

Spinal Cord Injury in Postearthquake Haiti: Lessons Learned and Future Needs

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Just before 5 PM on January 12, 2010, a 7.0 earthquake struck Haiti, a Caribbean nation that shares the island of Hispaniola with the Dominican Republic. The epicenter was approximately 10 miles southwest of Port-au-Prince, the capital of Haiti. Port-au-Prince is the country's largest city and is an overcrowded, sprawling urban center with a population before the earthquake of approximately 3 million people, including the surrounding areas. The earthquake was devastating and more than twice as lethal as any previous magnitude 7.0 event [1]. Precise totals will never be known, but current United Nations estimates are 250,000-300,000 deaths, which is more than twice that of the atomic bomb dropped on Hiroshima at the end of World War II [2]. In addition, there were 300,000 injuries and 245,000 buildings were destroyed (Figure 1), which rendered 1.5 million Haitians homeless, most of whom are now living in tent cities [1-3].

Before the earthquake, Haiti was the poorest nation in the Western Hemisphere and was ranked 149 on the 2009 Human Development Index [4]. The existing health care system was tenuous, and the majority of Haitians did not have access to regular health services. Although the response from the international community was swift and massive, first responders were still placed in the unenviable position of having to ration medical care because the sheer magnitude of the tragedy outstripped available resources. Some facilities decided not to treat catastrophic injuries, such as spinal cord injuries (SCI), because of the resource intensive needs of these patients, perceived low survival rates, and "minimal chance of ultimate rehabilitation . . ." [5]. Nevertheless, despite the challenging circumstances, initial efforts led to the stabilization and survival of many individuals with injuries that would have likely been life-threatening in pre-earthquake Haiti.

Before the earthquake, individuals living with severe SCIs were largely nonexistent in Haiti. Although the exact number and survival rate before the earthquake is unknown, the feeling among rehabilitation professionals with long-standing involvement in Haiti is that individual cases were sporadic and that persons with severe injuries, if they survived the initial injury and acute period, typically died within the first 1-2 years. This would be consistent with other developing nations. Under these circumstances, there was little need for expertise in the delivery of care to individuals with SCIs. Likewise, there were no true inpatient rehabilitation beds for individuals with SCI.

The events of January 12 led to an unprecedented number of SCIs. A preliminary report by Handicap International estimated that there were more than 100 survivors with SCIs [6]. The number is now thought to be closer to 150 despite the fact that most persons with cervical injuries did not survive. The situation was compounded by damage to medical facilities, for example, the General Hospital in Port-au-Prince. An undetermined number of persons with SCIs were transferred to facilities outside Haiti, including the United States. Given that acute care facilities were stretched beyond their capacity, an urgent need arose for patients to be discharged to alternative settings once stabilized. Under these difficult and dire circumstances, 3 organizations established SCI units to address this pressing need: Haiti Hospital Appeal (HHA) in Cap-Haitien (northern Haiti), Project Medishare/University of Miami in Port-au-Prince (central Haiti), and St. Boniface Hospital in Fond-des-Blancs (southern Haiti). Currently these facilities are caring for approximately 60 individuals with SCI.

Two authors (A.S.B., M.D.L.) were recently part of an interdisciplinary team from the Toronto Rehabilitation Institute (TRI) that, in partnership with Team Canada Healing

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Figure 1. An onlooker views what is left of a large collapsed building in Port-au-Prince after the earthquake. The interior rooms are readily visible. Photograph courtesy of Colleen O'Connell.

Hands and Healing Hands of Haiti International, provided care for 19 individuals with SCI at the HHA for a period of 2 weeks. TRI has subsequently sent 3 additional teams for consecutive 2-week rotations for a continuous 8-week presence. HHA has 2 buildings where the patients with SCI are housed in barrack conditions, and family members, many of whom are homeless, live at the bedside and share common facilities. Staffing is a combination of Haitians and dedicated volunteers predominantly from the United Kingdom and New Zealand. As anticipated, the stories were heart wrenching and compelling. Our patients had routinely been trapped in the rubble for hours before being freed by family, friends, and neighbors. Spinal precautions were not possible. On some occasions, this was followed by hours or days spent in fields, lots, and other places before formal medical assessment occurred. This was typically followed by a convoluted journey through a variety of medical facilities, including institutions in the Dominican Republic.

