

Plastic Surgical Outreach to Low- and Middle-income Countries and Global Health Priorities: An Analysis of 96 Nongovernmental Organizations

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Background: Conditions that are treated by surgery constitute a significant portion of the global burden of disease. In low- and middle-income countries (LMICs), allocation of resources toward the most cost-effective surgical procedures (essential surgery) and care delivery platforms is critical. Nongovernmental organizations (NGOs) and the plastic surgeons who work with them play a significant role in plastic surgical outreach to LMICs. However, it is unknown whether their work aligns with existing global public health recommendations.

Methods: A previously established internet-based methodology was used to identify plastic surgical NGOs. Through direct correspondence with NGOs and publicly available data, plastic surgical NGOs were cataloged with respect to the subspecialty areas of plastic surgery performed, care delivery platforms, and geographic sites. These results were then compared with the existing global public health recommendations.

Results: A total of 96 NGOs met inclusion criteria. The most common subspecialty area was cleft surgery (80.3%), followed by pediatric plastic surgery (46.9%). No NGOs used a continuous care delivery platform. Instead, all NGOs used an intermittent model through short-term surgical missions, of which 62.8% used a nonrotating care model and returned to the same site(s) annually, whereas 37.2% used a rotating care model.

Conclusions: Most NGOs perform cleft surgery, an area considered essential surgery, and thus, collectively, the work of NGOs largely aligns with global public health priorities. However, there is room for improvement for both the types of procedures performed and the care delivery platforms to provide the most cost-effective and sustainable care. (*Plast Reconstr Surg Glob Open* 2023; 11:e5477; doi: 10.1097/GOX.0000000000005477; Published online 26 December 2023.)

INTRODUCTION

Conditions that are treated primarily by surgery constitute a significant portion of the global burden of disease. An estimated 2 billion people lack access to even the most basic surgical care.¹ In the 1990s, several studies began to question the perception that surgery was too costly to be considered a global health priority.² These and the studies that followed ultimately demonstrated

that many surgical procedures rank among the most cost-effective of all health interventions.³ Subsequently, investigators sought to identify the most cost-effective and impactful surgical interventions in the context of the resource-restricted environments that exist in low- and middle-income countries (LMICs).^{4,5} Since 1993, the World Bank, a global leader in addressing poverty and raising prosperity in LMICs, has led the way in systematically evaluating interventions that address the major sources of disease burden in LMICs, including recommendations for the most cost-effective surgical procedures (essential surgery) and care delivery platforms.⁶

Nongovernmental organizations (NGOs) and the surgeons who work with them play a crucial role in

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Received for publication August 30, 2023; accepted October 24, 2023.

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DOI: 10.1097/GOX.0000000000005477

Disclosure statements are at the end of this article, following the correspondence information.

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providing surgical services to LMICs, especially for more specialized areas like plastic surgery.⁷ Compared with public or governmental institutions or establishments, NGOs possess a number of characteristics that make them well suited to provide healthcare in resource-restricted environments: NGOs operate with few restrictions; are able to perform their work at all levels (local, regional, national) within a given setting; and are relatively less affected by certain pressures, such as geopolitical interests, compared with governments.⁸ However, because NGOs operate independently, little is known about their collective efforts and whether they align with existing global public health recommendations, which was the focus of this study.

This topic has not been previously investigated, and so we sought to take steps to better understand fundamental aspects of plastic surgical outreach by NGOs to LMICs. Specifically, we systematically identified and characterized plastic surgical NGOs with respect to the subspecialty areas of plastic surgery performed and their care delivery models, and then compared these results with existing global public health recommendations. This was achieved via a combined approach of direct correspondence with NGOs and acquiring publicly available data, which to our knowledge was novel and aimed to allow for a comprehensive analysis. We hope this study will improve our understanding of the important work carried out by plastic surgical NGOs and the surgeons who work with them, provide a framework for future research, and potentially provide insight into ways the efforts of NGOs can be optimized.

METHODS

NGOs

A previously established internet-based methodology was used to identify NGOs that provide plastic surgical services to LMICs.⁹ In brief, this approach applies the United Nations definition of a NGO as any “nonprofit, voluntary citizens’ group which is organized on a local, national or international level.”¹⁰ To qualify as a plastic surgical NGO in the context of this study, the organization must perform plastic surgery in at least one LMIC, where surgery is defined as the therapeutic excision, incision, or manipulation of tissue in an operating room and distinguished from the logistical or financial support of such care.⁹ Based on these criteria, plastic surgical NGOs were identified through the following NGO databases: idealist.org, Operation Giving Back Surgical Volunteer Opportunities, US Private Voluntary Organizations, Society for Pediatric Anesthesia, Volunteer Medical Services Abroad, International Medical, Volunteer Association, MedicalMissions.com, MissionFinder, OmniMed database, Foundation Center Online Directory, UK Charity Commission, Australia Charity Commission, New Zealand Charities Services, Canada Revenue Agency Charity Search, and Plastic Surgery Foundation Volunteers in Plastic Surgery.^{9,11} Institutional board approval was obtained before undertaking this study.

