

Preparedness Lessons from Modern Disasters and Wars

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In life, unlike chess, the game continues after checkmate.

Isaac Asimov, 1920–1992

In 2003, the severe acute respiratory syndrome (SARS) outbreak unmasked the vulnerability of health care professionals caring for these contagious patients.^{1,2} In some countries, 50% of the SARS casualties were health care workers.³ A tsunami in 2004 killed an estimated 230,000 people, mostly in Indonesia.⁴ In 2005, Hurricane Katrina struck the United States, an industrialized nation with enormous resources. Despite the presence of a substantial response infrastructure in the United States, news images revealed an initial paralytic aftermath with individuals “dying in the streets” and stranded critically ill patients in the shells of hospitals. Ensuing floods rendered intensive care units (ICUs) nonfunctional.^{5,6} News headlines in 2008 estimated that more than 100,000 people died in Myanmar⁷ as a consequence of cyclone Nargis and almost 70,000 people died following earthquakes in China last spring.⁸

Fortunately, in the wake of these events, medical response to disasters significantly evolved.^{9–11} Most recent disasters around the world have witnessed brisk execution of well-structured, integrated response, albeit with occasional operational flaws.^{12,13} Much of this progress has occurred as a result of governmental policy shifts that followed disasters.¹⁴ In the United States, for instance, there has been a clear increase in focus on disaster preparedness since the events of September 11, 2001.¹⁵

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At the government level, we witnessed the creation of the Department of Homeland Security to streamline and improve the efficiency of multiple response agencies.¹⁶ In addition, the ongoing scientific,^{17,18} technical,^{19–21} and educational advances^{22–24} and their integration with disaster medicine^{25,26} have advanced our ability to respond to disasters. For example, we have increased capability of transporting very sick patients,^{27,28} improved early detection of unusual and previously unidentified microbes,²⁹ and enhanced our ability to rapidly acquire information from disaster scenes through mobile telecommunications systems, global positioning, and telemedicine technologies.³⁰

What lessons can we learn from these events and from other disasters over the last many decades? Despite the varied nature of these catastrophes, many critical care themes are common to all:

Planning matters—a lot!^{12,31,32}

The absence of sufficient training and education equals confusion, uncertainty, and increased secondary casualties (including injuries and fatalities to health care professionals).³³

The provision of critical care must include “portability,” defined as the ability to provide credible, sustainable, sophisticated care outside of the normal confines of an ICU.^{9,34–36}

Dispelling myths: It’s too many casualties, so what possible impact would a (relative) “handful” of resources mean to this many patients?

To address these issues, we need to identify simple, broadly available technologies that can be universally employed.^{28,37}

What follows is a representative, but not exhaustive, list of representative disasters that have occurred over the last few decades, with a summary of each disaster, as well as specific clinical lessons learned. Finally, we offer suggestions regarding how each of these disaster events should influence our current critical care preparedness planning.

EVENT: CHERNOBYL NUCLEAR DISASTER

Summary

On April 26, 1986, a large-scale nuclear disaster occurred at Chernobyl, a small town in Ukraine, which was a part of the Soviet Union.^{38,39} Compared with other large-scale disasters, such as the nuclear bomb detonations in Hiroshima and Nagasaki and exposure to cesium-127 in Brazil,⁴⁰ this is the worst nuclear disaster in history. It resulted from overheating of a reactor core, while testing a safety procedure. An estimated 56 deaths occurred, including 28 radiation deaths among reactor operators and firefighters.⁴¹ Additionally, it is estimated that there may have been hundreds of subsequent cancer occurrences among the adjacent population, as well as among the 6 million people who lived within the radiation fallout plume.⁴²

Relevance to Today and Clinical Teaching Points

The medical literature contains little about the immediate response to the Chernobyl disaster. Even so, lessons can be learned about the gaps in reporting and communication and the secrecy of the authorities at the time. This failure to inform generated fear, rumors, and uncertainty.³⁹

There could be very high rates of posttraumatic stress disorder after a major radiation exposure. Groups particularly at risk include children, pregnant women, mothers

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