Not surprisingly, stage IV pressure ulcers were common, which often precluded mobilization. Upon our arrival, the majority of patients were improving with proper nutrition and ongoing attention to nursing care and pressure relief, which highlights the continued importance of hands-on, low-tech service provision. HHA was originally established as a maternal and pediatric facility, and as result, physician staffing was composed of Haitian pediatricians. The absence of SCI-specific expertise was apparent because most patients had indwelling urinary catheters, and many others were impacted with stool and/or had varying degrees of urinary retention. We initiated bowel programs and intermittent catheterization; however, training and sensitization of staff and patients to the importance of these issues that will require attention and persistence in the months ahead. Staff

and patients alike also had trouble grasping the prognostic implications of a severe SCI, which was accompanied by a general reluctance to discuss such issues for fear it would demoralize the patients. Addressing prognosis proved to be a challenge given the lack of formal psychological supports and our desire to respect cultural beliefs and attitudes. Later, the involvement of a Haitian rehabilitation specialist, who spoke Creole and French, proved invaluable for initiating this important dialogue in an appropriate and sensitive manner.

Diagnostic services (laboratory and imaging) to guide decision making were limited. For these reasons, infections were routinely treated empirically. Volunteer helicopter services were available, and we were able to obtain plain radiographs by transporting patients to a full-service hospital in Milot (Hôpital Sacré Coeur) operated by the Crudem Foundation, a U.S. based nongovernmental organization. The roads precluded ground transportation. Many patients had not had the benefit of surgical spine stabilization, which would be analogous to many low-resource environments and the early days of spinal cord medicine. Despite this, imaging studies of the spine typically revealed significant callus formation, because it was more than 3 months after the earthquake. We were able to initiate cautious mobilization for many individuals by using spinal orthoses (often shared among patients) and the avoidance of spinal flexion and extension. RoughRider wheelchairs (Whirlwind Wheelchair International, San Francisco, CA) designed for environmental conditions common to low-income countries also have been obtained for all patients.

There were many interesting clinical observations that contrasted with the patterns typically observed in North America. Most striking was that only 1 individual of 19 had a cervical SCI (C6 motor complete), which probably reflects the initial survival rates. Typically, cervical injuries comprise



Figure 2. A wheelchair inaccessible community in the northern town of Cap-Haitien, which was unaffected by the earthquake. Photograph courtesy of Annie Rangecroft.

approximately half of SCIs in North America [7,8]. High thoracic injuries were also uncommon with the majority of injuries involving the low thoracic or lumbar spine. High thoracic injuries are often accompanied by significant internal injuries that can also impact survival. Thirteen of the 19 individuals had motor complete SCIs (American Spinal Injury Association Impairment Scale grade A or B), in accordance with the International Standards for Neurological Classification of SCI [9].

The long-term challenges are daunting but not insurmountable. Although community reintegration is the ultimate goal of rehabilitation, the reality is that the urban and rural environments of Haiti were largely inaccessible to individuals with severe mobility impairments even before the earthquake (Figure 2). Most roads are unpaved, and a typical home might be a 1-room cinder-block structure with a corrugated tin roof and dirt floor. Many wheelchair-dependent individuals would essentially be confined to their immediate shelter. Accessible facilities and communities, therefore, will need to be built to accommodate nonambulatory persons. Ideally, this would incorporate housing for family supports, as well as options for vocational and recreational activities. Systems will also need to be devised to ensure availability of ongoing follow-up for SCI-specific complications, such as neurogenic bladder dysfunction and pressure ulcers. A coalition of local organizations, including the 3 SCI units, is beginning to tackle these tough issues; however, the ongoing assistance and support of the international community will be essential to their success.

Fiscal resources and clinical expertise are urgently needed. Specifically, money is needed to design and construct accessible housing, as well as provide ongoing logistical support for volunteers. Clinical expertise will be central to maintaining the long-term health of affected individuals through the provision of direct patient care and training of Haitian clinicians (capacity building).

Our experience in Haiti provides valuable lessons for future disaster relief efforts. Improved rapid response efforts will be accompanied by the increased survival of individuals with major impairments and with long-term, longitudinal medical, and rehabilitative needs. Early postdisaster planning, therefore, should routinely incorporate concepts such as patient cohorting and staff training, the structured procurement of required rehabilitation expertise, the provision of accessible shelter and community re-integration, and a commitment to long-term follow-up. There is an important ethical dimension to preserving life and in knowing that the individual will have life-long impairments. Postearthquake Haiti serves as a reminder that it is not only important to save life but also to improve function, independence, and quality of life for the fortunate who survive.

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