

The Academic Health Center in Complex Humanitarian Emergencies: Lessons Learned From the 2010 Haiti Earthquake

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Abstract

On January 12, 2010, a 7.0-magnitude earthquake struck Haiti. The event disrupted infrastructure and was marked by extreme morbidity and mortality. The global response to the disaster was rapid and immense, comprising multiple actors—including academic health centers (AHCs)—that provided assistance in the field and from home. The authors retrospectively examine the multidisciplinary approach that the University of Chicago Medicine (UCM) applied to postearthquake Haiti, which included the application of institutional structure and strategy, systematic deployment of teams tailored

to evolving needs, and the actual response and recovery. The university mobilized significant human and material resources for deployment within 48 hours and sustained the effort for over four months. In partnership with international and local nongovernmental organizations as well as other AHCs, the UCM operated one of the largest and more efficient acute field hospitals in the country. The UCM's efforts in postearthquake Haiti provide insight into the role AHCs can play, including their strengths and limitations, in complex disasters. AHCs can provide necessary intellectual and material resources as

well as technical expertise, but the cost and speed required for responding to an emergency, and ongoing domestic responsibilities, may limit the response of a large university and hospital system. The authors describe the strong institutional backing, the detailed predeployment planning and logistical support UCM provided, the engagement of faculty and staff who had previous experience in complex humanitarian emergencies, and the help of volunteers fluent in the local language which, together, made UCM's mission in postearthquake Haiti successful.

On January 12, 2010, a 7.0-magnitude earthquake struck Haiti. The epicenter of the quake was 25 kilometers west of the country's population-dense capital, Port-au-Prince. The event was marked both by extreme morbidity and mortality and by disrupted infrastructure, including damage to or the destruction of all but one Port-au-Prince hospital.¹ The United Nations has estimated that the earthquake resulted in approximately 225,000 lives lost, 300,000 injuries, and 1.5 million persons (15% of the population) displaced.² The great majority of internally displaced persons (IDPs) sought refuge in one of over 1,300 IDP camps throughout Haiti.³ The international response to the earthquake was immediate and immense. Over 150 nations along with thousands of nongovernmental organizations (NGOs)

contributed money and direct field support.

Academic health centers (AHCs) with faculty and staff trained in disaster management and humanitarian crises also responded. Using the University of Chicago experience in postearthquake Haiti, we illustrate that AHCs have the potential to play a unique and vital role in the context of acute, complex, humanitarian emergencies. Despite notable strides in recent years to develop and systematize the discipline of disaster relief and medical aid—including the establishment of graduate course work and master's programs⁴—engagement by the broader academic and research communities in complex humanitarian emergencies remains relatively ad hoc and unstructured.^{5,6} Nonetheless, several institutions have already described their experiences in disaster settings.⁷⁻⁹

Case Study: The University of Chicago Experience

In late January 2010, the University of Chicago Medicine (UCM), under the guidance of the Global Health Initiative (GHI; see below), mobilized

a systematic, strategic response to help alleviate medical needs resulting from the disaster in Haiti. GHI mobilized internal resources and partnered with multiple external actors, including other AHCs, government organizations, and both international and local NGOs¹⁰ in an effort to help build what became one of the largest acute care field hospitals in Haiti. In addition to efforts at the field hospital, UCM also sent a team of nine medical volunteers to the Hôpital Universitaire de l'Etat d'Haïti in Port-au-Prince, Haiti; however, in this article we focus on the experience at the field hospital in Fond Parisien (Figure 1).

Institutional structure and initial strategy

Within hours of the earthquake, members of the university community expressed an overwhelming interest in responding to the disaster. The university already had a well-established entity, GHI, that fostered interdisciplinary collaboration among faculty, staff, and students involved in global health research, education, training, and service; thus, the UCM administration quickly empowered GHI

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Figure 1 Map of Haiti showing the locations of the University of Chicago Medical Center's two field hospitals in postearthquake Haiti, January to May, 2010: Hôpital Universitaire de l'Etat d'Haiti in Haiti's capital, Port-au-Prince; and the field hospital, the Disaster Relief Center, in Fond Parisien.

leadership through the associate dean for global health to assess the crisis and develop an institutional strategy.

