

The Role of Anaesthesiologists in Natural Disasters

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Abstract

Although the frequency and magnitude of disasters vary between countries, it is evident that disasters will continue to affect us, making preparedness crucial for effective response. Disasters exert immense pressure on health care systems, highlighting the need for strengthened institutional readiness. The knowledge and skills acquired by anaesthesiologists during training equip them to assume leadership roles in disaster management. In this review, we aim at emphasizing the vital role of anaesthesiologists in disaster preparedness and response. Being prepared for disasters reflects a community's resilience. Drawing from recent global experiences, in this paper, we highlight the role of anaesthesiologists in disaster preparedness and response and the importance of integrating anaesthesiologists into institutional disaster response plans. Their active involvement in disaster preparedness and management enhances patient safety, optimizes resource use, and improves outcomes during crises. Anaesthesiologists must advocate for involvement in disaster planning and take a leadership role in disaster management to strengthen health care systems and promote community resilience in the face of future disasters.

Key words: anaesthesiologist, natural disasters, disaster management, disaster preparedness

INTRODUCTION

Disasters are sudden and unpredictable events that can cause significant damage, destruction, and loss of life. These often exceed local response capacities and require external assistance at the national or international level.^{1,2} Globally, both the number of disasters and the wide-ranging and diverse health risks associated with them are increasing daily.

Disasters can occur in several ways. Natural disasters may result from geophysical, meteorological, hydrological, climatological, biological, extraterrestrial, and similar phenomena, including extreme heat or cold, floods, storms, hurricanes, tsunamis, earthquakes, landslides, typhoons, droughts, volcanic eruptions, wildfires, and epidemics.³ In an era marked by global warming, it is nearly impossible not to be concerned about the potential for future natural disasters. In 2024, the Emergency Events Database recorded 393 natural disasters. These events have caused over 16,000 deaths and have affected approximately 167 million people. The economic losses amounted to approximately 240 billion USD. In 2024, extreme heat events in Asia led to thousands of deaths, severe droughts in Africa impacted more than 25 million people, and devastating tropical storms in the United States caused damages exceeding 100 billion USD.⁴

Preparedness and preventive measures are essential to potentially reduce disaster-related mortality.⁵ Despite their critical skills, anaesthesiologists are not included on hospital disaster management committees in most places. Disaster plans are typically led by emergency medicine specialists and surgeons, overlooking the essential role of anaesthesia teams.^{6,7} This underrepresentation highlights a persistent gap in disaster preparedness and response. In this paper, we aim at highlighting the role of anaesthesiologists in disaster preparedness and response, emphasizing the need for their inclusion in institutional and national disaster plans.

THE ROLE OF ANAESTHESIOLOGISTS IN NATURAL DISASTERS—BEING PREPARED FOR DISASTERS

Anaesthesiologists have played critical roles in managing past disasters and will continue to do so in future disaster response efforts.

In the context of disasters, the question is not if they will happen but when and whether we are prepared for them.⁶ While disasters are unpredictable, their numbers and impacts are becoming increasingly devastating with the increasing global population,

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placing immense pressure on health care systems. Unpreparedness for disasters often leads to the partial collapse of health care systems. Disasters damage health care infrastructure and hospitals, disrupting the ability of doctors and health care teams to provide care.

In response, numerous organizations and countries have developed disaster management plans. Institutions such as the World Health Organisation (WHO) and the World Federation of Societies of Anaesthesiologists (WFSA) have engaged in various initiatives in this field and continue to align their strategic priorities accordingly. The WHO has published a comprehensive disaster management guide that includes critical components such as best-practice protocols for clinical procedure safety, needs assessment, and essential emergency equipment lists. It also covers anaesthesia, resuscitation, ketamine anaesthesia, postoperative care, a general inventory of essential emergency supplies, and anaesthesia infrastructure and materials in disaster settings.⁸

The WFSA is the leading global alliance of anaesthesiologists and specialist physicians dedicated to the comprehensive care of patients before, during, and after surgery. The WFSA designated its central theme for 2025 as 'anaesthesiology in health emergencies'. Global preparedness is crucial for disaster management.

