

Scientific review

EMERGENCY MEDICAL MANAGEMENT OF MASS DISASTERS

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Abstract: From the medical standpoint, a disaster is any event that causes death or endangers the health of the population at a large scale, which goes beyond the current medical capabilities and resources for their health care.

The architecture of security in the modern world is changing dynamically, with the emergence of numerous challenges. The most difficult circumstances and mass injuries are characteristic primarily for natural disasters, armed conflicts, great outbreaks or terrorism, as a historical monster that is becoming an increasing global problem and constantly changing forms, even using modern bio-technology.

The common features of mass disasters in these circumstances are the abruptness of natural forces or human factors, the emergence of large-scale human casualties and material damage, with a usual disproportion of the ratio between the consequences and the forces of rescue and recovery.

The essential elements for a successful treatment of the wounded and the sick during mass disasters are a good organization, the existence of educated and prepared services for work in such situations, a timely established cooperation at the local, regional and global levels.

The aim of this work is to support the implementation of education, a professional training of all subjects involved in the integrated protection and rescue system with defined tasks and obligations which will certainly contribute to a more effective protection and resistance to disasters.

Keywords: *security challenges, mass accidents, integrated system of medical care, education*

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INTRODUCTION

The age we live in is characterized by terrorist threats, including the use of weapons of mass destruction, such as the anthrax campaign in 2001 that followed the conventional terrorist attacks in New York and Washington DC, as well as the many terrorist actions we are faced with every day, including the possible epidemic and pandemics threats (SARS, swine flu, Ebola, Zika). Natural disasters such as floods, earthquakes, hurricanes are also possible threats, as a result of global climate changes. Technological accidents are also a reality of the modern era. Our past experience and lessons learned during the outbreak of influenza, typhus, smallpox (the largest European outbreak was in Yugoslavia in 1972, and the swine flu epidemic occurred during Universiade 2009) as well as the lessons from war times (two world wars and the 1999 NATO aggression) and natural disasters (the 2014 flood) are sufficient to show that healthcare organizations must be prepared, funded, and organized to respond to hazard impacts, regardless of their location (Jeftić et al., 2011; Ristanović et al., 2016; Ristanović, 2015). The diversity of potential hazard impacts may affect these systems in a multitude of ways that must be acknowledged and addressed by healthcare emergency managers. Emergency Management is a relatively new discipline. Its formal predecessor was the more narrowly defined Civil Defense.

Mass casualty incident is a term that involves disasters and represents casualty-creating hazard impacts in which the available organizational and medical resources, or their management systems, are severely challenged or become insufficient to adequately meet the medical needs of the affected population, thus resulting in increased morbidity and mortality among the impacted population. Multiple casualty incidents equate to “emergencies.” Mass effect incident is a hazard impact that primarily affects the ability of the organization to continue its usual operations (or the usual medical care capability and capacity can be compromised) (Jeftić, Ristanović, 2014).

The past several years have witnessed a resurgence in interest for emergency management as a profession and an increasing recognition that it can be distinguished from homeland security in its focus, philosophy, strategy and methodology. The growth of emergency management within the healthcare industry began more recently than general emergency management, including separate disciplines such as disaster medicine, which focuses primarily upon clinical guidance, for mass casualties, healthcare engineering, which addresses mission critical areas of infrastructure continuity, including utilities, heating, ventilation, air conditioning, and other support systems, information technology, and financial management, healthcare executive efforts which were driven by regulatory and accreditation compliance, with recent recognition of the importance of continuity planning as well as healthcare security efforts which focus on protecting facilities and the

resources available within them. The inter-relatedness of these areas has become increasingly obvious (CDC, 2011).

Emergency management includes four stages:

1. **Mitigation** that encompasses all activities that reduce or eliminate the probability of hazard occurrence, or eliminate or reduce the impact from the hazard if it should occur. Mitigation activities are undertaken during the time period prior to an imminent or actual hazard impact.
2. **Preparedness** that encompasses actions designed to build organizational resiliency and/or organizational capacity and capabilities for response to and recovery from disasters and emergencies. These activities precede any imminent threat or hazard impact.
3. **The response phase** that encompasses activities immediately before (for an impending threat), during, and after a hazard impact to address the immediate and short-term effects of the disaster or emergency.
4. **The recovery phase** encompasses activities and programs implemented during and after response that are designed to return the entity to its usual state or to a “new normal.”

The Integrated Emergency Management System includes the following steps: hazard analysis, capability assessment, emergency operations plans, capability maintenance, mitigation efforts, emergency operations, evaluation, capability shortfall, multiyear development, annual development increment, state/local resources, and annual work increment (CDC, 2011).

