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Disaster, Earthquake and Intensive Care

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Introduction

The World Health Organization (WHO) defines disaster as any natural, technological or human-induced event that causes a serious disruption in the functioning of a community or society, exceeds the ability of the affected community or society to cope using its own resources, and causes widespread human, material, economic or environmental losses [1].

In order for an event to be defined as a disaster, normal life must be interrupted and the resource capacity of the society to cope with the event must be exceeded. Over time, people's perspective on disasters has changed due to the increasing importance given to human life, technological and scientific developments, and it has been seen that disasters can be prevented or overcome with minimal damage if the necessary precautions are taken [2].

In the 21st century, there are ten factors that can cause disasters due to the increase in both risks and fragility. These are: population growth, environmental degradation, global warming, deforestation, infectious diseases, hazardous substances, chemical warfare, nuclear substances, economic inequality and ethnic or religious discrimination [3].

On the other hand, development, which is the most important factor in terms of disaster resilience, is still far away for many countries. The wealth gap between countries is widening, and poor countries are getting poorer. According to experts, although natural events develop independently of people, whether they will cause a disaster is determined by society. How much harm will be caused by a hazard depends on the distribution of power and resources within that society. The poor always suffer the most from disasters [4].

Earthquakes

Earthquakes are the most lethal type of disaster, causing approximately 820,000 deaths worldwide between 2000 and 2023. Approximately two-thirds of all earthquakes worldwide have occurred in Asia, where they affect more people than earthquakes on any other continent [5]. The biggest reason for earthquake deaths is that the ground on which the buildings sit is loose and the buildings are not resistant to tremors. In developed countries that choose their settlements consciously, have planned cities and have earthquake-resistant buildings, earthquake damage is low. Since the early warning period is short in earthquakes, what can be done after a fault rupture occurs is limited. Instead, it is necessary to prepare for earthquakes and to build buildings in suitable places and in a solid manner. This is difficult for poor countries that have various management problems and resource shortages and for the poor citizens of these countries. According to the analyses, increasing population, influx to cities and unplanned urbanization will lead to greater deaths and material losses from earthquakes in the future [6]. Although earthquakes have an egalitarian appearance by affecting the entire society in the area where they occur, they are quite discriminatory in terms of their results. They affect the poor

and disadvantaged groups much more. The most important criteria for an earthquake to turn into a disaster are human deaths and injuries. Although all kinds of responsibility for earthquake and disaster management lies with the state and governments, this does not eliminate the responsibility of the society and individuals. Because responsibility in disaster management is too important to be left to the state and governments alone. Society and individuals must take responsibility, follow the process and use their social power and resources when necessary. Civil society organizations (CSOs) have important responsibilities and duties. Earthquake triage focuses on ensuring the survival of the mass/society rather than the survival of the individual. In this respect, earthquake triage differs from routine emergency room triage [7]. In addition, even if the probability of survival is low in emergency room triage, the first to receive intervention are the most critically ill patients. In earthquake triage, those with a low chance of survival constitute the last group to receive care, and the concept of "the best for the greatest number", which is accepted as the purpose of earthquake triage today, has emerged [7-9]. Primary triage is performed at the scene to provide intervention, transfer and prioritization. Secondary triage is performed at the health institution to provide definitive treatment and prioritization. Tertiary triage involves the determination of priority for surgery or intensive care unit admission by surgeons or intensive care physicians [10, 11].

