

Global Surgical Initiatives to Reduce the Surgical Burden of Disease

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A 12-YEAR-OLD GIRL INVOLVED IN A MOTOR VEHICLE crash is transported to a district hospital in sub-Saharan Africa with a femur fracture and splenic laceration. Because resources and surgical personnel are limited, resuscitation efforts for the injured girl are inadequate. However, governments, the World Health Organization (WHO), funding agencies, and international nongovernmental organizations (NGOs) are beginning to reassess the importance of surgical services in developing countries and to prioritize the support, resources, training, and workforce required.

Global surgical initiatives are hindered by the lack of data reflecting the magnitude of the unmet need.^{1,2} In this Viewpoint, we (1) describe the progress of global surgery initiatives, (2) delineate research priorities, (3) review metrics that assess the cost-effectiveness of surgical services, and (4) discuss approaches to building surgical capacity to reduce the global surgical burden of disease.

History

In resource-limited poor settings, international aid agencies have traditionally focused on infectious diseases. Recent global health initiatives, however, are increasingly addressing surgical conditions, defined as “any disease state requiring the expertise of a surgically trained provider”² and requires anesthesia for incision, excision, and suture.³ The burden of surgical conditions has been defined as “the total disability and premature deaths that would occur in a population should there be no surgical care.”²

In an effort to assess the amount of worldwide diseases and injuries, in 1991 the World Bank commissioned a preliminary study, which is currently being updated by academic institutions and the WHO.⁴ The Disease Control Priorities Project crudely estimated that 11% of premature death or disability could be averted with surgical services concentrating on trauma, cancer, and congenital deformities (eg, cardiac, cleft lip/palate), the latter accounting for about 9% of the surgical burden.⁵

Disparities in access to surgery are profound between the low- and middle-income countries and developed world.⁵ Approximately 26% of the estimated 234 million

operations that take place worldwide each year are performed in the poorest countries, which represent 70% of the global population.⁶ Short-term medical missions represent the traditional response to the surgical access imbalance. Although these visiting teams can address surgical disease (eg, cataracts or cleft lip), “they cannot substitute for a continuing investment in local health infrastructure and staff training that would allow LMIC’s [low- and middle-income countries] to develop their own long-term surgical capacity.”⁷

The costs of visiting surgical teams working in low- and middle-income countries are difficult to estimate. These humanitarian surgical teams are laudable; however, there is little information about the effectiveness, quality, and potential unintended consequences. In 2008, surgeons, anesthesiologists, and others formed the Global Burden of Surgical Disease Working Group to characterize the global unmet need for surgical services and establish standards of care within the international surgical aid community.^{3,8} With improved estimates of the prevalence of surgically treatable disease, stakeholders (eg, governments and NGOs) may be able to better allocate funding and priorities for resources and support.⁸

What Are the Research Priorities?

The 4 most relevant research priorities for the medical community include the following: (1) collecting epidemiologic data to establish the met/unmet need, (2) measuring the effects of surgical services on the prevention of lifelong disability, (3) establishing benchmarks for quality of care, and (4) evaluating cost-effectiveness.^{1,3,8} Research on these interconnected objectives has focused on understanding the quantity and distribution of surgical disease. Worldwide, the delivery of surgical care is shared by a disconnected network encompassing national ministries of health, private hospital systems, NGOs, and individual health care professionals. Without a centralized data collection system, accurate estimation of the burden of disease remains difficult.

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The Metrics of Surgical Services

The burden of disease is the difference between the actual and ideal health of a population, and it can be measured by a metric called disability-adjusted life-years (DALYs).^{4,5} Surgically treatable diseases and injuries often occur during a person's most economically productive years. The DALY represents the loss of a healthy year of life (death or disability) due to a given condition or injury. Using the cost of care/DALY averted, the estimated expenditures for surgical services in Sierra Leone (US \$32.78/DALY averted) compare favorably with the cost of vaccines (US \$5-\$7/DALY averted) or antiretroviral therapy (US \$300-\$500/DALY averted). However, more data are needed to assess the cost-effectiveness of providing surgical services in low- and middle-income countries, measured in cost of care/DALY averted, to determine the priority of surgical services compared with more traditional global health programs.⁹

The DALY metric includes both the incidence and duration of a treated or untreated condition (eg, childhood amputation resulting in 50 years of disability). Critics of the DALY metric recognize that it "does not take into account contextual variables" and call for more accurate assignment of disability weighting scores to surgical conditions, "aimed at achieving a consensus opinion from health professionals in both high- and low-income environments."²

The deficit of surgical capacity in low- and middle-income countries can also be measured with the effective coverage concept, which integrates the estimation of the met/unmet surgical need and quality of care.¹⁰ Quantifying the number of operations from all hospital settings is difficult. Although this approach is time- and resource-consuming, the most powerful instrument used to gather the met/unmet surgical need is through prospective, community-based surveys.²

Improved Measurement of the Surgical Burden of Disease

Improving the local surgical capacity in low- and middle-income countries has many facets. Subspecialized surgical care may be best addressed with visiting teams, but an expanded model of sustainable surgical care delivery, which emphasizes empowerment of local health care practitioners through education, equipment/supply support, and quality/safety benchmarks, is emerging. Academic partnerships ("twinning") and NGOs can provide a consistent and dedicated surgical capacity building program. One suggestion to help address the unmet surgical need is to consider surgical residency rotations in low- and middle-income countries.¹ Any such rotations should meet the ethical standards of established residency programs to include adequate supervision. The WHO Safe Surgery Saves Lives program promotes safe anesthesia and surgical guidelines to reduce complication rates in both developed and low- and middle-income countries.¹⁰

Instead of creating a parallel system of health care delivery, NGOs can integrate surgical services with the local ministry of health. Even if a team is concentrating on one surgical condition, the care provided by that team can be integrated into the medical and public health system. The training of local health care practitioners is best supported when NGOs use medications and equipment that are available to the local health care system,

Access to a surgeon is only one aspect of meeting the unmet surgical need. Specifically related to trauma, the system of care delivery can be strengthened by teaching resuscitation to first responders and community health workers as well as by supplying basic treatment supplies and emergency vehicles. The district hospitals' surgical and trauma services must be strengthened with an expanded workforce.

Conclusion

An expanding community of practitioners and public health experts has recognized that surgical services are integral to improving population health in low- and middle-income countries and must be prioritized with other disease prevention and treatment programs. The arduous task of estimating the prevalence and distribution of the burden of surgical disease is a crucial step in creating and evaluating strategies such as establishing adequate access to surgical care for individuals, irrespective of geographic location; implementing evidence-based care; and encouraging quality improvement in international surgical care delivery.

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