Upper Limb Prosthetic Services Post Haiti Earthquake: Experiences and Recommendations of Haiti-Based Rehabilitation Program

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ABSTRACT

The World Report on Disability 2011 estimates that 0.5% of the population in developing countries is in need of prosthetic and orthotic services. However, in such environments, access to services and availability of data to support interventions are severely lacking. The 2010 earthquake in Haiti raised international awareness on the issue of persons with amputation in low-resource and disaster settings. At the same time, a rapid influx of humanitarian responders to provide prosthetic services occurred. Although efforts were not well coordinated with identified leads for the disaster response, many individuals in Haiti benefited from improved access to such services. However, most efforts focused on lower-limb amputations. Herein, we report on the experiences of a nongovernmental nonprofit organization in providing upper-limb prosthetic services in Haiti 2010–2011 (n = 181), with a focus on recommendations for ongoing and long-term support of regionally based prosthetics training programs. (J Prosthet Orthot. 2012;24:77–79.)

KEY INDEXING TERMS: upper limb, prosthetics, Haiti, earthquake, low resource, training

HISTORY OF PROSTHETICS IN HAITI

The International Society for Prosthetics and Orthotics (ISPO) and the World Health Organization (WHO) have estimated that people needing prostheses or orthoses and related services represent 0.5% of the population in developing countries. In pre-earthquake Haiti, there was a paucity of data available on persons with amputations, although it was recognized that the services available were not sufficient to meet the needs of the population. In one survey, the most common cause of amputation was infection, followed by motor vehicle accidents, and only 25% of persons had received prosthetic rehabilitation.

At the time of the earthquake, Healing Hands for Haiti (HHH) operated the only full-time prosthetics and orthotics laboratory, with on-site rehabilitation therapy and medical services. Six technicians had been trained in an apprenticeship format through visiting expatriate-certified prosthetists/orthotists (CPOs), and by December 2009, participation in a credentialed training program through Don Bosco University in El Salvador was in the process of being finalized through a collaborative effort of Healing Hands, Physicians for Peace, and the International Committee of the Red Cross—Special Fund for the Disabled (ICRC-SFD).

Polypropylene technology with modular componentry and custom sockets was the primary type of prostheses fabricated in the Healing Hands clinic. The decision to use this method was based on over 10 years of experience in the country with prosthetics and orthotics services, which included long-term follow-up of patients, training of community-based rehabilitation workers and technicians, and an evaluation of durability, acceptability, and affordability of the devices. A system that could be fitted, modified, repaired, and replaced in Haiti by local technicians at an affordable cost was felt to be superior to alternatives such as fabrication out of country or short-term “full-service” clinics and workshops conducted by expatriate visitors. Consultation with the ICRC-SFD was essential in providing guidance and ultimate support throughout this process.

Upper-limb amputations had typically been managed with direct assistance of visiting CPO mentors, often with components being transported from the United States or Canada, and fabrication and fitting occurring over a succession of visits by international CPOs. Our experience has been that aesthetics are important and split-hook terminal devices are not well received. Despite progress with lower-limb services, the capacity to manage upper-limb needs remained extremely limited at the time the earthquake struck.

THE EARTHQUAKE AND AMPUTATIONS

On January 12, 2010, a 7.0-magnitude earthquake struck near the capital of Haiti, a Caribbean nation typically referred to as “the poorest country in the Western Hemisphere.” The devastation was profound, and with more than 300,000 injured, the need for urgent and emergent rehabilitation services was paramount. Rapid hospital survey and evaluation of catastrophic injuries conducted by Handicap International in the 2 weeks following the earthquake identified amputations as an emerging issue, with lower-limb amputations comprising the
Table 1. Breakdown of levels of amputation observed in 107 consecutive patients with amputations examined in 17 field hospitals between days 3 and 17 after earthquake

<table>
<thead>
<tr>
<th>Level of amputation</th>
<th>No.</th>
<th>Percent</th>
</tr>
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<tbody>
<tr>
<td>Below knee</td>
<td>27</td>
<td>25</td>
</tr>
<tr>
<td>Above knee</td>
<td>46</td>
<td>43</td>
</tr>
<tr>
<td>Upper limb</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>Unspecified</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>107</td>
<td>100</td>
</tr>
</tbody>
</table>

| Distribution of levels (N = 107) |

Amputations made up 35% of in-hospital injured in need of immediate physical rehabilitation.²

The majority (Table 1). Early estimates of more than 2,000 persons newly amputated as a result of injuries and secondary complications,² coupled with significant media attention, led to an unprecedented international response, with more than 20 organizations pledging support for prosthetic services. Coordination of these actors represented significant challenges, and many groups did not seek to collaborate with the WHO-designated leads for rehabilitation or with those providers already operating in the country pre-earthquake. This led to many types of fabrication techniques, prosthetic components, and service delivery models, including some that functioned exclusively of any national provider. Because the HHH clinic was destroyed, HHH partnered with Handicap International (HI) and began operation of the joint Physical Rehabilitation Centre (PRC) in February 2010. Pre-earthquake local staff members were joined by expatriate volunteers and staff to continue provision of limbs with polypropylene technology along with rehabilitation therapy, delivered by local staff complemented by expatriate mentors. By June 2010, more than 200 patients received limbs at the PRC. Nationwide, an estimated 600 patients had been fit by the various providers.

