

## Case report

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# The Challenge of Allocating Scarce Medical Resources During a Disaster in a Low Income Country: A Case Study from the 2010 Haitian Earthquake

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## ABSTRACT

Scarce medical resources during a natural disaster challenge the existing protocols for medical intervention. Triage decisions about which patient to care for can be extremely stressful for a medical team. This case analysis describes the experience of one mobile field hospital in Haiti in the aftermath of the January 12, 2010 earthquake. The medical team was confronted with the need to choose which of three critically ill patients should receive the remaining, dwindling oxygen supply. The ethical framework around these decisions is discussed. The development of an onsite ethics committee from team members is suggested to help lighten the burden of decision making off of the individual care provider.

**KEYWORDS:** Haiti earthquake; Disaster; Resources; Crisis; Palliative care.

**ABBREVIATIONS:** NDMS: National Disaster Management System; CIC: Commander-in-Chief; IOM: Institute of Medicine.

## INTRODUCTION

Natural disasters in low income countries rapidly deplete available medical and social resources. Rescue teams are confronted with the challenge of medical triage of critically ill patients when there are not enough supplies to treat everyone. The complex and challenging decision to shift from active to palliative care in the disaster setting is rarely straight forward. The experience of one disaster team during their deployment after the 2010 Haiti earthquake is described and analyzed.

The National Disaster Management System (NDMS) of the United States recruits volunteer health professionals who train for disasters and are called up when the United States government declares a national or international disaster.<sup>1</sup> When on deployment, the disaster team members are federal employees. The command structure of NDMS follows the incident command system of the military. In Haiti, our team received our orders from our Commander-in-Chief (CIC) in Washington. On the ground, a direct commander in chief was selected. The organization structure of the team followed the incident command structure set by our CIC. Our CIC was an EMT fireman. He organized the 63 team members into modules based on our work assignments. Because we were working in an unsafe environment physically (there were

daily aftershocks and unstable buildings) and politically (there was no effective government in Haiti and there were riots, looting, and gang violence), safety and security was the first priority of the CIC. One of the modules in our group was logistics. They were involved in obtaining supplies to keep our hospital running. All supplies including medicines, medical equipment, food, and shelter were brought in from the United States. The team did not use any local resources so as to not deplete locally scarce supplies.

A chief medical officer was assigned to coordinate the medical efforts of the group. Daily briefings were held by the CIC about safety reports, supplies, team safety. The sign-out among the nurses and doctors occurred every 12 hours in their particular tent

This report describes three patients who required oxygen when oxygen supplies were running out. The dilemma of triage is discussed and ethical questions are raised. How does one decide whom to give a limited resource to? How is this decision made? Who is responsible for making this decision? What is the impact on the medical team of rationing or withdrawing resources? One solution, to develop an embedded ethics presence within the team to guide and validate these difficult decisions, is discussed.

#### CASE REPORT

United States Health and Human Services sent Medical Disaster Teams into Haiti after the January 12, 2010 earthquake. Our team of 63 people (including 11 physicians, 29 nurses, 3 pharmacists, 2 respiratory therapists, and 18 logistics and security people) arrived in Haiti forty-eight hours after the earthquake. A perimeter and a mobile hospital unit were set up in a devastated region of Port Au Prince on the grounds of a destroyed hospital called Gheskio. There were two general medicine tents, a minor procedures tent for dressings and debridements, an operating room, "ICU", and children's ward. We were able to shelter 35 souls at a time and tried to triage, treat, and discharge patients quickly. From the time the hospital was set up, we worked at full capacity and sheltered an additional twenty to thirty patients on army cots covered by mosquito netting on the grass perimeter.

We were surrounded by a tent city of survivors, rubble from buildings, and the constant shifting ground of aftershocks. Because the airport had been severely damaged and transport resources were devoted to a constant stream of people being airlifted out of Haiti, there was limited delivery of medicines, supplies, and food into Haiti during the first two weeks after the earthquake.

Supplies were initially insufficient. For instance, while the most common injury was compound fractures of the arms, legs, and hips, external fixators were not available until our second week. Creative solutions included tying pieces of stone from the rubble to ropes swung over the poles of the army cots to use

traction to realign the fractures.

