

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

5,100

Open access books available

127,000

International authors and editors

145M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



# Disaster Management: A State-of-the-Art Review

*Jared Bly, Louis Hugo Francescutti and Danielle Weiss*

## Abstract

Disaster management involves the pillars of emergency management: planning and preparation, mitigation, response, and recovery. Emergencies are serious events that threaten health, life, and property and can be managed within the capabilities of the affected organization. Disasters, on the other hand, are hyper-complex emergencies, requiring resources not immediately available. Disaster management follows the principles of emergency management, and emphasizes flexibility, collaboration, and teamwork. Lack of resources will challenge people and organizations both in effects of disasters and the ability to manage them. Poverty, climate change, governance, and education are foundations to improve capacity. Hospitals play an important role in disaster response and can prepare accordingly. Plans, to be effective, must be implemented through appropriately-targeted exercises. Building on an all-hazards approach, to more hazard-specific considerations can improve disaster preparedness as well as day-to-day efficiency. Disaster management is complex and crucial. These principles are explored through the fictional tale of <sup>1</sup>Tucci, a coastal city in the worst flood anyone can remember. Well, almost anyone...

**Keywords:** natural disasters, emergency management, disaster management, disaster training

## 1. Introduction

*Sunday:*

*“Well, this is a disaster” said Jojo, the 19 year old apprentice to his mentor, Raj. They were pulling in the fishing nets near the usually beautiful seaside village of Tucci, now dull and grey and partly under water. The nets were heavy with debris from the churning sea. Raj grunted a mirthless laugh. “No. This is just a hard day of work. Tomorrow will be the disaster.”*

---

<sup>1</sup> I went with a fictional disaster to demonstrate the principles of disaster management for a number of reasons. 1. Any current disaster would soon be overshadowed by one more recent. 2. There are many people that would have a much greater understanding than me of any historical event. 3. Any real event risks being ‘foreign’ to people in other places. The story of Tucci belongs to no one, and so applies to anyone. I agree with Robert Fulghum who wrote “...myth is more potent than history” (*The storyteller’s creed in All I needed to know I learned in kindergarten*). JB

*Then the old man added, “unless it stops raining, the bridge stays above water, the power line’s fixed, and we have enough sandbags for everyone to keep their houses from washing away.”*

*It wasn’t totally exaggerated. The rain had been the worst in decades. Many homes in the low-lying village were already flooded. Those that were a little higher than the rest were already overcrowded with friends and relatives who’s houses were in a foot or two of water. And the bridge, the only land access to the village, was visible only as rail posts marking a dotted line through the sea between the village and the green foothills.*

Disasters require both a potentially harmful event and a component of vulnerability [1]. If an event overwhelms local response capacity, whether by insufficient material resources or by inadequate social systems or structure, outside help is needed. This is a disaster. Thus the magnitude of an event that causes a disaster will vary by organizational capacity. Many of the natural events described elsewhere in this textbook (earthquakes, tsunamis, etc.) create disasters. An earthquake in a remote, uninhabited area might be called a natural disaster, but it is not truly a disaster if people are not severely impacted. Disasters occur at the interface of nature and civilization [2].

Emergency management is usually described in terms of planning, mitigation, response, and recovery. As we move along the spectrum of severity, from emergency to disaster, the same principles apply, with an emphasis on adaptability and collaboration. Specific to hospital disaster management, contextual issues such as triage, decontamination, and patient care are built upon a general and pervasive approach to disaster readiness. In resource-poor environments, the challenge is magnified as the impacts of natural disasters are greater, and the ability to respond and recover less. Education and training will be most effective if methods match the objectives. With all the uncertainty therein, training for disaster must include establishing relationships between organizations and allowing for flexibility in the face of events that can be predicted but never fully anticipated.

*Not every windstorm, earth-tremor, or rush of water is a catastrophe...So long as the ship rides out the storm, so long as the city resists the earth-shocks, so long as the levees hold, there is no disaster. It is the collapse of the cultural protections that constitutes the disaster proper. ([3], p. 211)*

## 2. Definitions

From crisis to catastrophe, emergency to disaster, there is a spectrum of events that may threaten people and organizations. Not just the event, but the characteristics of the affected population define disaster. Risk and resilience are opposing forces that must be considered with disaster management.

### 2.1 Emergencies

Disasters and emergencies differ in quality and magnitude but are often and inaccurately used synonymously. “Disasters are not just ‘big emergencies’” ([4], p. 293). Emergencies are time-sensitive, potentially harmful events that put life and well-being at risk. Resources are available at the local level to prevent, mitigate, or minimize the harm, and a single responding organization is responsible [5, 6]. Local resources, as a variable in the equation, can affect what constitutes an emergency,

and what goes beyond. An event of the same magnitude, in locations or situations with different capabilities and resources, may be managed within the organization (emergency) or need outside help (disaster). An example in a health care context might be a car crash involving one or two seriously injured people requiring prompt medical investigations and treatment, assuming the facility is equipped to deal with such an event.

## 2.2 Disasters

Disasters are sometimes considered “hypercomplex emergencies” or “major emergencies” involving multiple people at risk of harm, multiple jurisdictions responding, and resources that are not immediately available locally ([5], p. 8; [7]). Coordination between agencies, many of whom have no prior relationships, becomes a challenge [5]. Plans for resource utilization must change when those resources are overwhelmed [8]. Preparations, planning, and training at the local level, within the abilities and available resources of a single agency, do little to prepare for disaster.