Ultimately, the estimated number of persons surviving with earthquake-related amputations in Haiti was revised to 1,200 to 1,500; and by approximately 6 months post earthquake, more than half of those had received lower-limb prostheses, a response not seen in any other recent natural disaster of this magnitude.

Upper-limb loss was not prioritized by any of the organizations, although the HHH/Hi clinic (PRC) initiated evaluations for need and type of upper-limb prostheses in the 12 weeks following the earthquake. Once the emergency phase of services provision was completed, introduction of upper-limb fitting and technician training began. We present here the early results of the upper-limb amputation program provided by HHH and Handicap International in the aftermath of the 2010 earthquake.

**UPPER LIMB PROGRAM**

As of September 31, 2011, 160 persons with upper-limb loss have been evaluated by an occupational therapist at the HHH/Hi PRC, and as of December 2011, there were 181 patients (beneficiaries) registered in the PRC database. The average age of patients was 30 (3–72) years, with a gender breakdown of 81 females and 100 males. Of the 76 patients with data on cause of amputation, 56 cited the earthquake. Data on level of amputation were available for 147 patients, with 11 having shoulder disarticulation, 50 with transhumeral amputation, 5 with elbow disarticulation, 67 with transradial amputations, 9 with bilateral amputations, and 5 with finger/hand amputations.

Each beneficiary first attends a peer group session facilitated by a rehabilitation assistant who also has an upper-limb amputation. The format includes psychosocial discussion and review of various prosthetic options to assist in the decision on whether to proceed with fitting and rehabilitation. If the beneficiary decides to be fitted with a prosthesis, an occupational therapist and prosthetist will then evaluate and determine prosthetic prescription, and the fitting follows. After fitting, the beneficiary will have a minimum of four training sessions (Figure 1A and 1B) and will continue to participate in the peer support group sessions.

A total of 9 patients have been provided with a prosthesis and received associated training, 5 are awaiting arrival of components, and 50 are identified to start the next round of provision. All fitting, fabrication, and rehabilitation therapy are done at the HHH/HI PRC.

The reason cited by the majority of beneficiaries for wanting a prosthesis is aesthetics. Mothers will wear a functional device to assist with child care and domestic tasks. Persons with bilateral amputations will use functional devices for most activities of daily living, including toileting.

Upper limb sockets have been both ICRC polypropylene or laminated using Otto Bock acrylic resin. Componentry is a combination of Otto Bock from Germany and Hosmer in the United States. Two HHH local technicians have participated in 2-week intensive upper-limb training at Don Bosco P&O program, sponsored by ICRC-SFD. These technicians actively participate in the upper-limb prostheses service delivery under the direction of expatriate prosthetists.

Challenges include the high cost of components, difficulties with importation and customs, limitations with no Haitian-credentialed P&O staff, and the ongoing cultural stigmas related to acceptance and utilization of prosthetic limbs. Initiatives that have been helpful include the involvement of...
expatriate occupational therapists with locally trained staff, who together facilitated numerous peer support group sessions providing psychosocial and community support. Local adaptive aids fabrication and supply sources, further training for people supplied with a prosthesis, and outcome evaluation options should also be considered.

DISCUSSION
We were directly involved with emergency efforts responsible for rapid assessment of catastrophic injuries requiring emergent rehabilitation services, including prosthetics. We directly examined patients in 17 field and hospital settings in the 3 weeks following the earthquake and interviewed surgical staff at each site. We had been working in Haiti in P&O services and training for 10 years before the earthquake and have had ongoing presence in Haiti since the earthquake through routine visits and medical advisor to HHH (C.O.) and onsite as director of P&O for HHH and country director HHH (A.I.). We fully concur with the current estimates of earthquake-related amputations. We emphasize that both pre-earthquake and ongoing, there are significant number of persons with amputations requiring prosthetic and rehabilitative services. The earthquake has resulted in increased international awareness of the needs and challenges experienced by persons affected by disability in Haiti and the recognition by the government of Haiti that a national strategy for both education and training in the rehabilitation professions and for health services are needed, including P&O.

CONCLUSION
Organizations involved in P&O services should work in partnership with the government ministries, Secretary of State for Inclusion of People with Handicaps (SEIPH), and disabled persons organizations to collaborate in data collection and dissemination to better inform direction of training and service delivery. In keeping with the ISPO/WHO 2003 statement on the relationship between prosthetics and orthotics services and community-based rehabilitation, training of community rehabilitation workers should complement formal training programs of Category I–III personnel, not replace them. Therefore, formalization of credentialed training programs for Haitian P&O staff is a priority of HHH and the ICRC-SFD.

Haiti remains a country where life for many remains a day-to-day challenge. A physical disability impacts one’s ability to care for self and family, and with limited national resources in assistive technologies and rehabilitation, an amputation impacts survival. The earthquake in Haiti has resulted in an increase in opportunities for persons with amputation to receive prosthetic rehabilitation. It is imperative that coordinated international efforts continue to support the development and delivery of credentialed P&O training programs and accessible services throughout the country, not only for earthquake victims but also for all persons affected by disabling conditions.

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