Healthcare Emergency Management

Healthcare Emergency Managers are professionals in the medical, public health and public safety community who staff positions in such places as community health centers, local hospitals, local city and county boards and councils, and within local, state, and federal public safety and homeland security offices.

A Healthcare Emergency Manager assists state and local authorities in identifying and meeting the health and medical needs of the victims of a major disaster or catastrophic incidents. Incorporating the disaster lifecycle, a healthcare emergency manager encompasses planning for, responding to, recovering from, and developing ways of mitigating the following:

- Radiological, chemical, biological, and natural hazards;
- Overall public health and medical response; triage, treatment, and transportation of victims of the disaster; and
- Emergency services personnel health & safety.

A significant natural disaster or man-made event that overwhelms the affected region would necessitate health and medical care assistance. Hospitals, nursing homes, ambulatory care centers, pharmacies, and other facilities for medical/health care and special needs populations may be severely structurally damaged or destroyed at worst or simply overwhelmed by volume at best. Facilities that survive with little or no structural damage may be rendered unusable or only partially usable because of a lack of utilities (power, water, sewage) or because staff are unable to report for duty as a result of personal injuries and/or damage/disruption of communications and transportation systems. Medical and health care facilities that remain in operation and have the necessary utilities and staff will probably be overwhelmed by patients ranging from the “walking wounded” to the seriously injured victims who may be transported in the immediate aftermath of the occurrence (Landesman, 2011).

In the face of massive increases in demand and the damage sustained, medical supplies (including pharmaceuticals) and equipment will probably be in short supply. (Most health care facilities usually maintain only a small inventory stock to meet their short-term, normal patient load needs.) Disruptions in local communications and transportation systems can also prevent timely re-supply. Healthcare emergency managers work to meet the public health and medical needs of those affected by disaster and resolve the impacts that they impose.

An examination of the healthcare system response during mass casualty and mass effect incidents demonstrates that the initial response to any medical incident will almost entirely be based upon locally available health and medical organizations. Effective healthcare response during disasters is very complex and impacts an entire community and involves numerous diverse medical and public health entities, including healthcare systems and facilities, public health departments, emergency medical services, medical laboratories, individual healthcare practitioners, and medical support services. A coordinated, multi-disciplinary response is essential, involving support from and integration with public safety agencies and other response entities. Healthcare organizations must be an integrated component of a larger response system that opens many legal, financial, and logistical issues. Public health should be also recognized as an essential partner for successful management of mass casualty or a mass effect healthcare response. Medical issues in large-scale incidents are rarely clear immediately, and complex information must be collected from disparate sources, as well as processed and analyzed rapidly in order to determine the most appropriate course of action. This requires a robust information management process that may differ markedly from any used in everyday healthcare system operations. Thus, a medical response to mass casualty incidents can be exceedingly

complex, with many seemingly diverse tasks requiring coordination between disparate operating units which do not work together on a regular basis or are under stress of response. Despite these challenges, all necessary functions must be adequately addressed for a successful mass casualty or mass effect response. In such circumstances, medical system resiliency is achieved by a combination of mitigation measures and adequate emergency preparedness, assuring continuity of healthcare system operations despite the hazard impact (Swayne et al., 2012).

The major issues that a healthcare system faces during an emergency may be grouped into the following broad categories of emergency response and recovery capabilities: 1) protection and security (evacuation or sheltering and other occupant emergency procedures), 2) continuity of operations (maintaining usual patient care services and business practices to achieve organizational resilience), 3) actions that provide a medical surge capacity and capability to meet the incident-specific medical and psychological needs of the affected population, and 4) support for external requirements. Key management strategies to achieve healthcare organization emergency response and recovery capabilities include effective management methodology across all emergency management activities, appropriate distribution of responsibility and authority, and managing service degradation. An exclusive focus on identifying additional people, places, and things is not cost effective or efficient and will not address important response issues such as the mobilizing and managing of these resources. Effective management systems have additional benefits such as the coordination between and within organizations so that the need for total resources may be less (Landesman, 2011).

The Serbian Emergency Response System – the role and tasks of the Health Care Sector

The National Strategy for Protection and Rescue in Emergency Situations of the Republic of Serbia was adopted in 2011. The purpose of the strategy is to protect life, health and the property of citizens, as well as the environment and cultural heritage of the Republic of Serbia. It also defines and determines the national mechanisms for coordination and guidance programs to reduce the effects of naturally and man-made disasters and accidents, as well as protection, response and recovery (Serbian national strategy of protection and rescue, 2011).

The Serbian Ministry of the Interior, through its Department for Emergency Situations, organizes and conducts activities to protect the life, health and property of citizens, preserve the conditions necessary for life and preparing to overcome the consequences of disasters, technological accidents,

terrorist acts and other dangerous situations. The place and role of the Ministry of Defense and the Army of Serbia and all its resources in such circumstances are also very important and defined within the framework of defined missions (Serbian National Strategy of Protection and Rescue, 2011).