## 2.3 Crisis

Crisis is a more generic description. A crisis is a “critical event or point of decision which, if not handled in an appropriate and timely manner (or if not handled at all), may turn into a disaster or catastrophe” [9]. We use the word *crisis*, then, nonspecifically, as an emergency event that has potential to evolve; *emergency* as time-sensitive event with potential harm; and *disaster* as an event larger and more harmful than an emergency, with many people at risk, and where management requires resources outside of the responding organization or department.

## 2.4 Catastrophe

The word *catastrophe*, more severe than a disaster, completes the spectrum [5]. Many variations of the definition exist, but all suggest a magnitude of harm and inadequacy of response capabilities beyond what would be considered disaster [1] (Figure 1).

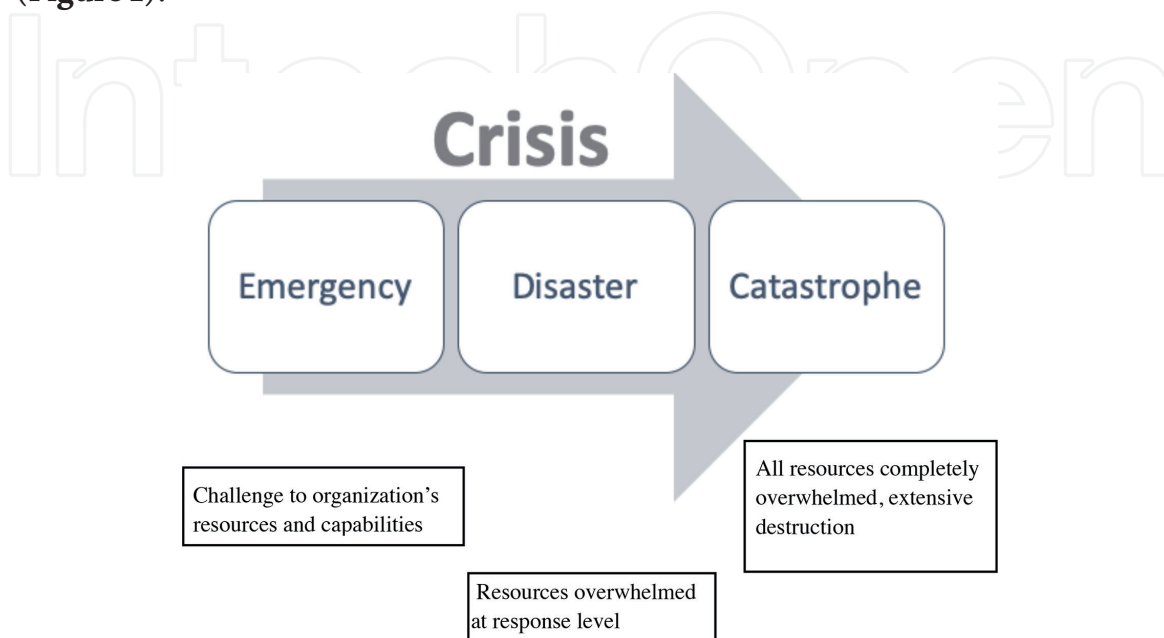


Figure 1.  
Spectrum of crises.

Monday:

*The school gymnasium was packed with wet bodies. A kind of bored panic filled the air. After all, what more could they do but wait for the worst the storm threw at them and then pick up the pieces when it blew itself out?*

*“Thanks for being here, I know it’s been hard for everyone. And there’s still lots of work to do to clean up after yesterday’s catastrophe” said Ros, the town’s mayor, referring to the wind that had blown off parts of a few roofs, and torn off a main limb of the biggest cedar in town, crushing a corner of J. Z.’s corner store.*

*Ian spoke up, “we can’t worry about yesterday’s fiasco. We gotta think about the crisis we’re gonna be in tomorrow if the power’s not back. Then it will be a real emergency!”*

## 2.5 Hazard

Our first thought when we think of a hazard will often be an event—earthquake, flood, or fire. But only thinking in terms of characteristics of the event — wind-speed, the size of tsunami wave, the magnitude of an earthquake, etc. — is to neglect a critical component. To become relevant to disaster management, nature must collide with human activity [10]. Hazards can be quantified simplistically as the probability of an event occurring, causing harm [11]. And there is no separating hazard from risk and resilience [12]. So the hazard is the oncoming storm and the potential for harm to the village it approaches (**Figure 2**).

## 2.6 Risk

Risk is connected choice and probability [11]. Choice by the decisions we make. We build in flood zones, we develop seaside resorts, and we ignore all but the

**Hazard.**  
The natural event encroaching on human safety.

**Risk.**  
The house, precariously situated, representing risk.

**Vulnerability and resilience.**  
Represented by the strength or weakness of the walls, the stability or instability of the foundation, the rising waters, etc.



**Figure 2.**  
*Hazard, risk, and vulnerability illustrated.*

most active fault lines when looking at real estate. We buy fire insurance or not. We upgrade the old building to comply with seismic building codes or not. We run disaster drills or not.

Probability is the other face of risk. Risk is an abstract concept, forever in the future, always uncertain.

*Risk is a complex and, at the same time, curious concept. It represents something unreal, related to random chance and possibility, with something that still has not happened. It is imaginary, difficult to grasp and can never exist in the present, only in the future. ([11], p. 47).*

## 2.7 Vulnerability

Vulnerability will create harm from the hazard. A predisposition to be harmed, intrinsic to the organization or organism is its vulnerability [11]. Poverty, age, gender, racial identification, geography, and many social, economic, and political factors are all parts. The vulnerability can accumulate until recovery is complete [12].

## 2.8 Resilience

The ability to adapt is central to an organization's ability to resist and rebound from disaster [13]. Resilience is woven through all aspects of disaster management—from preparation through mitigation, response, and recovery [12, 14]. Resilience alters the disaster threshold. The more resilient a system, the more harm can be absorbed before the system is overcome [13]. More resilience means less susceptibility to disaster.

