

UNISDR Scientific and Technical Advisory Group Case Studies - 2015 Ethical dilemmas with amputations after earthquakes

The problem

Medical needs after natural disasters are varied and complex. Earthquakes frequently lead to bone fractures and other limb injuries, some of which may require surgery. This often leads to the 'surgeon's dilemma.' [1] Deciding to amputate or not requires balancing the *pros* and *cons* of amputation (with reduced risk of infection and crush syndrome but increased disability) against procedures which attempt to save the limb (with increased risk of infection and crush syndrome but potentially less disability). In addition, limb preservation may require several and longer procedures, leading to fewer patients being treated overall. This raises ethical questions about the just allocation of resources and balancing the good of an individual against the common good. On top of this, cultural issues may arise where patients refuse a needed amputation preferring to risk death over loss of a limb. [2]

The impact of non-medical factors on amputation decisions was seen in Haiti after the 12 January 2010 earthquake. This 7.0-magnitude earthquake led to an estimated 222,570 deaths and 300,000 injuries. [3] Approximately 1500 people received amputations. [4] Within a month of the earthquake, more than 600 organisations were in Haiti providing emergency humanitarian relief, with over 450 organisations addressing health needs. [5] The number of organisations carrying out amputations is unknown, but one study documented 44 foreign medical teams (FMTs) providing surgery. [6] This influx of foreign medical aid created what has been called 'a wild market rather than coordinated help' with survivors 'shopping around' to find what they perceived as the best treatment. [1] Such issues led to calls for best practice guidelines for amputations in disasters and humanitarian emergencies.

The science

Evidence is lacking to address many of the questions raised in relation to the response to Haiti's catastrophic 2010 earthquake. Some reviews have been conducted, but data are often missing because records were not kept. [7] A prospective study [7] found that only half of those undergoing limb

surgery, whether amputation or with limb preservation, were satisfied with the results. Stump revision surgery was required in 30% of amputees, while in high income settings this is usually necessary in only 5.4% of patients. [7] Perceived functional status worsened as time went on. All of those whose limbs were preserved, and 79% of those amputated, stated that they would choose limb preservation if amputation could be avoided. [7]



Surgery in Haiti 2010; photograph by Johan von Schreeb

A retrospective study collected qualitative and quantitative information about earthquake-related surgical procedures carried out in the 3 months after the earthquake and on rehabilitation services provided up to 10 months after the earthquake. [1] The authors acknowledge significant limitations, primarily due to important data being



External fixation, Haiti 2010; photograph by Johan von Schreeb

unavailable and inconsistent descriptions. Data were collected from seven large Foreign Medical Teams (FMTs) conducting over ten thousand procedures including 1,476 amputations. Qualitative interviews were carried out with 82 patients receiving amputation rehabilitation services. Even with its limitations, the study showed widely varying amputation rates. In one FMT, amputation accounted for less than 1% of the procedures, but in another it was over 45%. [1] However, information on how patients were selected was not available. By comparison, the first FMT in place after the earthquake had an amputation rate of 13% in the four months after the earthquake. [3] Findings suggested that newly arrived FMTs were more likely to amputate than those already in the field. One FMT described a patient being subjected to inappropriate surgery by a newly arrived FMT composed of what were called 'disaster tourists.' [8] Other evidence shows that amputations were carried out when limbs could, and should, have been salvaged. [7]

In addition to medical support, psychosocial support is necessary to address grief over the loss of limb, loved ones, and earning capacity, and also to prepare for possible ostracism, stigmatisation and other psychological difficulties. [9] Family and community support for amputees is important for successful rehabilitation, but complicated in disaster settings. After surgery, amputees will need follow-up care, monitoring, support and, when appropriate, assistive technology or prosthesis provision. Sometimes these services are not available. Family and community integration can be a significant challenge and therefore needs to be discussed at all stages of amputation decision-making. Without addressing all these challenging issues, and when FMTs arrive without appropriate and diverse resources, difficult ethical decisions become even harder.

The application to policy and practice

To address problems with quality of medical care in disasters, the World Health Organization (WHO) published a classification system and minimum standards for FMTs providing trauma and surgical care in sudden onset disasters. [9] These provide benchmarks against which FMTs can measure themselves and be held accountable. Each FMT would register itself as Type 1, 2 or 3 depending on its capacity and capability to provide various services. These recommendations follow on from others issued by the Humanitarian Action Summit (HAS). [4]

Did it make a difference?

Such guidelines aim to encourage accountability, consistency and quality of care in austere circumstances, including amputation after earthquakes. Foreign medical teams intend to provide much-needed medical care after disasters, but good intentions are not enough. Standards of professionalism and ethics must be upheld even when other resources are lacking. Such guidelines are based on ethical principles, such as the importance of caring for patients' varying needs. This places an ethical responsibility on FMTs to be multidisciplinary so they can ensure all aspects of surgery and rehabilitation are addressed. Triage must include examination of short-

term and long-term outcomes. For example, when people are crushed in earthquakes, 'crush syndrome' can develop where muscle breakdown releases biochemicals that cause kidney failure. Such patients' survival is greatly reduced if dialysis is not available, making them poor candidates for surgery and amputation after earthquakes.[10] However, there is limited evidence available to guide optimal treatment for such crush injuries.[11] A key recommendation related to evidence and guidelines is that even in disasters, medical records should be established, especially for amputation patients. For each amputation a score sheet should be filled out that clearly indicates the status of the injured limb and documents the reasons why an amputation was necessary.[9] In Haiti, these were often inadequate and hampered efforts to evaluate the effectiveness of different interventions.[1]

