



Humanitarian surgical care delivery: lessons for global surgical systems strengthening

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Abstract: Humanitarian crises can occur during armed conflict, natural disasters, and epidemics, and may result in injuries and neglected surgical conditions requiring operative intervention. This article describes surgical delivery by humanitarian medical organisations (HMOs), and examines their contribution to global surgical systems strengthening. Two HMOs, Médecins Sans Frontières (MSF) and the International Committee of the Red Cross (ICRC), are used to illustrate these concepts. During humanitarian surgical delivery, HMOs can strengthen local hospital infrastructure by improving laboratory and X-ray services, emergency units, operating theatres, and other critical hospital infrastructure. Collaboration with the local Ministry of Health and the multitude of international actors is critical to provide effective, time-sensitive surgical care. Furthermore, effective collaboration can lead to knowledge sharing and innovative solution building. HMOs have worked to improve the quality of care in resource-constrained settings by establishing protocols and minimum standards for care, such as the need for clean water, sterile instruments, and the availability of blood products. HMOs have also been instrumental in training the local workforce in critical surgical and anaesthesia skills, as well as offering training courses to international staff to bridge the gap in humanitarian surgical needs. On the other hand, HMOs can detract from local surgical health system strengthening by inadvertently competing with local human resource recruitment. In addition, there is a paucity of routine and systematic data collection and research in humanitarian surgery. Research in this field could be used to define the burden of surgical disease during humanitarian crises, improve programmatic planning, and contribute to the collection of global surgery indicators. HMOs should only be a temporary measure and their provision of surgical care should not replace sustainable national- and local-surgical solutions. However, HMOs can provide necessary care when local health systems are overwhelmed during crises, and contribute to local surgical systems strengthening by improving hospital infrastructure, establishing protocols and minimum standards of care, and training the local workforce.

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Introduction

In 2019, 167 million people needed humanitarian assistance worldwide (1). Humanitarian settings span the globe and often stem from armed conflict, natural disasters, and epidemics. These crises can be acute or protracted, placing additional burdens on already fragile states and health systems (1). The populations living in these settings are vulnerable to increased health care needs, including conditions requiring surgical care. Armed conflict can result in traumatic injuries from gunshot and knife wounds, mines, and bombs. Falling debris and collapsing infrastructure during natural disasters can lead to fractures, and crush and de-gloving injuries. Pandemics, such as COVID-19, can lead to neglect of baseline surgical conditions (2). For example, as a result of the COVID-19 pandemic, an estimated 28 million elective surgeries would be postponed or cancelled globally (3). Additionally, humanitarian crises can lead to poor water quality and sanitation (4,5), increasing the risk of infectious surgical conditions, such as abscesses and intestinal perforations from typhoid fever.

Many low- and middle-income country (LMIC) health systems are fragile and underdeveloped. During humanitarian crises, the fragility of these systems become exacerbated (6,7). In humanitarian settings where public health systems are insufficient, humanitarian medical organisations (HMOs) provide health care, including surgical care, for vulnerable populations. Although both HMOs and other non-governmental organisations (NGOs) provide surgical care in LMICs, HMOs often focus on acute surgical needs during or after humanitarian crises.

Numerous HMOs provide humanitarian surgical care, although their activity is often not described in the published literature. A recent study cited at least 37 organisations (8), although there are likely many more. Two large HMOs that provide humanitarian surgical care and have published widely about their activity are Médecins Sans Frontières (MSF) and the International Committee of the Red Cross (ICRC). In 2018, MSF performed 104,700 humanitarian operations in over 20 countries and ICRC conducted 159,813 operations (9,10). The focus of this article will be to describe HMO surgical delivery, specifically by MSF and ICRC, and examine their contributions to global surgical systems strengthening.

Well-organised surgical systems for quality surgical delivery

HMOs recognise the need for well-organised surgical

systems because they need to deliver surgical care rapidly in settings where a baseline health system has been destroyed or never existed. Therefore, HMOs must be able to provide or build all the needed components of surgical delivery, including infrastructure, equipment, medication, and consumable supplies.

After a humanitarian disaster, such as a major earthquake, there can be large numbers of injured people who require prompt surgical attention. Therefore, MSF has pre-packaged surgical kits that include all the necessary materials for surgical care: surgical instruments, essential medications, data collection and triage tools, and other essential materials (11). These kits are deployable within hours or days' notice (12,13).

Furthermore, HMOs can build infrastructure, and provide clean water supply and other hospital services needed for surgical delivery if needed. For example, when many existing hospitals were destroyed after the 2010 earthquake in Haiti, MSF erected its own field hospitals, which contained operating rooms, an intensive care unit, and a laboratory (14).

The infrastructure that HMOs build can contribute to sustainable surgical capacity in-country. In the prolonged armed conflict of Eastern Congo, MSF partnered with Masisi Hospital, a local government district hospital, to provide surgical care for over 10 years (15). According to MSF internal reports, during this partnership, MSF improved several aspects of the hospital's infrastructure such as the emergency department, the operating theatres, and the laboratories.