Takeaways

Question: Does the global outreach work undertaken by nongovernmental organizations (NGOs) and plastic surgeons align with global health recommendations?

Findings: Most NGOs perform cleft surgery using an intermittent model through short-term surgical missions and a nonrotating care model where the team returns to the same sites annually.

Meaning: Collectively, the work of NGOs largely aligns with global public health priorities, but there is room for improvement for both the types of procedures performed and the care delivery platforms.

Variables

Plastic surgical NGOs that met inclusion criteria were cataloged with respect to the subspecialty areas of plastic surgery they perform, care delivery platforms, and geographic locations of outreach efforts. This information was obtained through a combination of direct correspondence with NGOs and publicly available data obtained from the databases described and NGO websites. Direct correspondence was performed via email to obtain an NGO travel schedule and description of the type of work performed using a standardized script (Supplemental Digital Content 1). Subspecialty areas of plastic surgery were categorized as burn, cleft lip and palate (cleft surgery), hand, pediatric (noncleft), trauma, and general (when not falling into any of the other categories). With respect to care delivery platforms, NGOs were coded as having either a “continuous” model if they provided continual surgical support, or an “intermittent” model if surgical support was provided through short-term surgical missions. NGOs with a continuous care delivery platform were further classified based on whether surgical support was provided in “first-level hospitals” versus “specialized hospitals.”⁶ NGOs with an intermittent care delivery platform were further classified as “nonrotating” if they returned to the same location(s) annually, or “rotating” if they traveled to different cities or hospitals each year. The sites of outreach efforts were classified as being in low-, lower middle-, and upper middle-income countries, as defined by the World Bank.¹² (See document, Supplemental Digital Content 1, which shows the script used to collect information about NGOs. <http://links.lww.com/PRSGO/C931>.)

Analysis

The work of plastic surgical NGOs was compared with existing global public health recommendations regarding surgical care made by the World Bank, including whether the procedures performed are considered essential surgery based on cost-effectiveness (Table 1) and the types of care delivery platforms used.⁶

RESULTS

A total of 96 NGOs met inclusion criteria. (See document, Supplemental Digital Content 2 which shows

Table 1. Procedures Considered Essential Surgery in LMICs⁶

Type of Procedure	Procedure
Dental	Extraction, drainage of dental abscess, treatment of caries
Obstetric, gynecologic, and family planning	Normal delivery, cesarean birth, vacuum extraction/forceps delivery, ectopic pregnancy, manual vacuum aspiration and dilation and curettage, tubal ligation, vasectomy, hysterectomy, visual inspection and cryotherapy for precancerous cervical lesions
General surgical	Drainage of superficial abscess, male circumcision, repair of perforations, appendectomy, bowel obstruction, colostomy, gallbladder disease, hernia, hydrocelectomy, relief of urinary obstruction
Injury	Resuscitation with basic life support measures, suturing laceration, management of nondisplaced fractures, resuscitation with advanced life support measures, tube thoracostomy, trauma laparotomy, fracture reduction, irrigation and debridement of open fractures, placement of external fixator, escharotomy/fasciotomy, trauma-related amputations, skin grafting, burr hole
Congenital	Repair of cleft lip and palate, repair of club foot, shunt for hydrocephalus, repair of anorectal malformations and Hirschsprung disease, cataract extraction and insertion of intraocular lens, eyelid surgery for trachoma
Nontrauma orthopedic	Drainage of septic arthritis, debridement of osteomyelitis

the NGOs included in analysis. <http://links.lww.com/PRSGO/C932>.) In total, these plastic surgical NGOs serve 67 LMICs (See table, Supplemental Digital Content 3, which shows low- and middle-income countries served by plastic surgical NGOs. <http://links.lww.com/PRSGO/C933>), of which 15 (22.4%) are low-income, 31 (46.3%) are lower middle-income, 21 (31.3%) are upper middle-income. The distribution of geographic sites of outreach by continent was 32 (37.7%) NGOs in Africa, 49 (57.7%) in Asia, four (4.7%) in Europe, 17 (20.0%) in North America, and 47 (55.3%) in South America. There were 42 (49.4%) NGOs that served more than one country.