## 3. Emergency management

Preparation and planning, mitigation, response, and recovery are the basic principles of emergency management. [15]. It is called *emergency* management, but should really be called *disaster* management. Necessarily limited to first responders, the title emergency management gives an illusion of control that makes it both “a misnomer and an oxymoron” ([16], p. 5). Regardless of the size of the event's magnitude, management includes all those efforts before, during, and after to minimize physical, social, and economic damages. Both planned and improvised actions should be included [16].

Preparation occurs before the disaster and includes preventative measures [17]. Disaster preparation, then, can also raise the disaster threshold if the disaster is thus avoided. At least, effects are minimized through planned measures. In our example settlement, prevention of a storm may not have been possible, but prevention of harm was through city planning, weather warning systems, and flood-resistant housing and infrastructure. Food and fuel stores could only be built up before the flooding.

Mitigation also includes a component of prevention but is closer to the event than planning. Anything to minimize harms that are not prevented could be considered mitigation. This can be through the reduction of the effects of the hazard, vulnerability of those affected in harm's way. In Tucci, they could build up walls of sandbags to protect their homes. They could moor their boats securely. They could evacuate, or they may have been able to if they had made adequate plans and preparations. Clearly, all these components are intricately connected.

The response may be what we typically think of when we envision a disaster. This is the responders—firefighters, paramedics, police, military, municipal forces, and volunteers—dousing the flames, treating the wounded, rescuing the stranded, and searching for victims.

Recovery entails returning, rebuilding, restoring. It is regaining a sense of normalcy, if not returning exactly to the pre-disaster state. Tucci will never be the same. The coastline will be altered. Attitudes may change forever. Lives may be lost. Houses will have to be repaired or rebuilt. Few residents will rebuild their houses exactly as they were before the storm. Recovery should focus on learning from the disaster and improving those liabilities made apparent by the wind and waves. This applies not only to the repairs to physical structures but to emotional health and economic stability.

### 3.1 From emergency management to disaster management

Preparation, planning, mitigation, and recovery are all important management principles for crises of any magnitude. As complexity increases towards disasters, we focus on the response at the front lines. This is because this phase sees the most variation and inconsistency [18]. On the front and back ends, in planning and recovery, the skies are clear. There is time to think. Not so in response. The response is the result of planning and facilitates recovery. To be prepared for an emergency should be routine. Preparedness for a disaster does not automatically follow.

By definition, local resources are sufficient to respond to an emergency. When these resources are overwhelmed, either by supply (nature of the event) or demand (response capabilities), the situation is a disaster ([19], Ch1). Outside help is needed. Intra-agency communication and coordination are required, usually without the benefit of established relationships and protocols. As complexity increases, more emphasis must be placed on flexibility and coordination between teams.

When the crisis moves from emergency to disaster, flexibility becomes increasingly important in planning, preparation, and response. In disaster planning, people should be prepared not to respond to specific circumstances, but to be able to adapt to the unanticipated. Training for disaster, then, ideally trains flexibility, communication, and the ability to work across organizational boundaries [20, 21]. Some structure is necessary to create the ability to adapt the structure to the situation. Brandrud's [22] description of their successful system is excellent: "...[the] written preparedness and response plan was structured just enough to remind the health professional of their role and task, yet flexible enough to enable them to release their creativity to improvise solutions" (p. 811).

*Tuesday:*

*"Anyone got a charger?" The question was becoming a little repetitive. At first, the people that asked this were given sympathetic smiles and apologies. Now, if anyone dared ask, it was only met with grunts and grumbles. Part of 'the plan' involved keeping in touch with people by cell phone. There were only a handful of people who still had any battery life left on their phones, and no one had reception.*