Start (Simple Triage and Rapid Treatment)

The Simple Triage and Rapid Treatment (START) system was developed in the early 1980s based on the NATO triage system. In the system, triage officers are asked to evaluate each case in terms of respiration, pulse and level of consciousness within a maximum of 60 seconds. In this system, patients and injured people who are evaluated are assigned to one of four color categories: green, yellow, red and black. Following a disaster or mass casualty event, START triage begins by directing those who can walk to a designated safe area [11, 12]. These patients are labeled as "mildly ill" using a green label. Patients and injured people who are placed in the green category are not evaluated more comprehensively until the seriously injured patients left behind are treated [7]. The triage process continues systematically for patients and injured people who cannot walk. During this process, triage decisions are made by evaluating respiration, tissue perfusion and level of consciousness. Patients without spontaneous breathing are categorized as "dead" by being marked with a black tag if they remain apneic despite being positioned appropriately to ensure airway patency. No medical intervention is applied to these groups, but they are re-evaluated as frequently as possible to determine if there is a change in category [11-13]. The respiratory rate of patients with spontaneous breathing is assessed. Patients with a respiratory rate greater than 30 per minute, a capillary refill time greater than 2 seconds, or those who cannot follow simple commands are marked as patients/casualties requiring "immediate" intervention using a red tag. Other patients and casualties at the scene are categorized as yellow and marked as "delayable" with a yellow tag. According to the START system, only two emergency interventions can be performed during the triage process. These interventions are direct pressure application for bleeding control and basic airway opening maneuvers. Since the clinical conditions of patients and casualties who are held may change, it is recommended that they be re-evaluated frequently. According to the system, when capillary refill time cannot be determined in very cold and very dark environments, the triage decision can be made by evaluating the radial pulse [11].

A standard classification system accepted internationally for earthquake triage has not been developed. Considering the existence of multinational response teams acting with the awareness of cooperation in an earthquake occurring anywhere in the world, the need for evidence-based, consistent and universally valid disaster triage systems is clearly increasing. In addition, earthquakes are unpredictable events and can lead to sudden changes in the scope of duties and responsibilities of healthcare professionals. In such a case, changing the focus of healthcare services aimed at individual survival towards mass survival may not be easy for healthcare professionals with limited experience in disaster triage. For this reason, it is important for healthcare professionals who will take part in the first response in a disaster to receive continuous training and competence in disaster triage.

Crush (Crushing)

Although the word crush literally means "crushing, crushing", crush syndrome covers all of the systemic damage to the body caused by trauma [14].

Crush syndrome is also known as crush syndrome. It was defined by Bywaters and Beall in 1941 after many patients died from acute renal failure during the bombings in the Blitz, revealing a relationship between traumatic muscle injury and acute renal failure [15]. Crush syndrome is seen due to muscle damage in major earthquakes, disasters or after heavy exercise [16, 17]. Myoglobin, which is normally found in the muscle, passes into the blood due to trauma and blocks the kidney tubules, causing acute tubular necrosis (ATN) and then acute renal failure (ARY). At the same time, potassium ions, which should be in the muscle, pass into the blood and a state of hyperkalemia occurs, which causes systemic problems [14]. Crush syndrome; ATN includes medical and surgical complications such as electrolyte disorders (especially hyperkalemia), hypovolemic shock, heart failure, respiratory failure, infections, compartment syndrome, and bleeding [17, 18]. It is the second most common cause of death in earthquakes after the direct effects of trauma [17, 19]. Rescue death; metabolites resulting from rhabdomyolysis due to compression in the debris, which are released when the patient is rescued from the debris and the metabolites pass into the bloodstream and cause death [20]. In conclusion, Crush syndrome is an important life-threatening syndrome. Intravenous potassium-free fluid should be given urgently to patients suspected of Crush syndrome. In order to avoid the need for intensive care after an earthquake, professional teams trained in health and earthquakes should evaluate the earthquake victim with scoring systems and ensure that acute treatment is provided with an effective and rapid triage. It is mandatory for all stakeholders to evaluate earthquake victims and work in coordination, especially within the first 72 hours after an earthquake. Otherwise, an earthquake victim will significantly disrupt the functioning of tertiary hospitals. Although hospitals are prepared to rapidly mobilize resources to treat a large number of injuries in the event of an earthquake due to the increase in injured patients with long-term hospitalizations, efforts must also be made to prevent adverse health outcomes resulting from conditions other than injuries, to ensure accessibility to the hospital and a rapid return to normal.