Plastic Surgery Subspecialties

With respect to the subspecialty areas of plastic surgery performed, 34.8% of NGOs performed plastic surgery within a single subspecialty area, and 65.1% of NGOs performed plastic surgery in more than one subspecialty area. The most common subspecialty areas of plastic surgery performed were cleft surgery (80.3%), followed by pediatric plastic surgery (46.9%) (Fig. 1). Of NGOs that performed more than one type of plastic surgery, the most common combination was cleft surgery with pediatric plastic surgery. A total of 80.3% of NGOs performed procedures that are considered essential surgery (Table 1), all of which were related to cleft surgery.⁶

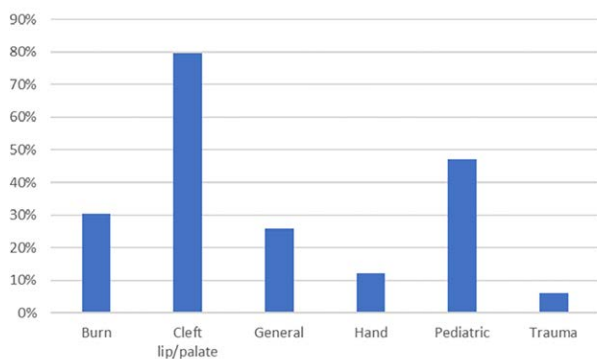


Fig. 1. Subspecialty areas of plastic surgery performed by plastic surgical NGOs.

Care Delivery Platforms

With respect to care delivery platforms, no NGOs utilized a continuous care delivery platform. Instead, all NGOs used an intermittent care delivery platform, of which 62.8% used a nonrotating model and 37.2% used a rotating model.

DISCUSSION

We found that the majority of plastic surgical NGOs perform cleft lip and palate surgery. As cleft surgery is considered a type of essential surgery, the work of plastic surgical NGOs largely aligns with existing global public health recommendations. This may perhaps be an unexpected finding because NGOs generally operate independently, and it suggests that NGOs may perform similar types of analyses in regard to how to allocate their resources. Although the lack of coordination among NGOs has sometimes been cited as a weakness, our findings indicate that coordination may not be necessary to have a collectively unified approach to outreach in LMICs.^{13,14} Although all plastic surgery procedures are of value, it behooves NGOs and practitioners to strongly consider cost-effectiveness in the context of the resource-restricted environments encountered in LMICs. In this regard, there is room for improvement in the types of procedures performed in plastic surgical outreach by NGOs, and specifically, we recommend that NGOs should consider focusing resources towards procedures that have been determined to represent essential surgery.

We found that all NGOs use an intermittent care delivery platform rather than a continuous one. Of these, approximately two-thirds of plastic surgical NGOs used a nonrotating model, where they partnered with in-country hospitals and regularly worked at those same sites. Approximately one-third used a rotating model, where NGOs performed their work at different sites over time. Although a rotating care delivery platform has an important role to play under certain circumstances, such as disaster relief, this model tends to be less effective for a specialty like plastic surgery, where the procedures are more elective. Nonrotating care delivery platforms confer the benefit of being able to provide more consistent patient care and education to the same practitioners, which may

also help local hospitals to eventually be led increasingly more by local providers.¹⁵ In this regard, we recommend that more plastic surgical NGOs consider using a nonrotating care delivery platform so that patient care can be provided in addition to contributing to sustainability and capacity building.

Evidence-based strategies for surgical interventions in LMICs focus on surgical procedures that can reduce burden from disease conditions in a cost-effective manner. One common way by which investigators have traditionally characterized burden is by mortality. However, because not all health burdens result in mortality, another important measure of burden is the disability-adjusted life year (DALY), which has more relevance to the types of conditions treated by plastic surgery. The DALY takes into account both years of life lost due to time lived in states of less than full health and years of life lost due to premature mortality.¹⁶ Using DALYs, the burden of diseases that cause premature death but little disability (eg, drowning) can be compared with that of diseases that do not cause death but do cause disability (eg, cataracts). Cost-effectiveness can then be calculated as cost per DALY averted. For example, the cost-effectiveness of cleft lip repair is approximately US \$10–\$110 per DALY averted, which factors in the prevention of potentially life-altering sequelae including feeding difficulties, social stigmatization, and speech and hearing developmental delays.¹⁷ For comparison, other widely disseminated public health measures are of similar cost-effectiveness (vitamin A supplementation, US \$10 per DALY averted) or are not as cost-effective (oral rehydration solution, US \$1000 per DALY averted).¹⁸ This framework serves as the basis for the 44 procedures identified as essential surgery.¹⁹ Of these, the following procedures are within the scope of plastic surgery: drainage of superficial abscess, suturing laceration, management of nondisplaced fractures, fracture reduction, irrigation and debridement of open fractures, placement of external fixator, escharotomy/fasciotomy, skin grafting, and repair of cleft lip and palate. With the exception of cleft lip and palate repair, the majority of these essential plastic surgical procedures are ones that are typically performed in the acute setting (primarily for upper extremity). It is perhaps not entirely unexpected that the NGOs that perform essential surgery perform cleft surgery, where maximizing the impact of their work can be done in a relatively more controlled fashion due to the elective nature of these procedures compared with acute trauma care.