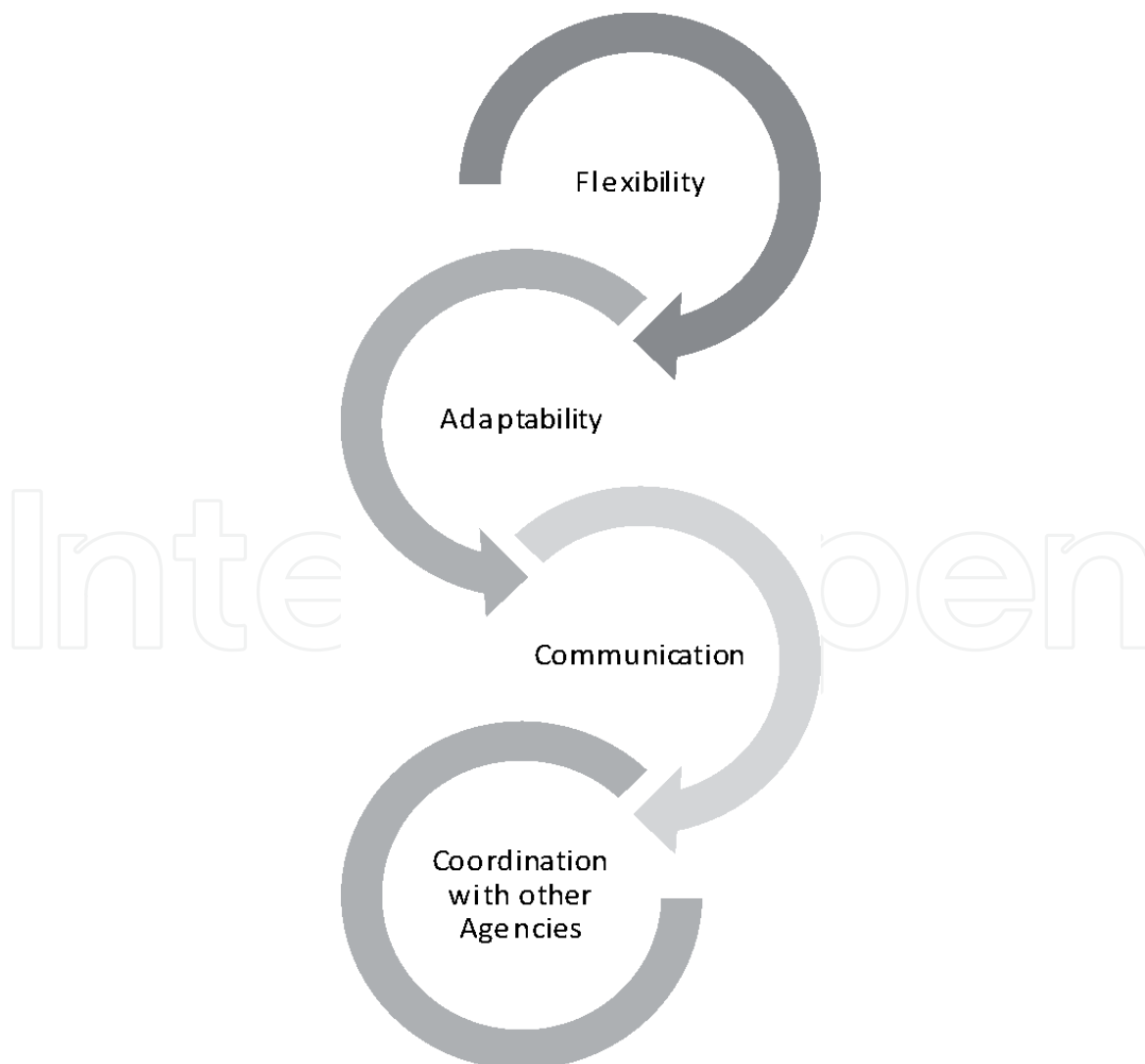
*All but a few of the townspeople were crammed into the school for the night. It was loud. Fifty quiet conversations, a few crying babies, the howling wind, and the incessant rain added up. And the air was thick with sweat and sewer (the toilets had all overflowed). A dozen people were standing in a circle in the middle of the gym, sorting through a pile of walky-talkies.*

*The side door flew open with the outside coming inside, and a group of bodies in rain gear, dripping from head to toe. It was a crew from Uah, an even smaller town down the coast. They had got their whole village out last week and came here on a few all-terrain vehicles to lend a hand. Apparently, there was a team coming from the city to take everyone out. If the rain ever stopped...*

Crisis standards of care are a reflection of the flexibility needed to respond when resources are lacking for the situation's need [23]. The same standards employed in day to day operations, or even in an emergency (when an organization has the capability to manage it), will consume valuable assets (time, supplies, personnel, cognition) when the system is asked to perform beyond capacity. Awareness of the difference between disaster standards and the standards applied to usual operations will facilitate effective disaster planning and response (**Figure 3**).

### 3.2 Disaster management: resource poor environment

Natural hazards alone do not result in disaster, but rather the vulnerability of the populations of countries impacted [24]. The complexity and chaos of disasters make management challenging in many ways. Even the best plans will be unable to address each difficulty encountered in a disaster [25].



**Figure 3.**  
*Principles in management when emergency becomes disaster.*



Resources are defined as the organization's fundamental financial, physical, individual and organizational capital attributes [26, 27]. In resource-poor environments, the challenge is greatly magnified. The environments most often impacted by a lack of resources are those of a lower socioeconomic status. Poverty and disasters are strongly associated [19]. Developing countries are repeatedly subject to disasters resulting in reduced or negative development [19].

*Wednesday:*

*There was a lot of talk about fixing houses, repairing roads, upgrading the bridge. People didn't want to talk about the deeper issues. Most would never be able to afford anything more than patching the holes. Someone brought up the idea of building up on the hillside where the waves couldn't reach. But that was so utterly inconceivable. How would they build a new town if they couldn't even build new houses? Some would have to leave. Hard to live in a fishing village if your boat got washed away and you got no other way to make a living.*

More impoverished communities are more vulnerable to natural disasters due to a mixture of social, political, cultural and economic factors [28]. Residents within these poorer communities tend to live in environments more prone to hazards such as rural areas with limited access to resources. The reduction in resources results in a more extended reconstruction period and can further delay developmental lag [19]. For example, in 2001, both El Salvador and the United States were hit by earthquakes, resulting in \$2 billion in damages [19]. Although the same monetary value, the impact on each country's economy varied drastically. This \$2 billion in damages had minimal impact on the U. S. economy, whereas, in El Salvador it resulted in 15% of the country's GDP [19]. These financial setbacks to developing countries can create a cyclical impact of further delayed development lag and economic growth.

Beyond the economic impacts, developing countries also face higher casualty rates. Over 96% of disaster-related deaths in recent years have taken place in developing countries [29]. Disasters may bring about harm to poor, developing countries in many ways beyond death, injury and destruction [19]. Some of the numerous examples include an increase in crime due to poverty and desperation, damage to schools leading to longterm impacts on education and further employment, destruction to hospitals which increase the vulnerability of disease, and the impact to vital infrastructure such as roads, bridges and airports, which may take years to rebuild and further impact resource access [19].

For meaningful disaster preparedness, the focus must be on improving availability and access to resources. This improvement should be a continual improvement effort to implement these resources to the area permanently. This implementation will help to support improvement to the quality of life to those impacted and decrease the inequity of resources and support when faced by disasters. Improved governance, combined approaches on all government levels, empowering communities, assessing vulnerability, ensuring access to quality information, and increasing the resilience of livelihood and infrastructure within these environments will reduce poverty and increase the quality of life [29].