One week after the earthquake, three critically ill patients arrived simultaneously to the Gheskio Field Hospital. N.S. was a 38-year-old woman who had decompensated congestive heart failure. She had been an inpatient at the University Hospital before the earthquake destroyed parts of the hospital. Her family had all died when their house crushed them. She was brought to us in severe respiratory distress. She received diuretics and oxygen.

J.P., the second patient, was a 25-year-old man who had survived under the rubble for three days until his family was able to dig him out. His severe crush injuries led to renal failure and then acute respiratory distress syndrome. He was emergently intubated and put on the respirator in the ICU tent.

The third patient was an infant with pneumonia who was intubated and ventilated manually as there was only one mechanical respirator at the field hospital.

On the morning that the three patients arrived, the chief logistics officer informed us that we were getting low on oxygen and gasoline. He was concerned that we would run out of gasoline used to run our generators. Requests for these supplies had been made but because of the precarious situation at the airport, it was uncertain when we would receive the needed supplies. Other medical supplies such as pain medication, antibiotics, and cardiac medications were adequate.

By that evening, it was clear that oxygen supplies were low; however there was no group meeting called to discuss how to manage the crisis. By midnight, oxygen supplies were running out. In the medical tent where N.S. was being treated, the medical officer made the decision to turn down the flow rate of her oxygen tank to try to ration it. She was treated with more diuretics and morphine to alleviate her panic from respiratory distress. The nurse taking care of N.S. spent the night trying to keep her comfortable. By morning, when the communications liaison identified another facility with resources, N.S. was transported without oxygen by a pickup truck to University Hospital in Port au Prince where oxygen was available. A doctor from our team transported her and tried to palliate her discomfort with inhalers. N.S. survived and was discharged after treatment.

J.P. and the infant were being managed in the ICU tent. The baby was hand ventilated using room air when her oxygen tank ran dry. The two respiratory therapists and the one pediatrician took turns squeezing the Ambu bag for 24 hours. The pediatrician who was ventilating the infant suggested that J.P. should not be intubated when he developed respiratory distress and be allowed to die. The other physician in the tent refused and intubated him. J.P. was given the last remaining tank of oxygen. The baby and J.P. were transported by helicopter to the USNS Comfort Hospital Ship that was docked in the harbor. J.P. died en route. The baby survived.

## DISCUSSION

### Triage in a Disaster Setting

Disaster triage includes assessing survivors for types of injuries and survivability from injuries. Triage categories are described based on the need for immediate versus delayed care, and scoring systems or universal color coding are used for quick communication of triage assessments.<sup>2</sup> For instance, an immediate triage category (color red) signals a group needing immediate attention to survive. The delayed category victim (color yellow) has wounds that can be treated after the red group. The minimal category victim (color green) does not have life-threatening injuries and can be managed at a later time. The expectant category (color black) will not survive and the focus should be on palliative care with a goal of alleviating suffering.

At the Gheskio Field Hospital, both the infant and J.P. had category red medical conditions. N.S, chronically ill for years was initially thought to be category yellow but actively decompensated when oxygen was withdrawn. All three patients were believed to have life-threatening conditions that could be reversed with the right therapeutic interventions.

### Resource Availability

Resource availability is categorized as Normal, Good, Fair, and Poor.<sup>3</sup> With normal resources (categorized as “conventional” by the Institute of Medicine (IOM)), normal care is provided. For good resource availability (categorized as “contingency” by IOM), the functional equivalent level of care can be maintained by substituting and conserving resources. Fair resources are considered in the “crisis” category by IOM and triage is needed to prioritize those with moderate life-threatening injuries. The rationale for this is that those with more severe life-threatening injuries will have higher resource requirements and worse prognosis even with treatment. For poor resource availability (also categorized as “crisis” by IOM), moderate life-threatening injuries are prioritized but resources can be inadequate to treat even this group. Severe casualties are triaged to the expectant category.

Resources at Gheskio Field Hospital were temporarily poor and in the “crisis” category for resource availability after a week of continuous disaster work in Haiti. The team hoped to keep the category red patients alive until more resources arrived. However, oxygen ran out before the camp could be resupplied. Using the IOM analysis, the survivability of these three patients should have been reconsidered. While J.P. was young and healthy, he had sustained a devastating injury and was developing multi-organ system failure. Realistically, the likelihood of his survival was low. However, it was emotionally impossible for the staff caring for him to disengage. This led to conflict among team members. A strong leadership presence with a “group huddle” to discuss events would have been helpful. In addition to these three patients, there were multiple other medi-

cal crises going on including a woman with a dysfunctional labor, five small children with amputations, and four people in the “expectant” category which included a woman dying of tuberculosis and AIDS, a woman with a severe crush injury, a pregnant woman with a broken neck, and a boy with tetanus. The CIC was chosen because of his strong logistics and security background, however because of his expertise in these areas, there was less leadership guidance on the challenges of medical management.