The effectiveness of care delivery platforms or facility types for providing surgical care also needs to be considered. In general, first-level hospitals are the most cost-effective for the delivery of surgical care.^{20–22} However, because most surgery in first-level hospitals consists of emergency surgery where it is most effective to have providers that have a broad array of basic emergency skills rather than a narrow range of specialized skills, first-level hospitals may not always be the most appropriate for many of the procedures performed by surgical subspecialties like plastic surgery. In these cases, specialized hospitals seem to be among the most cost-effective, as has been found in areas such as cataract and obstetric fistula surgery, because

patients can be scheduled to achieve high volumes, contain costs, and improve technical quality.¹⁵ Moreover, if strong links are built with local practitioners to promote training and appropriate postsurgical care, specialized hospitals can eventually evolve to be led by these local practitioners.¹⁹ Short-term surgical missions by outside surgeons seem to be beneficial only if no other option is available; otherwise, suboptimal outcomes, unfavorable cost-effectiveness, and lack of sustainability limit their usefulness.²³ In this regard, plastic surgical NGOs should strive for being able to provide continuous rather than intermittent surgical support. Certainly, continuous surgical support is significantly more resource-intensive and not always logistically feasible, and therefore, when short-term surgical missions are the most viable options, plastic surgical NGOs should also consider employing a nonrotating rather than a rotating model.

This study has a number of limitations. First, it is primarily descriptive in nature. However, because little is known about plastic surgical outreach by NGOs and plastic surgeons to LMICs, we felt that a critical initial step was to gain an understanding of fundamental aspects of this subject, and therefore, we feel that this work is worthwhile in this regard. In addition, it is not possible to confirm whether every relevant plastic surgical NGO was captured in this study. This is due in part to the broad definition of NGOs and the minimal requirements to which they are subject, including reporting. While this characteristic represents a strength of NGOs with respect to the ease with which they may assemble and act, it also means that publicly available information may be limited. A related point is that several plastic surgical NGOs were excluded on the basis of the inclusion and exclusion criteria, which were designed with the intent to strengthen the methodology. We felt it was important to utilize a methodology for identifying NGOs that was previously peer-reviewed to strengthen the validity of our study, and to allow for comparative analyses with other studies that use the same methodology. Although we needed to exclude several NGOs in this process, we believe that the nearly one hundred NGOs analyzed in this study is sufficient to help improve understanding of this subject. Third, recommendations about what exactly represents global health priorities, including what constitutes essential surgery, may vary depending on the source organization. In this study, we elected to use recommendations from the World Bank due to their role as a global leader in addressing poverty and raising prosperity in LMICs and their work that has led the way in systematically and rigorously evaluating interventions that address the major sources of disease burden in LMICs. However, we recognize that opinions may differ regarding global health priorities. Notably, there is also overlap in the priorities established by other organizations that have investigated global surgery, such as between those of the World Bank and Lancet Commission on Global Surgery. Lastly, quantitative information about plastic surgery procedures, such as avertable disease burden, case volume, and clinical outcomes, does not exist or is not available for many of the procedures that plastic surgeons perform. There may be

plastic surgical procedures, such as local flap for coverage of an open fracture, that might potentially be considered essential if cost-effectiveness data were available. Future research should include investigations of the impact (including volume and outcomes) of the work of NGOs on the ability for local hospitals to provide sustainable plastic surgical care, the cost-effectiveness of the broad array of procedures performed by plastic surgeons in LMICs, and how the work of plastic surgical NGOs align with other global health priorities such as those put forth by the Lancet Commission.^{24,25}

CONCLUSIONS

The majority of NGOs perform cleft surgery, an area considered essential surgery, and thus, collectively, the work of NGOs largely aligns with global public health priorities. However, there is room for improvement for both the types of procedures performed and the care delivery platforms to provide the most cost-effective and sustainable care.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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