The first step needed to guide the UCM's engagement in postearthquake Haiti was the creation of a multidepartmental Haiti Relief Task Force, including representatives from the medical school, from UCM's administration, from other allied health schools, and from various

UCM offices (e.g., Alumni Relations and Development, Communications; see also Table 1). The first step for the task force—prior to deploying any teams to Haiti—was to assess the dynamic conditions on the ground in order to appropriately leverage the strengths of the university. Through colleagues from the Harvard Humanitarian Initiative who were already in Haiti, members of the task force identified Love A Child,

Inc., an orphanage in Fond Parisien that had no prior relationship to the UCM, to serve as a partner. Local governments in Haiti and the Dominican Republic identified the 60-acre, gated grounds of the orphanage as an ideal site to construct a field hospital, given both its proximity to the Dominican Republic and its road access to Port-au-Prince (Figure 1). Once the task force confirmed with colleagues on the ground that the rural field hospital was indeed a feasible and safe location (fenced and gated), the UCM joined members of the Harvard Humanitarian Initiative (taking and ceding control every two weeks) in sharing the role of incident commander and in managing the field hospital, which the task force and its Harvard partners named the Disaster Recovery Center (DRC). The incident commander role entailed overall leadership for the management of the refugee camp, including security, finance, logistics, planning and maintenance, and daily review of checklists of tasks.

On January 25, 2010, in an effort to clarify the most appropriate role for UCM to play in the acute disaster phase, the first team deployed for two weeks to conduct a rapid field assessment including a careful and detailed evaluation of the safety of the camp grounds and adjoining neighborhood, an assessment of the functioning of the telecommunication system, and an appraisal of the existing relationships with the Haiti government, the Pan American Health Organization, and the U.S. military. Professors and graduate students in the social sciences who had done ethnographic research in Haiti shared relevant information on the history and culture of Haiti with the team members (and with subsequent teams) prior to their deployment(s). The first team comprised a medical expert in complex humanitarian emergencies who is fluent in French, an orthopedic surgeon, an anesthesiologist, and two intensive care nurses of Haitian descent, both of whom are fluent in Creole and French. The selection of these specialists reflected both the task force's initial focus on treating trauma and crush injuries and its understanding that the language skills of multiple team members would be essential to the DRC's success. The first deployed team also carried over 1,100 pounds of medical, surgical, and pharmaceutical supplies, including orthopedic instruments, antibiotics, and pain medications. Additionally, the team

Table 1
Haiti Relief Task Force Division of Labor, January to May 2010

Task	Division (no. of personnel in Chicago involved)
Leadership and administrative support	University of Chicago Medical Center Administration (2) Global Health Initiative (5) Office of Legal Counsel (3)
Medical support	Pharmacy (1) Department of Medicine, including Nursing (2) Department of Surgery (3)
Logistical support	Information Systems (1) Purchasing (2)
Fundraising and public relations	Office of Alumni Relations and Development (2) Medical Center Communications and Marketing (2) Office of Community Relations (1)

brought (via a private plane donated by a Chicago philanthropist and a member of the UCM board of trustees) field equipment such as satellite telephones, temporary lighting, power strips, extension cords, English/Haitian picture dictionaries, and cash. The private plane enabled the first team to carry far more supplies than a commercial flight would have allowed.

Once the first team reported that the DRC would indeed be suitable for future volunteer-based deployments, the task force issued an open call to all university and medical center staff interested in assisting the relief efforts by volunteering for a two-week period in Haiti. Within days, over 200 volunteers responded to the request. Simultaneously, the task force issued a call for financial support for the Haiti relief effort, and the UCM promised a dollar-for-dollar match up to \$250,000.

Systematic Deployment

Volunteer selection. The task force made a concerted effort to match the skills and expertise of volunteers who deployed to the changing needs of the field environment. Volunteer selection for early deployments targeted registered nurses and physicians board-certified in emergency medicine, internal medicine, anesthesiology and critical care, surgery, and orthopedics. Preference went to staff with prior experience working in resource-limited settings and to volunteers with language skills in Haitian Creole and French. The task force coordinated selection with division heads to ensure that the deployment of a staff member did not negatively affect the hospital's ability to provide care for patients at the UCM.