Using the same analysis, while in an environment with normal and “conventional” resources, N.S. would have been fitted with a home oxygen tank. She also might have been on a heart transplant list. In Haiti, a country without a single functioning hospital in Port Au Prince, it was only a matter of time before her chronic condition would deplete available resources. Given the huge need of other people who did not have chronic conditions and who could survive, one might argue that oxygen should be saved for them. The staff caring for N.S. could not make that decision and continued to give her the remaining oxygen.

### Team Dynamics, Psychological & Behavioral Responses to Disaster Care

Our team and NDMS teams in general are required to participate in trainings through the year. Drills with volunteer victims to learn how to triage casualties and allocate scarce resources are routinely performed. Yet in the heat of real crisis, the primary role as patient advocates collided with the intellectual knowledge of triage developed from drills. Therefore, it is important that part of leadership in the disaster setting involves constant guidance and discussion when these distressing decisions arise about whom to treat and whom not to treat. Studies of emergency responders show that they have a powerful sense of duty and deep commitment to help.<sup>4</sup> Despite adequate pre-disaster training, dysfunctional behavior can occur when responders are vastly overwhelmed and severely under-resourced. Additionally, dysfunction occurs when there are threats to personal safety and limited information about what is happening globally. In our team, we were physically uncomfortable due to the austere environment and heat. The air was filled with smoke from fires in buildings, from burning of bodies, and from burning of tires during riots. There was wide spread frustration at the lack of adequate supplies. There was limited communication with the outside world and with other rescue sites on the ground because of a lack of cell phone function and destruction of land line communications.

In the setting of severe stress, decision-making can be adversely affected. During Hurricane Katrina, thirty-four patients died at Memorial Medical Center. The staffs, who were not trained in disaster management, made decisions about patient care and triage that were later questioned. One editorial concluded that training and community discussions about what care should be provided when there are crisis category resources after a disaster.<sup>5</sup> Our experience in Haiti suggests that training is not enough.

### Ethical Resources for Disaster Work

Theoretical ethical analyses of disasters offer ethical frameworks to help professionals identify the obligation to preserve life, name crises in resources, and even to consider euthanasia in settings of irresolvable suffering.<sup>6</sup> Pre-disaster training is important. Other tools include Edwards and Robey's "Virtual Mentor".<sup>7</sup> They discuss three strategies for approaching ethical issues: 1 - anticipate and practice; 2 - use pre-existing ethical frameworks; 3 - build a scaffolding within which to place issues.

Hunt discusses the importance of establishing "moral bearings" in humanitarian work.<sup>8</sup> He identifies specific challenges that impact the uncertainty of the ethical decision-making in acute emergencies that include 1- the level of achievable care is much lower than health care providers are used to; 2 - in contexts of resource scarcity, increased instability, and widespread health needs, population health concerns abound; 3 - in humanitarian settings the volume and urgency of needs of the local population are elevated and providers often work extremely long shifts causing exhaustion and have limited opportunity to debrief.; 4 - important differences exist between cultural frameworks in how health, wellness, disease and disability are understood and experienced; 5 - imbalances of power occur between providers and patients; and 6 - there is less regulatory oversight and professional accountability in the field than at home. Hunt suggests asking several focused questions to help understand the appropriate action.

These questions listed here in italics could have guided decision making during our dilemma of managing the three patients who required the diminishing supply of oxygen:

#### 1. Identify/clarify the ethical issue

*a) What is the issue that we are experiencing?*

Who should receive the limited oxygen resource?

*b) What is at stake and for whom?*

All three patients are at risk of dying without the oxygen.

*c) How is this issue experienced/understood from different perspectives?*

All of the team is aware of the consequences of withdrawing oxygen from the three patients. There was disagreement about who should receive oxygen based on differing assessments of survivability.