Surgical delivery requires multiple components of a health system to function properly. HMOs recognise and contribute to this important aspect, thereby supporting local health systems strengthening.

Importance of local relationships

HMOs with a history of working in the region have local political, geographic, and health knowledge, and are able to maintain pre-positioned resources, allowing for the rapid set-up of services and effective surgical delivery (13,16).

Specifically, HMOs working in-country prior to a large humanitarian crisis have the advantage of established relationships with local stakeholders, such as the Ministry of Health (MoH) and local surgical organisations. These relationships are crucial for rapid surgical delivery. For example, MSF had been working in Haiti since 1991, well before a major earthquake struck the island nation in 2010 (17). In response to the 2010 earthquake, MSF was

able to provide emergency surgical care within hours and days because of existing relationships with local authorities. MSF rapidly identified a site to construct a new hospital, and provided local staff, medication, and equipment (14,16).

Without consultation of local stakeholders and knowledge of the local landscape, HMOs might inadvertently weaken local surgical systems with their surgical programmes (18). For example, HMOs hire local surgical providers during a humanitarian crisis, which might directly compete with human resource recruitment in the local health system (19,20). HMOs must recognise the need to collaborate with local stakeholders.

International collaboration and coordination

During a major humanitarian disaster, many types of organisations respond, including HMOs, other NGOs, and international government agencies. Collaboration and coordination between all stakeholders are essential to ensure rapid and effective surgical delivery. However, the interplay between organisations is complex as they can have both complementary and competing interests.

During the 2010 Haiti earthquake, over 2,000 agencies provided support, of which over 600 were health organisations. The short-term influx of actors without coordination and variation in relevant humanitarian surgical expertise led to duplicate services in some areas and lack of services in others (16).

In the aftermath of the December 2004 tsunami in South East Asia, the United Nations Resident and Humanitarian Coordinators and Office for the Coordination of Humanitarian Affairs took leadership in connecting governments in South East Asia with international NGOs and other stakeholders, while the Inter Agency Standing Committee (IASC) centralised coordination on the ground. However, an evaluation of the humanitarian response revealed challenges in coordinating multiple stakeholders (21). Specifically, there was a lack of information and resource sharing, integration with local actors, and representation from national and smaller international NGOs in IASC meetings. Furthermore, there was unclear leadership and division of labour, and high personnel turnover. Stakeholders favoured vertical reporting to donors or headquarters over lateral coordination (21).

However, effective collaboration can lead to knowledge sharing and innovative solution building. For example, establishing an “Emergency Surgery Coalition” (ESC) of organisations with experience in delivering surgical care

in humanitarian emergencies can provide clear leadership and guidance before, during, and after disasters. An ESC can coordinate recruitment of staff through a central hub, establish procurement agreements, set priorities, and delegate service delivery and data collection (16). Effective coordination and collaboration are valuable in both humanitarian and non-humanitarian settings to ensure global surgical system strengthening.

Human resources for health

Humanitarian surgery requires surgical providers with broad-based skills. LMICs have a severe shortage of surgical providers (22,23) and therefore many HMOs recruit high-income country (HIC) surgeons for emergency missions. However, as HIC surgical and anaesthesia training has become more specialised and reliant on high technology solutions, such as laparoscopic and robotic surgery, there is a discordance between HIC surgical training and the skills needed for humanitarian surgical delivery (24-27). In comparison, surgeons from upper-middle-income countries, such as South Africa, receive broad-based surgical training that is more relevant to humanitarian settings, including extensive obstetric and gynaecologic, orthopaedic, and trauma experience in resource-limited contexts, and may be better suited to work in these settings (28). However, their skills are also needed in their home countries where surgeon density can be insufficient (29). Therefore, appropriate training of HIC surgeons and support and training of local staff are important.

International training courses

Humanitarian surgery training courses are offered by several HMOs and private foundations, which help bridge the gap between HIC surgical training and humanitarian surgical needs (30-32). Humanitarian surgical training programmes highlight the importance of skills relevant to the local context and burden of disease with the aim of strengthening access to specialised care in these settings.

Local capacity building

While the primary mandate of HMOs is to deliver health care to vulnerable populations, some include local capacity building—a key component of surgical systems strengthening. These organisations are sometimes the only means of care in unstable countries and often establish

partnerships with local health care organisations and governments (33). In these contexts, HMOs have trained the local workforce in critical surgical and anaesthesia skills. Some initiatives have been formal training programs recognised by local MoHs as capacity building initiatives, while other initiatives are less formal and stem from urgent service delivery needs.

From 2006 to 2008, MSF supported a surgical project in the conflict-ridden city of Guri-El in Somalia. Every few months, the expatriate staff, including its surgeons, were forced to evacuate during conflict escalation. To sustain service delivery, MSF trained local nurses to perform essential and emergency surgery. These staff continued to provide surgical care even during expatriate absences. Operations performed by local non-specialist surgical providers were not associated with a higher peri-operative mortality compared with those performed by expatriate surgeons, suggesting safe surgery is possible with lower surgical cadres (34).