Intensive Care Units

Intensive care units (ICUs) are special units where patients with life-threatening, critical illnesses are closely monitored and treated. Respiratory failure, severe infections (such as severe pneumonia, meningitis, etc.), heart attacks, sudden cardiac arrhythmias, coma, shock, serious trauma and accidents, poisoning, and special conditions requiring close monitoring in the postoperative period are the most common reasons for admission to the intensive care unit.

Earthquakes requiring medical intervention are low-probability but high-risk situations for healthcare professionals and hospitals. During earthquakes, intensive care units provide medical care to patients with critical health conditions as they normally do [21].

Anesthesia and Intensive Care Specialists should keep their knowledge and skills up-to-date against earthquakes and be familiar with how to apply these knowledge and skills. They actively take part in all stages of an earthquake, such as first aid, surgery of the injured during the hospitalization process and intensive care follow-ups. In the crisis management process, they take part in the preparation of intensive care unit capacity increase, more efficient use of materials and personnel; and the preparation of basic equipment such as ventilators and infusion pumps for rapid and efficient use. Intensive care units provide medical care to seriously ill patients in the post-earthquake period. The supply-demand balance of medical resources is different from normal. While responding to a large number of seriously injured patients, it is inevitable that the intensive care physician will tend to patients with a high probability of survival and who will benefit the most. ICU doctors should consider the location of the hospital and the resources of the community in a possible disaster scenario [22].

The allocation and rationing of limited critical care resources is legally, ethically, and emotionally complex. In the event of a catastrophic event, the absence of a plan for these issues will result in a perception of unfair allocation of resources or actual injustice. Optimal allocation of limited resources depends on the acceptance by public health authorities, government officials, institutional leaders, healthcare professionals, and the public of the transition from individual to community-based care in mass casualty events [23].

Planning

1. Requires significant growth in critical care capabilities.
2. Healthcare professionals who do not normally provide critical care are expected to do so in order to meet these demands.
3. Adequate availability of advanced medical equipment and access to all necessary supplies to provide this care must be planned in advance, because hospitals will not be able to provide the same service or satisfaction in a disaster.
4. Most hospitals do not have designated critical care areas outside the ICU.
5. Training of healthcare professionals to provide disaster care is inadequate in most hospitals.
6. Good training in the proper use of isolation and personal equipment is necessary to protect healthcare workers.
7. Hospitals need to have not only facility plans, but also functional special arrangements for sharing personnel and resources within communities. This should go far beyond written consensus texts and include precise, specific plans that have been meticulously worked through [24].

A competent ICU manager should have a written and comprehensive protocol to prepare for earthquakes with multiple casualties [25-27].

One of the first approaches that the ICU manager should take in an earthquake is to allocate beds to the most critically ill patients, including those in the intensive care unit and recent earthquake victims. Second, nurses and physicians should be assigned to these patients. It should be ensured that the intensive care unit is directed to those who are most likely to survive and who can benefit the most when treating a large number of seriously injured patients [28]. In order to maximize the survival of earthquake victims and minimize preventable deaths, ICUs will need to make exceptional judgments about how to use their limited resources (beds, ventilators, nurses, doctors) in various disaster situations. The damage control philosophy is advocated and accepted for the field triage, resuscitative and operative phases of mass casualty events [28].

Conclusion

It is seen that there is no common consensus in the medical literature on intensive care in earthquakes. Risk analysis, education, organization, and integration with pre-intensive care health services constitute the basic steps in making plans and preparing intensive care. After such a plan, testing the plan in both drills and real events, documentation of the deficiencies identified and the experiences gained, and maturing the plan with these will show us the way to the ideal plan.

The aim in multiple loss scenarios is to reduce mortality and morbidity. Mortality may be inevitable in earthquakes, but it can be reduced with appropriate preparation. The intensive care physician must be ready for triage, stabilization, clinical management, teamwork leadership, and management of hospital resources. Practice sessions must be conducted to understand our current level of preparedness, to teach staff how to react in disaster situations, and to be prepared for unexpected situations. The right person must do the right job at the right time.

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