Climate change and sustainable development both also influence the frequency and severity of disasters, particularly in resource-poor countries. Climate change, and irresponsible use of natural resources such as deforestation, make the environment more susceptible to hazards and disaster [30]. Disasters related to natural hazards, such as floods, storms and earthquakes, have significantly risen over recent years [30]. Such an increase in disasters is likely to further the frequency and severity of the impacts on the resource poor countries. Sustainable development is crucial to help reduce this burden.

### 3.3 Hospital disaster management

Disasters are easily forgotten. The unfortunate truth is that the longer the distance in time and space from disasters, the less influence they have on preparedness and planning [31]. This is especially relevant to hospitals because of a number of other interactions. Perception of disaster preparedness is often quite different between planners and frontline workers, the latter decidedly less optimistic about the facility's state of readiness [31]. And the pressures and problems of everyday operations can easily push aside concerns for an unforeseeable event. The attitude of disaster preparedness needs to pervade all aspects of the organization in the face of so many unseen but real hazards [32].

Specific hospital management principles include, but are definitely not limited to, vulnerability analysis, communications, triage, surge capacity, psychosocial effects, and medicolegal issues [31]. Hospitals must consider the disaster and its effects not only on a massive influx of patients but on existing patients, as well as health care workers in and out of hospital [33]. Patient care may be complicated and compromised by issues of security, chemical or biological exposure, and capacity for definitive care [29, 34].

Typically, an 'all-hazards' approach is employed as a basis of preparation for crises of any nature. More advanced preparedness will be tailored to specific hazards [30, 35]. We cannot plan for every possibility, especially not every extreme and infrequent event covered in this textbook. Plans must be broad enough to allow adaptation as needed [22]. If plans are too narrowly focused the preparation may be ineffective. Flexibility is key.

*Thursday:*

*Good thing we made it out when we did, although, an hour earlier would have been ideal. The leak that had been dripping constantly in the west corner of the gym turned into a stream, then a river, then the storm outside as the tiles gave way. The sick and the injured were evacuated first, down to Mayor Ros. Raj and me came on the last load. The hospital at Alec wasn't used to a hundred people at all, much less all within a couple hours. It was hard to tell who was who - doctors, nurses, housekeepers — might have been the president of the hospital — who were finding blankets, mopping up the incessant streams of muddy water, handing out bottles of clean water, looking at cuts and bruises and sore throats.*

Hospital disaster planning has important ramifications for capacity-building. That is, the threshold for disaster, an event that overwhelms local abilities, is intricately connected to capacity. "If a disaster is defined as an event that outstrips the organization's ability to deliver healthcare, preparedness is a method of "vaccination," raising the threshold not only in disaster periods but also in normal day-to-day function" ([31], p. xi). Disaster preparation is capacity-building.

Disaster preparedness is also about building networks. Again it comes back to the definition of disaster that requires help outside the immediately-affected organization. Coordination and communication between agencies are important in the success or deficiency of disaster response [23, 31, 36]. Establishing and enhancing relationships between organizations cannot be done in the moment of need. This should be a high priority for any organization in this time of global connectedness. Whether for a hospital, a nation, or a single-family, Alexander's [32] words for current and future emergency managers applies here: "Nothing can substitute for personal relationships" ([32, 37], p. 10).

The worst possible outcome of preparedness activities is to engender complacency. A "paper plan syndrome" refers to passively placing confidence in a

document detailing a facility's readiness ([35], p. 3). Written plans do not obviate problems [33, 38]. To be effective, training needs to be continuous, team-centred, and at least as far as disasters go, focused on the non-technical aspects of working in teams [22]. They have to use existing resources and include the possibility of the loss of these resources. The loss of electrical power is particularly important to consider. Our increasing reliance on technology is a modern blessing in times of peace and a serious susceptibility when things are bad [12].

## 4. Training

Plans are only 'fantasy documents' if they have no real implementation through training ([39], p. 2). Exercises also may only be preparation in fantasy if not implemented conscientiously. When planning disaster training exercises, we should consider our purposes. Is the intent to expose participants to the disaster response plan or their roles in the organizational structure? Is it to test the implantation of the response plan, to expose its weaknesses and oversights? This is often the objective, intended or not ([40], p. 277). Evaluation and improvement of disaster plans may be a useful objective if that is the need [31]. But simply observing shortcomings does not itself remedy them. Lessons "identified" does not mean lessons "learned" ([40], p. 280) Is the intent to learn from or improve collaboration with other agencies? Is the intent to improve decision-making and specific skills? These are all valid objectives and need to be determined to meet the organization's needs, lest any coincidental success be wrongly attributed to ineffective plans [41]. Disaster training should focus on adaptability. "Exercises and training on how to be creative and imaginative under such circumstances would be more useful than detailed disaster plans" ([25], p. 376).

*A month later...*

*"We just need to stick to the plan next time," Jan said, the last part sounding like a question. The storm was a memory like a bad dream. The town meeting, those who were left, was about getting ready for the next one.*

*The plan was new to almost everyone. Ros dug up some dusty old binder a few days ago. Too bad it made it, untouched, through the storm. It was full of detailed instructions about houses reporting to block leaders, block leaders reporting to councillors, councillors to the mayor, the mayor to the assistance team that was supposed to come from Alec, the capital city. Only thing was, households were all rearranged, trying to find somewhere dry to sleep. The block leaders didn't even know who they were, the mayor didn't have any councillors, and the team, well, not sure there ever was one.*

### 4.1 Barriers to effective exercises

Disaster exercises may not accomplish what is intended during their design [20]. Excessive complexity, targeting the wrong audience, and unforeseen social psychological effects are some of the problems that can impair the efficacy of disaster education.

