disruption of the public hygienic water distribution system's functioning and the possibility of mixing the potable water system with the sewage system during disasters.

Global warming is another implicated factor that can change the endemic incidence of some easily transmitted diseases such as yellow fever, malaria, and a series of viral encephalitis, making their outbreak after disasters a significant risk.

Impairment of regular and systematic control programs can lead to an increase in infectious diseases, especially in developing countries.

There are three main groups of health risks to the population in endangered areas:

1. Physical injuries (cuts, fractures)
2. Risks of infections by dangerous biological vectors, such as microorganisms
3. Exposure to harmful chemicals occurring at the site of a disaster.

The main factors that increase the risk of being infected with infectious diseases are environmental characteristics and endemic organisms, climate conditions during the disaster, geographical factors, anthropological factors, etc.

The incidence of infection by a specific disease increases if the population is dominated by very old individuals or very young people.

The consequences of withstanding a disaster depend on many factors, e.g., the medical staff sufficiently trained to manage the situation, are there health structures, sufficient hygienic conditions and reserves in medicines, equipment, institutional interaction, or coordination with international humanitarian organizations.

The risk of epidemics increases when the potable water and food resources are damaged, when we have large numbers of population displacements, when the necessary infrastructures of public health care bodies are damaged or destroyed (ambulances, hospitals, etc.)

2. NATURAL DISASTERS AND EMERGENCY INTERVENTIONS

Generally, with very few exceptions, outbreaks observed after a natural disaster always belongs to endemic pathologies for those geographical areas. Although earthquakes, hurricanes, and floods can increase infectious diseases (especially water-borne enteric pathologies), the speed and quality of public health bodies' intervention, before and after the event, be crucial and essential to the success of affording the natural disaster.

Infections caused by *Shigella dysenteriae*, *Vibrio cholerae*, *Salmonella typhi*, *A* and *E hepatitis* virus, and *leptospirosis* are the main infectious diseases that appear after natural disasters. **Diarrheal conditions** are particularly severe, followed by fatalities, with numerous cases recorded in refugee camps and in instances of population displacement. Outbreaks of epidemics, e.g., cholera, are rare in developed countries, but tragic episodes have been recorded in refugee camps and war conflict zones.

Lack of necessary sanitation procedures for the potable water, such as chlorination of water resources, lack of adequate protection of water resources and their subsequent contamination, as well as non-determination of areas of particular importance, are factors that lead to the outbreak of water-borne epidemics.

Damage to the public hygienic water distribution system and sewage can be accompanied by contamination of drinking water. If these two lines are located in parallel and close to each other, they can be easily damaged and intersect with each other, such as in earthquakes or floods.

The risk of developing diarrhea is closely related to the level of personal hygiene and hygienic living conditions.

Studies conducted during the 1988 floods in Bangladesh have shown that watery diarrhea was the most common infectious disease. The children were the most affected having the most severe consequences of this disease. Diarrheal disorders can be a consequence of the use of contaminated water and food. The use of unhygienic water bottles, shared cooking utensils, lack of soap, in general, the presence of poor hygienic conditions.

Cholera is a severe intestinal infection caused by ingestion of food or water contaminated with the toxin-producing bacterium (cholera toxin) - *Vibrio cholerae*.

The clinical disease caused by these serogroups results from the production of an enterotoxin of a protein nature, which stimulates the secretion of fluid and electrolytes into the lumen of the small intestine. Cholera may be endemic, epidemic or pandemic, and patients may be asymptomatic, mild to severe, or severely dehydrated and die within a few hours. Cholera is transmitted through the fecal-oral route and is not a problem for countries with well-developed sanitary systems. The mortality rate is lower in places where intravenous therapy is available. In Europe and America, the mortality rates are around 1%.

Escherichia coli *Escherichia* organisms part of the *Enterobacteriaceae* family (*E. coli*, *E. blattae*, *E. fergusonii*, *E. hermannii*, *E. vulneris* and *E. albertii*) are gram-negative bacilli, facultative anaerobes. *Escherichia coli* invasion is associated with various infections, including cholangitis, urinary tract infections, cholecystitis, diarrhea, pneumonia, and neonatal meningitis. *E. coli* bacteria typically live in humans' and animals' intestines. Most of them are harmless and constitute essential components of the human intestinal tract. Only a few *E. coli* strains are pathogenic and can cause diarrhea or disease outside the digestive tract. *E. coli* types causing diarrhea can be transmitted through contaminated water or foods or contact between animals and humans.