Predeparture. GHI provided volunteers with predeployment information, including a comprehensive briefing document with background information on Haitian culture, history, and language; packing lists; communication plans; and emergency contact information. Prior to departure, volunteers participated in a mandatory briefing session, led by GHI and task force members, meant to set expectations and to provide an open forum for discussion with previously deployed volunteers.

On the ground. During the two-week deployments, GHI provided central operations and staffed a 24-hour

emergency pager, as well as a 24-hour field update and medical inquiry line to provide for the changing needs, including those related to equipment and supplies, of personnel on the ground. In Haiti, daily communication among field-based program staff occurred initially via satellite phones (provided by GHI and the Haiti Relief Task Force) and eventually with restoration of some telecommunications, via text message, phone, pager, and e-mail. Volunteers relayed daily situation reports and requests for supply and personnel needs from the field to the task force in Chicago.

Staff deployed to the DRC field hospital remained on the payroll, and colleagues from their respective departments covered their clinical duties in Chicago. GHI, the UCM, and each individual department agreed on reimbursement plans to provide additional support, as necessary, for departments that had faculty deployed in Haiti.

Postreturn. In addition to the predeparture briefings, GHI and task force members held debriefing sessions for volunteers returning to Chicago. The formal debriefing sessions focused on personal security, medical and operational challenges, and communication difficulties. GHI and task force members used information gleaned from the debriefing sessions to improve care delivery at the field hospital during future deployments. The UCM Department of Psychiatry also offered free mental health services for those requesting additional support.

Field logistics and developing capacity

The volunteer group of doctors and nurses initially deployed to the DRC had the triple role of conducting a quick needs assessment, establishing the field hospital, and providing emergency care. The group faced a myriad of obstacles, including the reality that very little equipment was available or in place to deliver the complex health care they were accustomed to providing. The team improvised; during the response and recovery phase, they converted a large tent into a triage center with 18 cots, and they made use of a handheld veterinarian device in the absence of an X-ray machine to aid in diagnosing and treating patients. Because of the infrastructure in place at Love A Child, Inc., an on-site generator provided

enough electricity for the team to extend work lights to light the triage tent. The generator greatly increased the ability of the UCM volunteers to continue providing clinical care after sunset beyond that which flashlights or headlamps would have allowed. This initial deployed team, in collaboration with a group of Haitian volunteers, eventually extended electrical wiring to light other areas, including the preoperative and postoperative tents, the operating room, and sections of the field hospital designated for patients.

In the early phase of response and recovery, a UCM clinical pharmacist fluent in French converted a schoolroom into a pharmacy in an effort to make the allocation and delivery of medications at the DRC more systematic. A Haitian carpenter assisted in constructing the shelves, tables, and countertops, while the pharmacist trained Haitian volunteer nurses to help with organization and management. Once complete, the pharmacy had the capacity to prepare intravenous medications and intravenous drips to order, to prepare and deliver specific drugs in specific dosage amounts, and to provide pharmaceutical expertise.

In later phases of deployments, demonstrating the skills and resources that an AHC may bring to the field, UCM built a full-scale, sterile operating room in a former schoolroom, complete with HEPA air filters and a C-arm image enhancement device, both generously donated by Philips Electronics. A radiology suite, complete with computer digital imaging capacities, adjoined the operating room.

In addition to the creation of a functioning pharmacy and the upgraded, functional operating room, another unique feature of the DRC was a successful vaccination campaign for the population of the field hospital. Measles is of particular concern in an emergency setting and one of the top priorities in the initial phase of any intervention.¹¹ Extremely high fatality rates have been reported in several cases of complex humanitarian emergencies; however, mortality from measles is highly preventable with effective vaccination.¹² To prevent unnecessary fatalities, the task force and deployed volunteers established protocols and logistics for the administration of the measles vaccine at

the field hospital within the first month of care. In addition to vaccinating the population of young children (aged six months through nine years) at the DRC, field staff provided vaccinations to children at two nearby camps and five clinics in the Fond Parisien area. Volunteers completed an initial campaign in February and provided repeat vaccinations in mid-April.

The eventual scaling up of medical services at the DRC allowed field-based volunteers, with the help of the home (i.e., Chicago)-based task force, to develop referral networks of local providers at other camps, to collaborate substantially with multiple NGOs such as the International Medical Corps, to transfer and receive patients from the U.S. naval hospital COMFORT, to create a unique electronic medical record for each DRC patient, and to engage enhanced radiographic and surgical technologies consultation from the United States.