THE ROLE OF ANAESTHESIOLOGISTS IN DISASTERS: WHY WE SHOULD BE A PART OF THIS PROCESS

Anaesthesiologists are leaders in teamwork and patient safety and experts in anaesthesia and perioperative care, resuscitation, intensive care medicine, and pain management. Anaesthesiologists provide life-sustaining care regardless of the aetiology or condition of the event.⁹ A universal theme in anaesthesiologists' job descriptions is their exceptional breadth and adaptability, often likened to a Swiss Army knife of patient care, as they provide support across all hospital areas and throughout the continuum of life.¹⁰

Anaesthesiologists demonstrate flexibility in adapting to and innovating within challenging environments. They are trained to care for patients of all ages, possess the ability to rapidly recognize and manage deteriorating clinical conditions, and lead medical teams in crises.¹¹

Assuming a critical and primary role in disaster response, anaesthesiologists can help minimize injuries, reduce the overall impact on vulnerable populations, and maximize the number of lives saved, regardless of the nature or cause of the disaster. The need for anaesthesiologists and perioperative team preparation increases during disasters.⁶

WHERE DO ANAESTHESIOLOGISTS FIT IN DISASTER PLANNING?

Responding to extraordinary events or disasters requires executing a broad range of complex activities that are directly or indirectly interrelated. These activities range from search-and-rescue operations to providing adequate living conditions in the aftermath of a disaster, delivering medical care to the injured, and managing the logistics of critical support supplies. The effectiveness of post disaster services is closely linked to the ability of the predisaster plans to address potential scenarios.

Disaster preparedness plans are time intensive to develop and require collaboration among multiple professional and specialty groups. These plans must be periodically updated, tested in the field or through computer-based simulations, and tailored to accommodate the evolving risks and operational challenges.¹² Anaesthesiologists should be actively involved in all phases of disaster management.

Anaesthesiologists with important knowledge and skills are not included in hospital disaster management committees in most places. Although disaster plans are mandatory by law in most countries, the fact that anaesthesiologists should be on the front lines of disasters is ignored. Emergency medicine specialists and surgeons are primarily involved in planning and hospital preparations, while anaesthesia teams are not included in these processes. Their value as responders to mass casualty events is often underestimated and overlooked.¹¹

The skills of anaesthesiologists in airway management, resuscitation, and perioperative management (including regional techniques, intensive care, pain management, operating room logistics, coordination, and management) are vital. Recent disasters, including the COVID-19 pandemic and large-scale earthquakes, have clearly demonstrated the need for anaesthesiologists to assume and maintain leadership roles during crises.^{12,13}

Anaesthesiologists receive comprehensive and detailed training, and the success of emergency and surgical teams during disasters often depends on the availability of anaesthetic support.

During the 2005 London underground bombings, anaesthesiologists serving in the Helicopter Emergency Medical Service played an active role, particularly in performing field amputations for severely injured victims. In Europe, particularly the United Kingdom and France, anaesthesiologists play a crucial role in prehospital and emergency department settings during disasters.^{14,15} National disaster guidelines published in countries such as the UK, the United States, and Japan emphasize the critical importance of anaesthesia services in disaster planning and response. However, in many countries, disaster guidelines and protocols remain inadequate and often fail to sufficiently address the integration of anaesthesia services within broader disaster preparedness frameworks.

In many countries, including Türkiye, disaster response plans are mandated by law, and coordination committees have been established to oversee preparedness and response efforts.¹⁶ At the national level, regulations are implemented under the authority of the Ministry of Health, with compulsory annual drills and training programs. Planning efforts such as increasing bed capacity, establishing evacuation protocols, and defining administrative structures are also legally required.

Despite this, 2 major earthquakes, measuring 7.6–7.7 MW, that occurred simultaneously in the İskenderun-Kahramanmaraş region of Türkiye in February 2023, caused the collapse of numerous hospital buildings. As a consequence, surviving health care workers who were directly involved in the hospitals were unable to perform their duties. This initially caused widespread chaos in the health care system. During these earthquakes, more than 50,000 people

