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Managing anaesthetic provision for global disasters

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Abstract

The numbers of people affected by large-scale disasters has increased in recent decades. Disasters produce a huge burden of surgical morbidity at a time when the affected country is least able to respond. For this reason an international disaster response is often required. For many years this disaster response was not coordinated. The response consisted of what was available not what was needed and standards of care varied widely producing a healthcare lottery for the affected population. In recent years the World Health organisation has initiated the Emergency Medical Team programme to coordinate the response to disasters and set minimum standards for responding teams. Anaesthetists have a key role to play in Level 2 Surgical Field Hospitals. The disaster context produces a number of logistical challenges that directly impact on the anaesthetist requiring adaptation of anaesthetic techniques from their everyday practice. The context in which they will be working and the wider scope of practice that will be expected from them in the field mandates that deploying anaesthetists should be trained for disaster response. There have been significant improvements in recent years in the speed of response, equipment availability, coordination and training for disasters. Future challenges include increasing local disaster response capacity, agreeing international standards for training and improving data collection to allow for future research and improvement in disaster response. The goal of this review article is to provide an understanding of the disaster context and what logistical challenges it provides. There has been a move during the last decade from a globally uncoordinated, unregulated response, with no consensus on standards, to a globally coordinated response through the World Health Organisation (WHO). A classification system for responding Emergency Medical Teams (EMTs) and a set of agreed minimum standards has been defined. This review outlines the scope of the role of the anaesthetist in a Level 2 field hospital and some of the challenges that this scope and context present. It focuses mainly on natural disasters, but also outline some of the differences encountered in responding to other global disasters such as conflict and infectious outbreaks, and concludes with some of the challenges for the future.

Key words: anaesthesia; critical care; disasters; earthquakes; emergencies; disease outbreaks; warfare

The disaster context

The World Health Organisation (WHO) defines a disaster as "A sudden event causing severe destruction of infrastructure, people and the economy and which overwhelms the resources of that country, region or community."[1] These disasters may be caused by natural events such as earthquakes, tsunamis and disease epidemics or man-made disasters such as war and industrial accidents. Natural disasters have in recent decades increased in frequency.[2] This may be partly because of an increased rate of reporting but there is clear evidence that global flood events have increased in recent years.[3] Whilst the rate of earthquake events appear to be unchanged the numbers of those affected has risen as a result of their occurring in high population density areas.[2]

Disasters lead to a number of logistical challenges. The local government may be severely affected itself by the disaster, as

was the case after the 2010 Haiti earthquake. As a result the local organisations that would normally coordinate any disaster response may not be operational. The infrastructure is usually badly damaged, either because of physical destruction or as a result of the absence of the workforce; and so water, electricity, food and transport may all be absent or at best in short supply. In addition, the local healthcare structures and staff are also severely affected;[4 5] so just at the point where there is a massive surge in healthcare needs there is also a large reduction in healthcare capacity (Fig. 1).

Whilst the logistical challenges across disasters are fairly consistent the medical challenges vary widely. Different types of disaster have different patterns of mortality and morbidity. As anaesthetists the disaster that tends to represent our "worst case scenario" is the urban earthquake. Urban earthquakes produce a high ratio of injuries to deaths (three injuries:one death) compared with flooding and tsunamis (one injury:nine deaths). This is because in flooding type disasters anyone with significant injuries is likely to drown.[6 7] The type of injury in an earthquake is also more likely to require surgical and therefore anaesthetic care. Typically, earthquakes produce severe blunt trauma with crush injuries, wound infections and burns, often requiring multiple surgical procedures.[8 9] After tsunamis and flood events patients are more likely to present with near drowning, pneumonia, hypothermia, and infected soft tissue injuries.[10 11]

Different disaster types also follow different timelines in terms of presentation to hospital. In a "typical" natural disaster there will be an initial peak of injuries directly related to the event. These may present over several days as a result of the difficulties of getting to a hospital. There may then be a second peak of admissions after two to three weeks "the second emergency," when medical teams who only have resources for a few weeks deployment go home and their patients must be transferred. In conflict situations by contrast there tend to be smaller recurrent peaks of casualties (Fig. 2).[12] In both situations over weeks to months there is a gradual increase in presentations of exacerbation of chronic health conditions reflecting breakdown in primary care and difficulty accessing medicines; an increase in burns because of displaced populations using kerosene lamps and stoves; an increase in infectious diseases as a result of cramped poor living conditions in displaced persons camps; and an increase in obstetric emergencies reflecting lack of access to antenatal care. For the duration of the emergency period there is not usually capacity for scheduled cancer and elective surgery.[13–15]

Organisation of the international disaster response

Until recent years there was no coordinated, organised global medical response to global disasters. Whilst some of the large international non-governmental organisations such as Medecins sans Frontieres (MSF) or the International Committee of the Red Cross (ICRC) individually had a very high quality organised response, these were not integrated with other responders. Integration often relied on personalities on the ground rather than at the headquarters level and usually only after deployment of teams. In recent years social media and 24 h news has led to very rapid and extensive reporting of disasters. One effect of this has been a raised awareness in the global medical population of disasters as they happen, and an understandable desire to do something to help. This combination of widespread media coverage and a large healthcare population wishing to help came to a head in the 2010 Haitian earthquake. Large numbers of medical teams responded, at its height around 40 medical teams a day were registering with the United Nations on arrival in Haiti, with more than 300 in place by the end of the second week. Other medical teams, in contrast, did not know to or chose not to register. These teams were extremely variable in terms of experience and training in disaster response. Many teams performed well but lack of coordination with other providers led to duplication of services and wasted resources. Some teams arrived without the necessary logistical support, causing a drain on already stretched local resources, and eventually left without ever treating any patients. In a few cases teams carried out inappropriate procedures, that they were not qualified to do in their own countries, with inadequate anaesthesia and analgesia, on the grounds that it was the best that could be done in a disaster. The local population was left with a healthcare "lottery" with very different standards of care depending on which team they presented to. The population were very aware of this and if able to "shopped"

Fig 1 Trinite hospital, the MSF trauma centre destroyed in the 2010 Haiti earthquake.

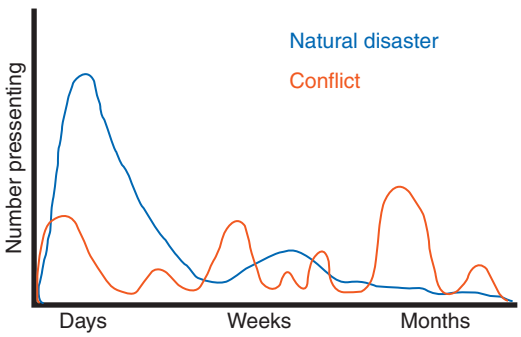

Fig 2 Conceptual graph of numbers of patients presenting to hospital over time in conflict *vs* natural disaster.