Response to changing needs

As the ground situation stabilized, the field hospital transitioned to a more comprehensive approach to health care. After the number of patients requiring acute care and surgical interventions decreased, the DRC began to respond to more community-health-care-related needs, such as motorcycle and car accidents, poor prenatal care, and malnutrition, especially in children. The task force reviewed and revised their strategies for subsequent deployments to accommodate those changing patient needs. Reflecting an increase in injury-related disabilities, the systems of deployment later included occupational and physical therapists. These therapists assisted patients (most recovering from orthopedic surgeries) to walk on their own, deal with the loss of limbs, and improve their strength; they also provided support for the patients and their family members.

Final deployments and exit strategy

After three months, nearly 80% of all clinic patients who had recovered from their injuries were ready for discharge from the field hospital. The majority of these patients and their families relocated to an associated IDP camp approximately one kilometer from the field hospital. At that time, the incident commander

collaborated with the UCM to focus the DRC's efforts on the surgical cases in the remaining 20% of patients, who needed follow-up surgeries to remove casts, realign fractures, remove prostheses, and/or close wounds. After this final wave of surgeries, all patients with acute surgical injuries received care to facilitate active physical rehabilitation, and only a few transferred to other hospitals or health centers in Haiti or the Dominican Republic for more specialized surgical interventions.

Eventually, the hospital outlived its initial function of providing emergency response and recovery to those who had massive traumatic and crush injuries. Central to the mission of closing the DRC was the need to ensure that patients with residual and chronic problems were discharged to shelters and care settings where they could maintain their dignity and human rights. In April, the task force sourced and secured food and nonfood items for discharging patients with donations and support from United Nations agencies in Haiti, the world food program, USAID, and other organizations. After careful planning and discussions, the final deployed UCM team transitioned a medical clinic, physical therapy sessions, and chronic wound care to Haitian national staff and medical personnel at the nearby IDC camp, Camp Hope. With these provisions in place, nearly 1,700 individuals (representing both patients and their families) eventually were discharged and housed at Camp Hope. Every discharged person received hygiene kits, cooking materials, and a mattress.

Even after the field hospital in Haiti closed, a team of UCM faculty and staff (who had not previously deployed) began a novel six-month training course for Haitians in disaster management and health surveillance with support from the Pan American Health Organization. The aim of the program was to provide community-based training to Haitians who had been employed at the DRC while also transitioning services to meet the various public health needs of patients and their families now living in IDP camps.

Safety

Although overcrowding, crime, and poor sanitation beleaguered many camps in

Haiti, the DRC remained relatively safe in part because of its rural locale and controlled access. Further, the incidence commanders' prior management experiences, including regular debriefing with leaders and communication with camp personnel in Rwandan and Liberian refugee camps, mitigated safety and hygiene issues at the DRC.

Costs and funding sources

The cost of the Haiti Relief effort were substantial; however, the goal at the time was not cost-effectiveness but, rather, the provision of desperately needed medical care to help the people of Haiti. A private donor paid for the incurred costs of transportation, and other funds came from the UCM and from University of Chicago faculty, students, and alumni.

Outcomes

Volunteer personnel. From January to May 2010, 44 individuals from UCM deployed to the field hospital in Fond Parisien. Including the team that deployed to Port-au-Prince's Hôpital Universitaire de l'Etat d'Haïti, the total UCM Haiti relief effort of medical personnel included physicians ($n = 20$), registered nurses ($n = 16$), physical and occupational therapists ($n = 5$), and pharmacists ($n = 3$). Staff support in the field comprised 7 administrators and 2 personnel members who provided public relations and translation assistance (see Table 2).

Patient care. From the DRC's inception in January 2010 to its closing in May 2010, its staff treated over 2,000 patients and completed 1,500 minor procedures and over 300 major surgeries. Approximately 25% of all treated patients were amputees, and no deaths were reported at the DRC over the four-month period. Mortality during or after transfer to other medical facilities is unknown. In total, all individuals between the ages of six months and nine years at DRC (over 500 individuals) received measles vaccination with vitamin A supplementation. There were no reported cases of measles in the field hospital or in the associated IDP camp.