lost their lives, over 200,000 were injured, and many vulnerable individuals were severely affected. This catastrophic event clearly demonstrated that even the most advanced systems remain vulnerable to large-scale disasters. The combination of insufficient preparedness, fragile infrastructure, the overwhelming scale of the disaster, and deficiencies in planning and coordination resulted in substantial loss of life and property. The Ministry of Health made significant efforts to ensure the rapid deployment of volunteer physicians, particularly anaesthesiologists and surgeons, from across the country to disaster-affected regions while also providing essential equipment and logistical support. National and international organizations also mobilized quickly, establishing field hospitals and contributing to the reestablishment of health care services in the region. In many earthquake-affected areas, anaesthesiologists play pivotal roles not only in operating rooms and intensive care units but also in overall hospital management, using their coordination and crisis leadership skills. In retrospect, this revealed significant shortcomings in local and regional disaster preparedness plans proved inadequate for responding to an event of such a massive scale.^{17,18}

Anaesthesiologists play a fundamental role in providing effective and efficient health care services during disasters. They serve as critical links between surgical services and intensive care units, particularly in the coordination and implementation of disaster medical response strategies.¹⁹

Due to the nature of their training, anaesthesiologists are uniquely equipped to analyse complex situations, solve problems under pressure, perform systematic triage, deliver and supervise optimal anaesthesia care, and assist in identifying and addressing resource deficiencies. When applied in disaster settings, these routine competencies can significantly reduce disaster-related morbidity and mortality, ultimately saving lives.⁹

Post disaster management in the health care sector requires strong coordination and decisive intervention. Effective disaster response relies on prior development and implementation of a comprehensive disaster response plan. As advocates of patient safety, anaesthesiologists must play an active role throughout all 4 phases of the disaster management cycle—mitigation, preparedness, response, and recovery—by leveraging their leadership skills and clinical expertise. Disaster prevention is significantly more cost-effective than disaster response and recovery. For this reason, anaesthesiologists should be actively involved in disaster risk reduction and preventive planning efforts.²⁰⁻²²

PREDISASTER

Disaster planning requires a multidisciplinary health care system approach. Hospitals must be accustomed to making rapid and effective decisions to manage disaster scenarios. Hospital disaster action plans should include a dedicated section for anaesthesia. Anaesthesiologists should be formally represented on disaster preparedness committees. In this regard, anaesthesia care providers should assume leadership roles during the predisaster preparedness phase.¹¹ Core principles of the anaesthesiology specialty—such as anticipation, thorough preparation, hypervigilance, on-the-spot problem-solving, and sound decision-making under pressure—make

anaesthesiologists uniquely qualified for leadership roles in preparedness committees.^{11,23-25}

This committee is the central unit in developing disaster management strategies during the predisaster phase, including awareness building, disaster planning, resource assessment, and preparedness through drills and simulations. As seen in various models, dedicated disaster anaesthesiology teams can be established. Also, anaesthesiologists should be involved in field hospital planning from the earliest stages.

The anaesthesia team should play an active role in field exercises and simulation-based disaster drills.²⁶ During the preparedness phase, anaesthesiologists must be directly involved in the logistical planning of anaesthesia-related resources. This includes ensuring the availability of essential anaesthetic drugs, mobile anaesthesia kits, portable monitors, oxygen sources, and ventilators. They should also develop alternative protocols for providing sedation, anaesthesia, and analgesia using minimal resources, ensuring the continuity of care even under austere conditions.^{12,24}

Although anaesthesiologists receive training in disaster medicine, many still feel inadequately prepared in certain areas and continue to need regular, planned disaster preparedness training throughout their professional careers.^{12,27,28} Although disaster medicine has been integrated into the anaesthesia training curricula in Germany and many other countries, it remains inadequate or incomplete in many national anaesthesia curricula.²⁸ Therefore, a dedicated module titled ‘Disaster medicine and anaesthesia’ should be included in the anaesthesia residency training to enhance knowledge, preparedness, and awareness among trainees.

National anaesthesiology societies should take the lead in developing certified disaster training modules. The American Society of Anaesthesiologists, for instance, lists mass casualties, disaster management, and preparedness among the core requirements for anaesthesiology certification. Particularly in resource-limited settings, simulation-based disaster scenarios should be incorporated into training programs to cover critical areas such as anaesthesia delivery, intensive care services, ventilation, sedation, analgesia, crisis management, communication skills, leadership, and teamwork.²⁹ Throughout all phases of training, international resources and networks, such as educational materials provided by the WFSA, should be used.