Haiti has a huge shortage of anaesthesia providers. MSF trained nurse anaesthetists from 1998 to 2008 under an agreement with the MoH. Following the training, 79% remained in Haiti to work as nurse anaesthetists. A quarter of training graduates even worked for MSF during a post-hurricane surgical project, with a 0.3% perioperative mortality rate and no association between mortality and the lack of supervision by an anaesthesiologist (35).

HMOs strengthen trauma systems in countries where they work by partnering with local stakeholders to provide clinical training. MSF supported a local hospital in Iraq to upscale and increase the efficiency of their mass casualty response by providing additional trauma care training to nurses and doctors in the hospital, and emergency response training to first aid responders and paramedics (36). In Nepal, ICRC collaborated with a local university to implement emergency trauma training that augmented the existing trauma training and knowledge of local doctors (37).

Importantly, the relationships between HMOs and key local stakeholders facilitate human resource capacity building, thereby fostering sustainable solutions. Notably, MSF and ICRC's training of local health care providers in Iraq and Nepal relied heavily on collaboration with the MoHs and hospitals (36,37). These relationships facilitate the transfer of knowledge and support a smooth transition of service delivery from the HMOs to the local health system.

These examples of collaborative trainings build local capacity and skills transfer that respond to the needs of the context. While training during humanitarian crises can

have limitations given the time and resource constraints of an acute emergency setting, the resultant upskilling of local surgical providers contributes to sustainable global surgical systems strengthening and could decrease future dependence on HMOs.

Measuring and maintaining quality humanitarian surgical care

Burden of surgical disease

Quantifying the neglected burden of surgical disease is important for global surgical systems strengthening. Such data would demonstrate the health care needs of vulnerable populations, and therefore support programmatic planning in humanitarian settings. For example, a field survey in an internally displaced camp in Darfur, Sudan demonstrated that up to one quarter of the population had untreated surgical conditions (38). HMOs must contribute the knowledge gained from their surgical programs to inform the burden of local surgical disease, especially in the context of humanitarian crises where surgical needs may differ from and/or be higher than the baseline (39). While MSF has reported its surgical volume in several studies (25,26,40), this type of data is often lacking from many HMO surgical programmes.

Routine standardised monitoring and evaluation

Maintaining quality of care in humanitarian settings is essential to surgical systems strengthening. MSF reported the quality of care in various humanitarian settings, demonstrating low operative mortality in a large retrospective study (41). However, HMOs need to report surgical outcomes in a systematic manner to evaluate long-term quality of care. Outcome indicators, such as surgical site infections and other post-operative morbidities, and process indicators, such as use of a surgical safety checklist, should be routinely collected and reported (42,43). Given the unstable contexts of humanitarian settings, routine data collection has been challenging for some organisations. Nonetheless, a set of core indicators needs to be established for systematic data collection. HMOs should work with academic global surgery organisations to evaluate which core indicators would be feasible to collect in these resource-limited disaster settings.

Protocols, frameworks, and guidelines

Monitoring of indicators can help inform standardised

protocols for common procedures, antibiotic prophylaxis, and postoperative pain management. Standardised protocols and surgery safety checklists help maintain quality of care, applicable to humanitarian and non-humanitarian but resource-limited settings (42,43). ICRC has guidelines for surgical care provision in resource-limited settings, including detailed recommendations for triage, minor wounds, burn injuries, and anaesthesia (44). Similarly, MSF has published minimum standards for quality humanitarian surgical care, which includes safe facilities, electricity, clean water, blood bank, sterilisation equipment, a post-anaesthetic recovery unit, specific drugs, and qualified surgical providers (42).

Humanitarian surgery research

There is increased recognition that HMOs impact surgical system strengthening and global health. For example, the Consortium of Universities for Global Health annual conference featured a session on “Transitioning from Trauma/Disaster Response Toward Sustainable Surgical Care” (45). Prospective research on the epidemiology and quality of humanitarian surgical care should be supported, despite the instability of humanitarian settings. For example, the Humanitarian Surgical Outcomes Study (H-SOS) is a proposed 14-day multi-centre research study to evaluate clinical outcomes and inform safe surgical practice guidelines for resource-limited and crisis humanitarian settings (46). Understanding the epidemiology in these settings is crucial in planning humanitarian responses and developing local surgical ecosystems that are able to respond to the needs of the population. H-SOS aims to address these knowledge gaps and contribute to the discussion on how to make surgery safer in these settings (46).

Conclusions

HMOs play a critical role in providing surgical care in acute, often unstable, humanitarian settings. However, some programs are not viable long-term solutions, with humanitarian efforts often diluted by the lack of coordination between HMOs and local stakeholders. Furthermore, service provision by HMOs is a temporary measure and should never replace national- and local-health systems, especially in surgical care. Nonetheless, the provision of surgical care by HMOs offers lessons on surgical strengthening for the global community. HMOs are uniquely positioned and have the relevant expertise to

ensure service delivery to vulnerable populations and offer training to local health care providers. HMOs have played a crucial role in surgical systems strengthening, and where possible, should continue to strengthen existing health systems and build local capacity, while providing care in humanitarian settings.

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