**Complexity.** More complex does not mean better when it comes to training exercises [21]. Thinking that testing more skills will improve more skills, stressing more processes will improve more processes, and designing more complex scenarios will enhance a greater repertoire of individual and systemic responses is flawed.

The opposite can occur. Complexity can obscure the purpose of the exercise, lead to passivity among participants, and decrease collaboration [42]. Complexity can also interfere with learning [20]. Complex responses may be better trained by simple exercises. The goal is internal complexity with external simplicity (Loveluck cited in [21], p. 423).

**Leaders versus participants.** Many exercises benefit the designers and facilitators more than the participants [20, 21]. This may be effective when that is the goal. Some exercises explicitly target leaders and not participants [43]. But often, the intent is to train participants. Even when that is the stated objective, participants may not see it that way [44]. Facilities and educators may not be training who they hope to train. It is important to consider who the exercise is for, and who is actually benefitting.

**Social psychological.** Recognizing that crisis simulations are meant to evoke some stress in individuals and organizations, some researchers have examined the adverse social and psychological effects of exercises [20, 43]. Sometimes “unintended consequences” of these effects can appear as a failure to participate when trainees fear evaluation from superiors ([20], p. 422). Supervisors giving feedback can reinforce incorrect behaviors if hierarchical relationships are ignored [20].

## 4.2 Benefits

There is no doubt that planning and training is key to disaster preparedness [41]. Disaster exercises are beneficial when objectives are clear, and debriefing is effective. When objectives are appropriate and align with needs, response capacities improve. Debriefing helps with this and with all aspects of learning and growth. The debrief is one of the most important parts of effective exercise.

**Clearly defined objectives.** Objectives should identify whether the purpose of the exercise is evaluation or training, individual skills or collaboration, crisis or emergency response. Experts commonly identify the need for objectives to guide disaster exercises [20, 45]. Yet hospital exercises often do not include specific objectives [46] or have not clearly defined them [47]. Objectives help operationalize disaster training. That means we can identify what we wish to improve, measure to see if we have improved, and actually improve in the desired area [20, 21, 43, 46]. In many cases, the method of training and objectives of an exercise is not complementary and do not create the conditions for improvement in operational capacities [46, 48].

**Disaster vs emergency, stability vs flexibility, training vs drills.** Disasters and emergencies are different events and require different responses [21]. Training for emergencies requires drills, practicing being able to perform planned responses to anticipated events [20, 42, 51]. In a disaster, responses outside an organization’s policies and protocols are required [20, 44]. Training for disaster ideally trains flexibility, communication, and the ability to work across organizational boundaries [20, 21].

**Collaboration.** Disasters require interactions across and within organizations that is outside of usual lines of communication [20]. Collaboration, then, is key. Collaborative communication can help organizations recognize crises in the first place [49] and throughout the event. If there are barriers to effective communication across organizational boundaries, the response will be less timely, flexible, and effective [51]. We should prepare for the need to collaborate through practice working within new relationships and organizational structures [25].

**Debriefing.** “... the only reason for running a simulation is so that an exercise can be debriefed” (Thiagarjan cited in [20], p. 421). Debriefing is essential in order for learning to occur [20, 49]. Debriefing helps accomplish objectives, be they developing plans, training existing skills, or learning new things [50]. Learning from an

- 
- *Is the exercise overly complex?*
  - *Who is the exercise intended to benefit?*
  - *Is the possibility of psychological effects addressed?*
  - *Are there clear objectives?*
  - *Is training for emergency or disaster?*
  - *Is collaboration being trained in disaster exercises?*
  - *Is there an adequate and effective debriefing?*
- 

**Table 1.**

*Questions to ask to make disaster training effective.*

exercise increases with reflection individually and collectively [21, 44, 51]. The utility of an effective and adequate debrief cannot be underemphasized (**Table 1**).

*Seems like a dream. A dream I'd like to forget. I said as much to Raj, adding "won't see another one like that for a hundred years."*

*He was just shaking his head. "Forget this dream and it might as well be three days till the next one. Be the same dream all over again unless you keep this one in mind."*

## 5. Conclusion

Disaster management is challenged by the difficulty we have as people and organizations to think about future, uncertain events. The complexity and chaos of disasters further complicate the tasks of planning, preparing, and responding. The more complex the event, the more an organization must adapt and collaborate with other organizations. This frameworks of resource management in disasters will guide organizations in their disaster preparedness activities. We have touched on some applications of these principles to hospitals and resource-poor environments. From an accurate understanding of what constitutes a disaster, education and training will more likely be effective — directed to the right people, developing the right skills in the right places.

IntechOpen

## Author details

Jared Bly<sup>1,2\*</sup>, Louis Hugo Francescutti<sup>1</sup> and Danielle Weiss<sup>3</sup>

1 University of Alberta, Edmonton, Canada

2 Royal Roads University, Victoria, Canada

3 Northern Alberta Institute of Technology, Edmonton, Canada

\*Address all correspondence to: [jrdbly@gmail.com](mailto:jrdbly@gmail.com)