#### 2. Data gathering and attention to context

*a) Who can contribute to helping us understand this issue better?*

Information about when more supplies could be obtained would have been helpful. Understanding what resources other NGO tent hospitals in the area had available would have allowed earlier transfer of patients that we could not have taken care of.

*b) How do organizational features influence the issue?*

There was no embedded ethics committee within the organization of our team on the ground. It would have defused the tension to have an ethics subgroup of the team assigned to support team members about the dilemma of choice of who would receive oxygen. An ethics presence could have also weighed-in on who was the most appropriate recipient of our scarce resource.

*c) What is the impact of the professional and social norms of our home countries on how we understand this issue?*

The professional norms of the team heavily impacted the choices they made. The physician who decided to intubate J.P was an emergency room physician who could not watch the young man die when she knew she could prevent his death by intubation. The nurse, who worked in an intensive care unit in her home hospital, was traumatized by watching N.S. gasp for air all night long because of inadequate oxygen.

*d) What is the impact of this issue on collaboration and trust among the team?*

The team works because of collaboration and an acceptance of command decisions. When a situation such as running out of oxygen occurs, this stresses the trust relationship between team members. Trust between team members requires that there is open communication and collaborative problem solving.

*e) How are imbalances of power relevant to the issue?*

The command structure prevented a flexible problem-solving approach in this situation of crisis. The command focus was on the safety of the team members and did not allow problem solving about ethical issues. The choice of a logistics and security expert understandably occurred because of the unstable nature of the country. However, greater thought to structuring a medical leadership should have also occurred.

### 3. Exploration of ethics resources

*a) What ethics resources and approaches can assist us in evaluating this issue?*

The most important resource would have been an *a priori* establishment of an in-team ethics group. It would have been important to give the ethics group authority to weigh-in on contentious issues. The values and norms continue to be the observance of triage of victims by severity of injury plus an acknowledgement of the scarcity of resources. Group discussion of these limitations and emotional support to team members in distress is vital.

### The Ethical Landscape of a Disaster

Disaster responders have a moral compulsion to help in a disaster. They come into the disaster environment with a developed sense of ethical justice. Justice in this setting includes a sense of obligation to the victims. In the field, the lack of resources and the overwhelming number of injuries and victims can lead to despair and post-traumatic stress on the part of the providers. Providing an ethical framework and a moral landscape can lighten the burden of these providers, reduce tension between colleagues, and help with difficult decisions. Edwards

and Robbey<sup>7</sup> review the four ethical skills of:

1. *Recognition: What is the ethics issue in this case? Reasoning: What options are there, and what are the potential harms and benefits of each? What is at stake in this decision?*

2. *Responsibility: What are my professional obligations?*

3. *Respond: What will I do, and why?*

This simple articulation frames the most terrible of dilemmas. Additionally, the need for a disaster ethics committee takes the burden of these “Sophie’s Choices” off the individual providers. There is a need for training of selected individuals on the disaster team in ethics. The most workable model for an ethicist(s) on a disaster team is ethicist as a team member.<sup>9</sup> The wisdom of who should decide life and death decisions in a non-disaster setting is useful to support a similar practice in the disaster setting. Decisions should reflect the various segments of the community and no decisions can be made in isolation of that community.<sup>10</sup> Disaster medicine occurs within the fabric of a community that has been damaged or destroyed. One of the challenges of a disaster team is to identify local cultural leaders to help guide decisions. The ethics subgroup within the team should be tasked to explore community resources.

The United States National disaster team is, by its nature, a team that is trained to accept the authority of its commanders. The addition of an ethicist as an authority would be well received. The nature of authority *per se* and for an ethics consultant has been explored.<sup>11</sup> The two components to authority are epistemic and competence. Additionally, authority in action solidifies the status of the ethicist. This would definitely occur in the disaster field. Finally, the disaster team ethicist can help open up a moral space for discussion among team members. Having such a resource on the team emphasizes the importance of these issues in both decision-making and in the support of the team members. There is a need to find some existential meaning to the outcomes of disasters. Disaster responders feel that their participation in the alleviation of suffering gives meaning to the chaos and misery. The available ethical tools should be deployed to help bring clarity to impossible situations and prevent team members from feeling isolated when tough decisions need to be made.