The Law on Emergency Situations, adopted in 2009, defines emergency management and other elements necessary for the functioning of the protection and rescue system. These elements are a primarily precisely defined area of application as well as activity holders in case of emergency situations - decision makers, and all other entities that may be important in the case of reacting in emergency situations, but also for better preventive action and increasing the resilience of societies in emergency situations, such as non-governmental organizations, research institutions and others (WHO, 2011).

The Law on Health Care regulates with precision the role and missions of the health care system in emergencies and the organization of health services in such circumstances, including social care for the health of the population. The health institution is obliged to organize and implement measures in the event of natural and other major disasters and emergencies. Also, according to the mentioned Law, the Republic Institute of Public Health, in cooperation with other institutions, is responsible for establishing and implementation of special measures to natural or other major disasters and accidents.

Health facilities in emergencies are organized and operate on three levels: primary, secondary and tertiary (WHO, 2011). Depending on the scene, severity of disease, injury and trauma and the vulnerability of vital functions, urgent medical assistance is provided on three levels:

1. **Pre-hospital emergency medical care** is provided by the Health Center Emergency Department through the duty team; through organizational units of emergency medical services in the services of general medicine in the health centers and the work of the special medical institution;
2. **General-hospital care** in hospitals, depending on the size, work force and other conditions, that are obliged to provide medical health care in emergency situations for the population of the gravitating areas. Larger health centers and larger hospitals, particularly in the district centers, provide immediate medical help to traumatized persons. Hospitals provide adequate space, constant presence of the necessary number of medical staff and the use of optimal hospital diagnostic resources for effective trauma management. All institutions must have a working plan for the case of mass disasters, which must be periodically reviewed and checked in practice to determine its effectiveness. In communication with emergency medical services, the hospital is informed about the nature of the

accident, the number of injuries and time of arrival. If the number of injured is up to 50 (the number that disrupts the routine of any hospital), it is necessary to form a triage center and facilitate the provision of emergency assistance and activate all backup personnel. All elective operations are canceled in such circumstances. If the number of patients is larger than 50, all the usual activities in the hospital are reduced to a minimum. The patients whose state of health permits it are released;

3. **The third-tertiary level** represents highly specialized care in medical centers with trauma centers and burn centers, clinics and institutes. The Institute for Orthopedic Surgery and Traumatology (with 45 specialists) and the whole Clinical Center of Serbia with its institutes and competencies (in the management of cardiac-compromised patients, psycho traumatized, burned, etc.) should assume the role of the national trauma center. It would be necessary to establish trauma centers in regional administrative centers (Novi Sad, Niš and Kragujevac). Most medical institutions have plans of protection and emergency response that must be updated regularly, according to real needs and challenges. Based on the tasks of the Poison Control Center in the field of care for acutely toxic and exposed citizens in case of chemical accidents or potential terrorist chemical attack, the government has appointed the National Poison Control Center of the Military Medical Academy as a legal entity of special importance for the defense of the Republic of Serbia. Otherwise, the National Poison Control Center is the reference institution that carries out the medical service for prevention and therapy of acute poisoning, the detection of chemical substances in biological samples, water, soil and air, education in the field of clinical toxicology and toxicological chemistry, as well as scientific research in the field of toxicology and pharmacology. The Military Medical Academy (MMA) in Belgrade is an integrated system that brings together 27 clinics, 17 institutes, a powerful diagnostic-outpatient center, an Emergency Medicine Center, a Trauma Center, a center for transplantation of bone marrow, tissues and solid organs, a Division of Preventive Medicine, a capacity of 1,200 inpatient beds, highly qualified staff in different areas of medicine, pharmacy, biology, dentistry, veterinary medicine, as well as a long tradition in treatment, education and scientific work with experience gained in the toughest times of Serbian history. MMA represents a stable and reliable support of the Serbian state and its army, as well as the health system, especially in emergency situations (Jeftić et al., 2015).

CONCLUSIONS

Mass casualty emergency situations and disasters are the reality of the time we live in, as a possible consequence of terrorist acts, natural disasters, wars, disease outbreaks. The preparedness of the accountable institutions is a necessary tool for the prevention and response to such kinds of challenges. Health-care providers and organizations of the health care system in these circumstances are of crucial importance. They include awareness, education, personnel training, as well as adequate resources for triage, diagnostics and medical treatment of the injured or the ill, especially in the case of epidemics and highly contagious diseases. Emergency management and risk communication are also important. The lessons learned in the previous emergency situations can be useful for such preparedness.

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