Another ethical dilemma is whether amputation should proceed in disaster settings when standard medications are not available. The HAS guidelines concluded that amputation 'must never proceed in the absence of effective anesthesia (general or regional) and analgesia.' [4] Access to effective anaesthesia is a human right and evidence-based guidelines exist for its provision, even in resource-limited areas.[12] This places a responsibility on disaster responders to plan for adequate anaesthesia and pain management before deployment. When disaster planning and response is uncoordinated, as happened in Haiti, amputation can be carried out hastily and inappropriately. [4] Conventional indications for amputation should be adhered to as much as possible, even in disaster settings.

Further work is needed to develop and evaluate professional standards of care for surgery after disasters. One initiative where such guidelines have been adopted is the World Health Organization (WHO) Foreign Medical Teams Working Group.[13] This group, headed by WHO, aims to define minimum professional standards for FMTs in sudden onset disasters. In 2013, they outlined technical standards for surgery that any FMT should adhere to. Their work is on-going and procedures for how teams can adhere to standards in relation to their mandates and in extreme circumstances is being developed. The system was used in 2013 after Typhoon Haiyan in the Philippines, and evaluation of its impact is ongoing, but proofing to be very difficult because data on adherence, outcomes and impact are rarely collected or shared by FMTs. It is clear that in humanitarian missions, good intentions are insufficient and must be accompanied by measures to document the outcomes of potentially life threatening interventions such as surgery.

An amputation can be a life-saving procedure that gives an earthquake survivor another chance at a satisfying and productive life. It can also lead to long-term pain, debilitating disability and social stigma. An amputation is not over after surgery, and a clear plan must be developed for all patients that includes rehabilitation and access to prosthesis. To improve the chances of a satisfying outcome, more data must be collected during disasters and carefully analysed afterwards to help improve standards of care. Much more evidence is needed to identify the most effective and safest procedures and interventions, both for the surgical procedures themselves and for all aspects of the multidisciplinary care required. While the earthquake in Haiti led to mistakes in the humanitarian response, it has also provided a stimulus to provide evidence and guidelines that will improve future earthquake responses.

References

1. Redmond AD, Mardel S, Taithe B, Calvot T, Gosney J, Duttine A, Girois S. A qualitative and quantitative study of the surgical and rehabilitation response to the earthquake in Haiti, January 2010. *Prehospital & Disaster Medicine* 2011;26(6):449-456.
2. Iezzoni LI, Ronan LJ. Disability legacy of the Haitian earthquake. *Annals of Internal Medicine* 2010;152(12):812-814.
3. Hotz G, Ginzburg E, Wurm G, et al. Post-earthquake injuries treated at a field hospital — Haiti, 2010. *Morbidity and Mortality Weekly Report (MMWR)* 2011;59:1673-1676.

4. Knowlton LM, Gosney JE, Chackungal S, et al. Consensus statements regarding the multidisciplinary care of limb amputation patients in disasters or humanitarian emergencies: Report of the 2011 Humanitarian Action Summit Surgical Working Group on amputations following disasters or conflict. *Prehospital & Disaster Medicine* 2011;26(6):438-448.
5. de Ville de Goyet C, Sarmiento JP, Grünewal F. Health response to the earthquake in Haiti, January 2010. Lessons to be learned for the next massive sudden-onset disaster. Pan American Health Organization (2011) <http://new.paho.org/disasters/dmdocuments/HealthResponseHaitiEarthq.pdf>
6. Gerdin M, Wladis A, von Schreeb J. Foreign field hospitals after the 2010 Haiti earthquake: How good were we? *Emergency Medicine Journal* 2012;30:e8.
7. Delauche MC, Blackwell N, Le Perff H, Khallaf N, Müller J, Callens S, Duverger TA. A prospective study of the outcome of patients with limb trauma following the Haitian Earthquake in 2010 at one- and two-year (The SuTra2 Study). *PLOS Currents Disasters* 2013 Jul 5.
8. Van Hoving DJ, Wallis LA, Docrat F, De Vries S. Haiti disaster tourism—A medical shame. *Prehospital & Disaster Medicine* 2010;25(3):201-202.
9. Norton I, von Schreeb J, Aitken P, Herard P, Lajolo C. Classification and minimum standards for foreign medical teams in sudden onset disasters. World Health Organization (2013) http://www.who.int/hac/global_health_cluster/fmt_guidelines_september2013.pdf
10. Merin O, Ash N, Levy G, Schwaber MJ, Kreiss Y. The Israeli Field Hospital in Haiti — Ethical dilemmas in early disaster response. *New England Journal of Medicine* 2012;362:e38.
11. Gerdin M, Wladis A, von Schreeb J. Surgical management of closed crush injury-induced compartment syndrome after earthquakes in resource-scarce settings. *Journal of Trauma and Acute Care Surgery* 2012;73(3):758-764.
12. Size M, Soyannwo OA, Justins DM. Pain management in developing countries. *Anaesthesia* 2007;62(Suppl 1):38-43.
13. World Health Organization. Foreign Medical Teams Working Group - http://www.who.int/hac/global_health_cluster/fmt/en/