In disaster situations, anaesthesiologists may be required to work under extremely challenging conditions, including medication shortages, equipment failures, personnel shortages, and logistical support issues. Post-disaster trauma, burnout, emotional burden, and decision-making pressure in the face of resource scarcity can place significant psychological strain on anaesthesia providers.

Therefore, disaster planning for anaesthesiologists must extend beyond technical skill training to include education on ethics, emotional resilience, and psychological preparedness.¹²

DISASTER RESPONSE

Anaesthesiologists can make rapid decisions by evaluating field data during disasters. With their leadership, crisis management, and

communication skills, they can easily manage an organized rescue operation.^{11,12}

Anaesthesiologists can play an active role not only in the operating room but also in field hospitals, mobile triage stations, and even within on-site support teams during disaster settings. During such events, they may be required to work in unsafe environments and face numerous logistical and resource limitations.³⁰ They may be called upon to assist with on-site amputations to facilitate the extrication of trapped victims and may also be involved in medical evacuation under these challenging conditions. Once a plan has been established, anaesthesiologists on the initial response team should promptly begin triaging the most severely injured victims based on individual injuries and clinical conditions.^{11,12,24}

Following triage, anaesthesiologists primarily focus on assessing and supporting the patients' airway, breathing, and circulation. They are responsible for ensuring equitable access to safe anaesthesia during emergencies. Most hospital emergency departments lack robust anaesthesia teams. Therefore, the anaesthesiologists' expertise in rapid triage and prioritization is essential in emergency management. They may be assigned as first responders during mass casualty events, assisting emergency room staff with airway management or patient care, providing vascular access, cardiopulmonary resuscitation, administering medications, and treating chemical or biological toxicities. Additionally, they may be responsible for ensuring the availability of appropriate equipment and supplies during the disaster response.^{11,12,24}

Approximately half of the injuries sustained after earthquakes are fractures, most of which require surgical intervention.³¹ Under resource-limited conditions, anaesthesiologists can effectively manage both anaesthesia and analgesia using various techniques and pharmacological approaches. They often manage and oversee patient flow in the perioperative setting and coordinate patient transfer between the preoperative, intraoperative, and postoperative phases.^{9,11,12} Through these roles, anaesthesiologists contribute significantly to the efficient utilization of (often limited) hospital resources.

CONCLUSION

Don't Wait: Be Prepared

In situations such as disasters, where the entire system's burden is tested, preparedness reflects the resilience of society. Therefore, anaesthesia societies, universities, and hospitals must develop institutional preparedness systems and structured protocols for disaster readiness. The WFSA recently established a working group dedicated to disaster planning. The primary goals of this group are as follows:

- To promote the recognition of the essential roles anaesthesiologists play in disaster preparedness and response.
- To advocate that anaesthesiologists assume leadership positions during disaster management.
- To integrate disaster preparedness training into anaesthesiology curricula worldwide.
- To develop educational resources focused on disaster readiness.

- To support staff safety, psychological resilience, ethical decision-making, and crisis standards of care during disasters.
- To conduct research and collect data on the impact of disasters on anaesthetic care.
- To conduct epidemiological and implementation studies that inform global best practices.
- To work toward establishing an international coordination mechanism for consultation, supply chain support, and volunteer mobilization.
- To collaborate with global partners (e.g., the International Committee of the Red Cross, the International Federation of Red Cross and Red Crescent Societies, Médecins Sans Frontières, and the WHO) to strengthen international disaster response capacity.
- To address climate change as a driving force behind disasters by promoting environmentally sustainable anaesthesia practices.
- To advocate for resilient health systems that integrate surgical and critical care services into disaster planning.

The participation of anaesthesiologists from every country in the WFSA's disaster management initiatives is important for both their individual professional development and the future preparedness of their respective nations. Ultimately, every anaesthesiologist should be included in their institution's disaster preparedness plan. Disasters may occur at any time, but preparedness must happen every day. Disaster preparedness is not a luxury but a professional responsibility. Anaesthesiologists should take on leadership roles in disaster readiness. All anaesthesia societies must prepare seriously and take proactive action. Participation in disaster planning and training should be an integral part of every anaesthesiologist's career development.

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