Capacity. At its peak, the DRC, accommodating—daily—750 patients and attending family members, was estimated to be, according to DRC notes and field notes from meetings with U.S.

Table 2
Deployed University of Chicago Medical Center Volunteers by Training and Location, Haiti, January to May 2010

Training	DRC,* no. (%)	HUEH,† no. (%)	Total, no. (%)
Physicians	15/44 (34.1)	5/9 (55.6)	20/53 (37.7)
Anesthesia	2/15 (13.3)	1/5 (20.0)	3/20 (15.0)
Critical care	1/15 (6.7)	0	1/20 (5.0)
Emergency medicine	6/15 (40.0)	2/5 (40.0)	8/20 (40.0)
Internal medicine	3/15 (20.0)	2/5 (40.0)	5/20 (25.0)
Orthopedics	3/15 (20.0)	0	3/20 (15.0)
Registered nurses	12/44 (27.3)	4/9 (44.4)	16/53 (30.2)
Occupational therapists	1/44 (2.3)	0	1/53 (1.9)
Physical therapists	4/44 (9.1)	0	4/53 (7.5)
Pharmacists	3/44 (6.8)	0	3/53 (5.7)
Administrators	7/44 (15.9)	0	7/53 (13.2)
Translators	1/44 (2.3)	0	1/53 (1.9)
Public relations	1/44 (2.3)	0	1/53 (1.9)

*DRC indicates Disaster Recovery Center, Fond Parisien, Haiti.

†HUEH indicates Hôpital Universitaire de l'Etat d'Haiti, Port au Prince, Haiti.

military commanders and UN agencies (available from the author on request), one of the largest acute field hospitals in Haiti. Over the four-month period, the average daily inpatient census was approximately 270 patients. Including family members and volunteers, the overall DRC population daily average was 1,000 persons.

The Strengths of the AHC

AHCs have the potential to fill a unique niche in emergency efforts. Using this case study, we have shown that academic medical institutions have the ability to leverage the following strengths in a crisis setting:

- institutional structure and global health strategy,
- knowledge of complex health care delivery that is flexible and adaptable to extreme conditions,
- talented faculty and staff from a wide range of backgrounds who are experts in disaster response, various specialties, local languages, and/or teaching and training,
- mandates both to apply evidence-based practices to work and missions and to educate,
- a culture of collaboration, and
- large alumni networks that can help raise necessary funds.

AHCs can draw on known processes of health care delivery, including knowledge of supply chain management, integrated systems management, formal checklists of tasks and best practices, electronic medical records, and advanced modes of communication, to reduce cost and improve patient care. AHCs may lack a priori some in-place, field-based, logistical support systems; nonetheless, the UCM's experience with electronic health records, telecommunication systems, and written protocols at the DRC in Haiti supports research showing that these systems are effective in acute field hospital settings if successfully customized to local needs.¹³

AHCs are known as centers of expertise; their concentration of specialists with a wide range of knowledge and skills enables them to customize the right team of experts (e.g., in the case of the Haiti relief effort, pharmacists, surgeons, anesthesiologists, physical therapists, and medical educators) to provide a comprehensive, tailored approach both to the delivery of care to vulnerable populations and to the provision of skills training to local personnel, even in resource-limited settings. Further, the large human resource capacities of some AHCs allow select faculty to leave their services for extended amounts of time, assured of adequate medical coverage for their domestic patients.¹⁴

Academic medical institutions have a broad mandate that includes applying a research-oriented and methodological approach to daily work and emergent situations. The science of humanitarian crises and disaster medicine has become a formal component of several academic disciplines. Master's degree programs in humanitarian assistance and disaster medicine now exist,⁴ and they are sometimes available as part of graduate residency or postgraduate fellowship training, most notably in emergency medicine.^{7,15} Two of the UCM faculty volunteers applied their advanced graduate or fellowship training (master's degrees or above) in disaster and humanitarian crises management, as well as their field experience in complex humanitarian emergencies in Liberia and Rwanda, to their work at the DRC.