#### Communication as Part of Ethics Work in Disasters

Decision making in disasters should use five domains to help guide responders: triage and allocation, ethical concerns of patients and families, ethical responsibilities to providers, conduct of research, and international concerns.<sup>12</sup> This report focuses on the dilemmas providers confront in the first domain: triage and allocation.

Disaster management communication is vitally important during disasters.<sup>13</sup> Developing a language of quick sign-outs

to identify ethical issues will help teams work efficiently and reduce conflict. Research is needed into responders’ choices and how to best develop guidelines.<sup>14</sup> Additional training with real life scenarios, development of triage plans, and the use of ethics consults can minimize the burden of emotional and cognitive dissonance on providers in the field.<sup>15</sup>

#### REFERENCES

1. Ebola Information for Healthcare Professionals and Health-care Settings, 2014. <http://www.phe.gov/preparedness/pages/default.aspx>. Accessed February 13, 2015.
2. Eastridge BJ, Butler F, Wade CE, et al. Field triage score (FTS) in battlefield casualties: validation of a novel triage technique in a combat environment. *J Surg*. 2010; 200(6): 724-727. doi: [10.1016/j.amjsurg.2010.08.006](https://doi.org/10.1016/j.amjsurg.2010.08.006)
3. Guidance for Establishing Crisis Standards of Care for Use in Disaster Situations. <http://www.iom.edu/reports/2009/disaster-carestandards.aspx>. Accessed February 13, 2015.
4. Dodgen D, Norwood AE, Becker SM, Perez JT, Hansen CK. Social, psychological and behavioral responses to a nuclear detonation in a US city: implications for health care planning and delivery. *Disaster Med Public Health Preparedness*. 2011; 5: S54-S64. doi: [10.1001/dmp.2011.12](https://doi.org/10.1001/dmp.2011.12)
5. Okie S. Dr Pou and the Hurricane - Implications for patient care during disasters. *NEJM*. 2008; 358: 1-5. doi: [10.1056/NEJMp0707917](https://doi.org/10.1056/NEJMp0707917)
6. McCullough LB. Taking seriously the “what then?” question: an ethical framework for the responsible management of medical disasters. *J Clin Ethics*. 2010; 21: 321-327.
7. Edwards KA, Robey T. “Preparing for the Unexpected: Teaching ER Ethics”. *American Medical Association Journal of Ethics*. 2010; 12(6): 455-458. doi: [10.1001/virtualmentor.2010.12.6.medu1-1006](https://doi.org/10.1001/virtualmentor.2010.12.6.medu1-1006)
8. Hunt MR. Establishing moral bearings: ethics and expatriate health care professionals in Humanitarian work. *Disaster*. 2011; 35(3): 606-622. doi: [10.1111/j.1467-7717.2011.01232.x](https://doi.org/10.1111/j.1467-7717.2011.01232.x)
9. Fox MD, McGee G, Caplan A. Paradigm for clinical ethics consultation Practice. *Cambridge Quarterly Healthcare ethics*. 1998; 7: 308-314.
10. McGee DB. Issues of Life and Death. Understanding Christian Ethics an interpretive approach. In: Tillman W, ed. B&H Publishing Group. 1988; 11: 227-248.
11. Agich GJ. Why should anyone listen to Ethics consultants? The Philosophy of Medicine. In: Engelhardt HT Jr, ed. Copyright 2000, Kluwer Academic Publishers, Netherlands. 117-137.

doi: [10.1007/0-306-47475-1\\_6](https://doi.org/10.1007/0-306-47475-1_6)

12. Biddison LD, Berkowitz KA, Courtney B, et al. Ethical considerations: care of the critically ill and injured during pandemics and disasters: CHEST consensus statement. *Chest*. 2014; 146(4 Suppl): e145S-e155S. doi: [10.1378/chest.14-0742](https://doi.org/10.1378/chest.14-0742)

13. Bradley DT, McFarland M, Clarke M. The effectiveness of disaster risk communication: a systematic review of intervention studies. *PLoS Curr*. 2014; 6.

14. Mathúna D. Research ethics in the context of humanitarian emergencies. *J Evid Based Med*. 2015; doi: [10.1111/jebm.12136](https://doi.org/10.1111/jebm.12136)

15. Ozge Karadag C, Kerim Hakan A. Ethical dilemmas in disaster medicine. *Iran Red Crescent Med J*. 2012; 14(10): 602-612.