## IntechOpen

---

© 2020 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 

## References

- [1] Blanchard BW. Guide to emergency management and related terms, definitions, concepts, acronyms, organizations, programs, guidance, executive orders & legislation: A tutorial on emergency management, broadly defined, past and present. In United States Federal Emergency Management Agency 2008 Oct 27. Available from [https://training.fema.gov/hiedu/docs/terms and definitions/terms and definitions.pdf](https://training.fema.gov/hiedu/docs/terms%20and%20definitions/terms%20and%20definitions.pdf)
- [2] De Smet H, Lagadec P, Leysen J. Disasters out of the box: A new ballgame? *JCCM*. 2007;**20**(3):138-148. DOI: 10.1111/j.1468-5973.2012.00666.x
- [3] Carr LJ. Disaster and the sequence-pattern concept of social change. *The American Journal of Sociology*. 1932;**38**(2):207-218. DOI: 10.1086/216030
- [4] Tierney KJ. Businesses and Disasters: Vulnerability, impacts, and recovery. In handbook of disaster research. *Handbooks of Sociology and Social Research*. 2007. [https://doi.org/10.1007/978-0-387-32353-4\\_16](https://doi.org/10.1007/978-0-387-32353-4_16)
- [5] Oliver C. Catastrophic Disaster Planning and Response. CRC Press; 2010
- [6] United Nations (2019). UN-SPIDER. Space Based Information for Disaster Management and Emergency Response. Retrieved from <http://www.un-spider.org/>
- [7] McMaster R, Baber C. Multi-agency operations: Cooperation during flooding. *Applied ergonomics*. 2012 Jan 1;**43**(1):38-47. DOI: 10.1016/j.apergo.2011.03.006
- [8] Cannava P, Cicillini D, Higgins M, McGrath A, O'Leary J. Response to H1N1 influenza outbreak in a pediatric children's hospital: Challenges faced and lessons learned. *Journal of Pediatric Nursing*. 2010 Oct 1;**25**(5):375-381. DOI: 10.1016/j.pedn.2010.03.001
- [9] Business dictionary. <http://www.businessdictionary.com/definition/crisis.html>
- [10] World Health Organization. WHO/EHA Panafrican Emergency Training Centre, Addis Ababa. 2002. Retrieved from <http://apps.who.int/disasters/repo/7656.pdf>
- [11] Cardona OD. The need for rethinking the concepts of vulnerability and risk from a holistic perspective: A necessary review and criticism for effective risk management. In: Hilhorst D, Frerks G, Bankoff G, editors. *Mapping Vulnerability: Disasters, Development and People*. London: Earthscan Publications; 2003. pp. 37-51 Retrieved from [http://www.academia.edu/download/54365737/Rethinking\\_Risk\\_Cardona.pdf](http://www.academia.edu/download/54365737/Rethinking_Risk_Cardona.pdf)
- [12] Etkin D. *Disaster Theory: An Interdisciplinary Approach to Concepts and Causes*. Butterworth-Heinemann; 2014
- [13] Hufschmidt G. A comparative analysis of several vulnerability concepts. *Natural hazards*. 2011 Aug 1;**58**(2):621-643. DOI: 10.1007/s11069-011-9823-7
- [14] Murphy BL, Etkin D. Introduction. In Etkin D, Murphy BL, editors. *Disaster and emergency management in Canada*. Canadian risk and hazards Network 2011. p. 1-16. Retrieved from <https://www.crhnet.ca/sites/default/files/library/Introduction%20Formatted.pdf>
- [15] Public Safety Canada. *An Emergency Management Framework for Canada (Third Ed.)* Government of Canada. 2017.

- [16] McEntire DA. The status of emergency management theory: Issues, barriers, and recommendations for improved scholarship. University of North Texas. Department of Public Administration. Emergency administration and Planning 2004. Retrieved from <http://precisionmi.com/precisionmi/Materials/ManagementMat/Status%20of%20Emergency%20Management%20Theory.pdf>
- [17] Public Safety Canada. Disaster prevention and mitigation. 2015. Available from <https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/dsstr-prvntn-mtgn/index-en.aspx>
- [18] Van Wart M, Kapucu N. Crisis management competencies: The case of emergency managers in the USA. *Public Management Review*. 2011 May 1;13(4):489-511. DOI: 10.1080/14719037.2010.525034
- [19] Coppola, D. P. (2015). Introduction to international disaster management. Retrieved from <https://ebookcentral-proquest-com.ezproxy.royalroads.ca>
- [20] Borodzicz EP. The missing ingredient is the value of flexibility. *Simulation & Gaming*. 2004 Sep;35(3):414-426. DOI: 10.1177/1046878104266221
- [21] Borodzicz E, Van Haperen K. Individual and group learning in crisis simulations. *Journal of contingencies and crisis management*. 2002 Sep;10(3):139-147. DOI: 10.1111/1468-5973.00190
- [22] Brandrud AS, Bretthauer M, Brattebø G, Pedersen MJ, Håpnes K, Møller K, et al. Local emergency medical response after a terrorist attack in Norway: A qualitative study. *BMJ Quality & Safety*. 2017 Oct 1;26(10):806-816. DOI: 10.1136/bmjqs-2017-006517
- [23] Timbie JW, Ringel JS, Fox DS, Pillemer F, Waxman DA, Moore M, et al. Systematic review of strategies to manage and allocate scarce resources during mass casualty events. *Annals of emergency medicine*. 2013 Jun 1;61(6):677-689. DOI: 10.1016/j.annemergmed.2013.02.005
- [24] UNDP. Disaster Risk Reduction Governance & Mainstreaming. October, 2010. Retrieved from [https://www.preventionweb.net/files/17429\\_4disasteriskreductiongovernance1.pdf](https://www.preventionweb.net/files/17429_4disasteriskreductiongovernance1.pdf)
- [25] Quarantelli EL. Disaster crisis management: A summary of research findings. *Journal of management studies*. 1988 Jul;25(4):373-385. DOI: 10.1111/j.1467-6486.1988.tb00043.x
- [26] Hill CW, Jones GR, Schilling MA. *Strategic Management: Theory: An Integrated Approach*. Boston: Houghton-Mifflin; 2001
- [27] Hitt MA, Ireland RD, Hoskisson RE. *Strategic Management: Competitiveness and Globalization*, 2nd Ed. 1997. West, St Paul, MN.
- [28] Benson C, Twigg J, Myers M. NGO initiatives in risk reduction: An overview. *Disasters*. 2001 Sep;25(3):199-215. DOI: 10.1111/1467-7717.00172
- [29] OECD. Poverty and climate change: Reducing the vulnerability of the poor through adaptation. Available from [www.oecd.org/env/cc/2502872.pdf](http://www.oecd.org/env/cc/2502872.pdf)
- [30] De Smet H, Lagadec P, Leysen J. Disasters out of the box: A new ballgame? *Journal of Contingencies and Crisis Management*. 2012 Sep;20(3):138-148. DOI: 10.1111/j.1468-5973.2012.00666.x
- [31] Kollek D, editor. Disaster preparedness for health care facilities. In: PMPH-USA. 2013