Another aspect of the AHC mandate is to educate. Many faculty and staff at AHCs have experience and expertise in curriculum reform and development in developing countries. Academic institutions with institutional structure and global health strategy have the capacity to provide continued training for local staff as the UCM did in Haiti. Skills training reinforces and enhances the capacity of local staff. Improved, local capacity, in turn, becomes a long-term, durable solution. Additionally, training programs have the added benefit of providing opportunities for AHC faculty, staff, and students to work collaboratively with local staff and learners.

Another strength AHCs can bring to disaster relief is a culture of collaboration, which research shows is necessary during a complex, humanitarian crisis.¹⁶ In the UCM case, a collaborative process enhanced communication across multiple academic departments, which improved response time, decreased redundancy, expanded resource sharing, hastened resource procurement, and augmented the university's ability to provide tailored, comprehensive care. Collaboration outside of the medical center with other university departments also allowed UCM to provide a more contextualized and nuanced approach. Faculty expertise on the history and culture of Haiti based on anthropology work was also important in preparing the teams for deployment.

Finally, as illustrated by the UCM case, AHCs can harness a large network of alumni and other supporters to successfully mobilize financial and material donations to support efforts and needs in the field.

The Limitations of the AHC

Although their advanced health care delivery systems, their mandate to provide health education, their spirit of collaboration, and their network of supporters all increase the capacity of AHCs to respond to complex humanitarian crises, these advantages must be weighed against the limitations inherent in some large academic medical institutions. Historically, AHCs have been slow to react to global disasters. Unlike established humanitarian NGOs, large AHCs have limited experience in providing logistical support to relief efforts. Many lack both prior ground presence and the infrastructure to deploy materials and individuals as quickly as their NGO colleagues can. Thus, the fluidity of the ground environment may pose some operational and temporal challenges. Some AHCs, however, may have the infrastructure or resources to deploy relief quickly. For example, several faculty members with robust field experience in limited-resource settings, strong preearthquake partnerships with AHCs and NGOs on the ground (through the GHI), volunteers with fluency in Creole and French, and a burgeoning global health program that could act as a control center allowed the UCM to quickly identify and mobilize both resources and volunteers.

In general, funding streams that provide support for the kinds of programming that NGOs initiate in the field have not made their way to AHCs. Traditionally, AHCs have not been able to provide the kind of *internal* and initial funding needed to respond quickly to a disaster; usually, they must wait until *external* funding streams become available. The University of Chicago was able to react quickly because of funding from private donors and support from the UCM that allowed staff and faculty to volunteer on payroll during the four-month effort.

Unlike NGOs, AHCs have competing interests that have little to do with

disaster management. AHCs have a mandate to allocate resources responsibly in order to serve populations seeking care at their home institutions. At the same time, the academic medicine community has become increasingly interested in global health and aware of their responsibility and connection to populations around the world. As a result, AHCs have begun to strengthen and expand the care provided in remote locations.

Lessons Learned

The UCM does not have an extensive history of intervening in complex humanitarian emergencies; however, the experience in Haiti indicates that the UCM is uniquely poised to do so in future crises, and its experiences may provide lessons for other AHCs.

The existence of a formal global health program (such as, in the case of UCM, GHI) provides an institutional framework for responding to disasters. Having an existing global health unit promotes partnerships, which help AHCs maximize impact while avoiding duplication.

Academic institutions have embraced and should continue to embrace the mandate to provide expert medical care, through such means as building on the capacities of existing institutions and organizations that are already well equipped to respond to humanitarian emergencies. The technical expertise provided by AHCs can augment the benefit that such organizations (e.g., NGOs) can effect in the delivery of care during an acute medical response.

Piecemeal approaches focused solely on NGOs whose volunteers in the field may lack training are unlikely to improve the basic health of the Haitian people,¹⁷ and the continued presence of foreign physicians may hamper the growth of Haiti's medical system.¹⁸ AHCs and other institutions or organizations that respond to disasters should seek approaches that include training local personnel and/or that otherwise reflect the growing science of providing care both during complex humanitarian emergencies and after the acute phase has passed.

The global response to the Haiti earthquake among AHCs provides a

unique opportunity to learn from and prepare for future responses. The UCM Haiti Relief Task Force has since evolved into a permanent emergency response task force at the UCM. AHC leaders should reflect on their institutions' responses to disasters, and they should work to prioritize and continually improve their institutions' capacity to respond to future complex humanitarian crises.

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