A and E hepatitis are transmitted orally by the fecal route and often occur in places or areas with poor hygienic conditions, in which sewerage and drinking water management systems are not in full control. .

Leptospirosis: is a zoonosis transmitted through contact of mucous membranes and damaged skin with water or other impurities. Floods facilitate the multiplication and spread of leptospirosis in humans. This disease is often reported in developing countries after floods.

Acute respiratory infections, tuberculosis, meningitis, and measles are transmitted from one person to another, and their incidence increases in overcrowding conditions, which are encountered in the field of disasters and are responsible for increased mortality in refugee camps. The most severe forms have been observed in children under five years of age, the elderly, and persons with compromised immunity. Vaccination for measles, diphtheria, pertussis during complex emergencies (Fawzi et al., 2000) is of great value because it reduces the risk of being affected by these diseases, which compromise and weaken the body's immune system and increase the risk of complications from secondary bacterial infections.

Tuberculosis. Living displaced victims during the post-disaster phase, in overcrowded environments, factors that increase the incidence of new cases of *Mycobacterium tuberculosis* infections or increase this pathology's recurrence.

During the 1992 Bosnian conflict, cases of tuberculosis quadrupled (Toole et al., 1993). A study of Tibetan refugees in India (Bhatia et al. 2002) showed that tuberculosis was the second leading cause of death (14%), while in Ethiopia (Gele et al. 2010), for patients from war-affected areas, the time was two time longer. For receiving therapy compared to other patients. To prevent outbreaks, health facilities must have sufficient amounts of antimicrobial drugs.

Measles. Before the 90s, the creation of a measles epidemic after natural disasters was common. Their frequency has decreased due to the application of massive immunization programs and increased attention to vitamin A deficiency.

The eruption of Mount Pinatubo accompanied by the evacuation and sheltering of 100,000 people. Three months after the disaster, about 18,000 cases of measles appeared. Immunization before the catastrophe was low, which is thought to have contributed to the high incidence of the disease.

Measles has been a problem in refugee populations created by complex humanitarian emergencies, as in East Timor (1999), Somalia (1992), Nepal (Bhutanese refugees, 1992), Zimbabwe (1992), Sudan (1985, 1993).

Malaria is a parasitic disease that is transmitted to humans through the bite of infected Anopheles mosquitoes. The condition is caused by a single-celled parasite of the genus Plasmodium. Humans are infected by four species of Plasmodium, which look different under a microscope and give relatively specific clinical presentations. A major malaria epidemic broke out in Haiti after Hurricane Flora in October 1963, where 75,000 cases occurred within several months. In Burundi, between October 2000 and March 2001, was reported a massive malaria epidemic. About 2.8 million cases occurred in a country with 7 million inhabitants.

3. MANAGEMENT AND INTERVENTION PRACTICES

The management of infectious diseases during disasters is based on the following components. Taking measures to prevent infectious diseases - priority should be given to repairing damaged points of public health infrastructure, needs assessment, and defining active mechanisms of continuous monitoring. Implementation of epidemiological surveillance. Vaccination (vaccine for pertussis, tetanus, measles, rubella, etc.). They are providing safe havens for the displaced population, clean drinking water, and proper hygienic-sanitary conditions: timely diagnosis and correct treatment of all cases regardless of the disease stage.

Measures must be taken both before and after the disaster to prevent the spread of infectious diseases. Preventive measures (before and after the disaster) include training health personnel to identify and manage various natures' specific conditions. Preparation of specific medical equipments, materials, and supplies. They were strengthening ongoing surveillance health systems and operating health information and increasing knowledge and records for the population. Taking environmental measures to cope with the outbreak of various diseases. Realization of preparations for the establishment of possible field hospitals to treat the injured

During the post-disaster phase, the main measures should be followed by Providing urgent medical assistance. They are providing drinking water, hygienic and sanitary conditions as well as safe food. Expert checks are performed through the life-long education of the medical staff and the population.

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