- [32] Health Standards Organization. Emergency and disaster management [guideline]. 2020. Available from [www.healthstandards.org](http://www.healthstandards.org)
- [33] Francescutti LH, Sauve M, Prasad AS. Natural disasters and healthcare: Lessons to be learned. In Healthcare management forum. 2017 Jan.;**30**(1):53-55. DOI: 10.1177/0840470416679338
- [34] Baker MS. Creating order from chaos: Part I: Triage, initial care, and tactical considerations in mass casualty and disaster response. *Military medicine*. 2007 Mar 1;**172**(3):232-236. DOI: 10.7205/MILMED.172.3.232
- [35] McCann, DGC. Introduction to disasters and disaster planning. in Kollek, D, editor. *Disaster Preparedness for Health Care Facilities*. PMPH-USA. 2013. p. 1-9.
- [36] Hu Q, Knox CC, Kapucu N. What have we learned since September 11, 2001? A network study of the Boston marathon bombings response. *Public Administration Review*. 2014 Nov;**74**(6):698-712. DOI: 10.1111/puar.12284
- [37] Alexander DE. 2030: Adapting to complexity. *Haznet* 2020;**14**(1). <http://haznet.ca/haznet-magazine-spring-2020-issue/>
- [38] Juffermans J, Bierens JJ. Recurrent medical response problems during five recent disasters in the Netherlands. *Prehospital and disaster medicine*. 2010 Apr 1;**25**(2):127 <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.176.1952&rep=rep1&type=pdf>
- [39] Clarke L. *Mission Impossible: Using Fantasy Documents to Tame Disaster*. University of Chicago Press; 1999 May 15
- [40] Skryabina E, Reedy G, Amlot R, Jaye P, Riley P. What is the value of health emergency preparedness exercises? A scoping review study. *International journal of disaster risk reduction*. 2017 Mar 1;**21**:274-283. DOI: 10.1016/j.ijdr.2016.12.010
- [41] Steigenberger N. Organizing for the big one: A review of case studies and a research agenda for multi-agency disaster response. *Journal of Contingencies and Crisis Management*. 2016 Jun;**24**(2):60-72. DOI: 10.1111/1468-5973.12106
- [42] Berlin JM, Carlström ED. Collaboration exercises—The lack of collaborative benefits. *International Journal of Disaster Risk Science*. 2014;**5**(3):192-205. DOI: 10.1007/s13753-014-0025-2
- [43] Peterson DM, Perry RW. The impacts of disaster exercises on participants. *Disaster Prevention and Management: An International Journal*. 1999;**8**(4):241-255. DOI: 10.1108/09653569910283879
- [44] Berlin JM, Carlström ED. Collaboration exercises: What do they contribute? –a study of learning and usefulness. *Journal of Contingencies and Crisis Management*. 2015 Mar;**23**(1):11-23. DOI: 10.1111/1468-5973.12064
- [45] Hsu EB, Jenckes MW, Catlett CL, Robinson KA, Feuerstein C, Cosgrove SE, et al. Effectiveness of hospital staff mass-casualty incident training methods: A systematic literature review. *Prehospital and disaster medicine*. 2004 Sep;**19**(3):191-199. DOI: 10.1017/S1049023X00001771
- [46] Verheul ML, Dückers ML. Defining and operationalizing disaster preparedness in hospitals: A systematic literature review. *Prehospital and disaster medicine*. 2020 Feb;**35**(1):61-68. DOI: 10.1017/S1049023X19004187
- [47] Jamieson T. Disastrous measures: Conceptualizing and measuring disaster risk reduction. *International*

Journal of Disaster Risk Reduction.  
2016 Oct 1;**19**:399-412. DOI: 10.1016/j.  
ijdr.2016.09.010

[48] Beerens RJ, Tehler H. Scoping the field of disaster exercise evaluation-a literature overview and analysis. International Journal of Disaster Risk Reduction. 2016 Oct 1;**19**:413-446. DOI: 10.1016/j.ijdr.2016.09.001

[49] Lagadec P. Learning processes for crisis management in complex organizations. Journal of Contingencies and Crisis management. 1997 Mar;**5**(1):24-31. DOI: 10.1111/1468-5973.00034

[50] Hermann MG. In conclusion: The multiple pay-offs of crisis simulations. Journal of Contingencies and Crisis Management. 1997 Dec;**5**(4):241-243. DOI: <https://doi.org/10.1111/1468-5973.00062>

[51] Berlin JM, Carlström ED. The three-level collaboration exercise-impact of learning and usefulness. Journal of Contingencies and Crisis Management. 2015 Dec;**23**(4):257-265. DOI: <https://doi.org/10.1111/1468-5973.12070>