



## Review

## Surgical care in low and middle-income countries: Burden and barriers

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## ABSTRACT

Surgically correctable pathology accounts for a sizeable proportion of the overall global burden of disease. Over the last decade the role of surgery in the public health agenda has increased in prominence and attempts to quantify surgical capacity suggest that it is a significant public health issue, with a great disparity between high-income, and low- and middle-income countries (LMICs). Although barriers such as accessibility, availability, affordability and acceptability of surgical care hinder improvements in LMICs, evidence suggests that interventions to improve surgical care in these settings can be cost-effective. Currently, efforts to improve surgical care are mainly coordinated by academia and intuitions with strong surgical and global health interests. However, with the involvement of various international organisations, policy makers, healthcare managers and other stakeholders, a collaborative approach can be achieved in order to accelerate progress towards improved and sustainable surgical care. In this article, we discuss the current burden of global surgical disease and explore some of the barriers that may be encountered in improving surgical capacity in LMICs. We go on to consider the role that international organisations can have in improving surgical care globally. We conclude by discussing surgery as a global health priority and possible solutions to improving surgical care globally.

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Public health initiatives have long focused on issues pertaining to education, infectious disease, and child and maternal health. However, there has been an epidemiological transition in recent decades with an increase in the number of non-communicable diseases; 80% of deaths from these conditions occurring in low- and middle-income countries (LMICs) [1]. Much of the non-communicable disease burden is amenable to surgical treatment and has a combined mortality totalling more than double that of infectious disease, maternal and perinatal conditions, and malnutrition [1]. The recent Global Burden of Disease (GBD) study found that, in 2010, injury was the second leading cause of disease worldwide and accounted for 11% of all disability adjusted life years (DALYs) [2]. With increasing industrialisation and urbanisation, injuries from vehicular activity will increasingly constitute a

substantial proportion of the global disease burden, and with it the need for trauma and emergency surgical services is also likely to increase. With the transition in disease patterns away from the infectious and towards the chronic and non-communicable, the need for surgery to be recognised as a public health priority has never before been so requisite. In this article, we explore the current burden of surgical disease globally and explore some of the barriers that may be encountered in efforts to improve surgical capacity in LMICs. We consider the role that international organisations play in improving surgical care and discuss surgery as a global health priority. We conclude by exploring possible solutions to improving surgical care globally.

### 1. The global burden of surgical disease

The GBD study evaluated the causes and consequences of numerous disease groups (Table 1) [2]. Many of these groups (such as injuries, malignancies and musculoskeletal disorders) are amenable to surgical intervention. As such, surgically correctable pathology is highlighted as a major contributor to GBD. It has been estimated that 11% of the global burden of disease is surgically

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**Table 1**  
The leading causes of global burden of disease.

Disease group	Percentage of global DALYs
Cardiovascular and circulatory disease	11.8%
Injuries	11.2%
Neonatal disorders	8.1%
Neoplasms	7.6%
Mental and behavioural disorders	7.4%
Musculoskeletal disorders	6.8%
Diabetes, urogenital, blood and endocrine	5.0%
Chronic respiratory diseases	4.7%
Lower respiratory infection	4.6%
HIV/AIDS	3.6%
Neurological disorders	3.0%

DALY: disability-adjusted life-year.

Data from the Global Burden of Disease Study, 2010 [2].

treatable [3]. This burden has been shown to be predominantly from injuries and malignancies (Table 2) [3]. Despite these results, it is hard to quantify the true global burden of surgical disease as there may be many undiagnosed and untreated disorders in the community that remain unreported, particularly in the setting of LMICs [4]. The acute and chronic conditions amenable to surgical intervention confer a substantial social and economic toll on both individuals and society as a whole where these conditions are left undiagnosed and untreated.

The fact that the poorest third of the world's population receive only 3.5% of the estimated 234 million major surgical operations undertaken worldwide [5] serves as a startling reminder of the huge disparities in access to healthcare globally. Reported rates of surgery worldwide range from 295 operations per 100,000 of the population in Ethiopia to 23,369 per 100,000 of the population in Hungary [5]. This vast gulf in the provision of surgical care between low-income countries (LIC) and high-income countries (HIC) suggests a variance in access to care and a growing volume of unmet surgical need. Although this disparity may be partially explained by over-prescription in HICs, access to surgical care remains a significant concern in LICs. The reasons for this hiatus in access include, but are not limited to, the existence of barriers to the delivery of surgical care [6]. These barriers comprise patient, physician, institution and structural factors. In this review we have categorised these barriers under the following dimensions; problems with accessibility, availability, affordability or acceptability (Table 3). This is consistent with previous frameworks of categorisation of barriers to healthcare [7].

## 2. Patient-related barriers

The majority of the literature on patient adherence to treatment, although primarily focussing on communicable diseases, explores individual level factors such as health education [8]. For example, many patients may not be well informed about the treatment

**Table 2**  
The leading causes of surgical disease globally.

Disease group	Percentage of surgical DALYs
Injuries	38%
Malignancies	19%
Congenital anomalies	9%
Obstetric complications	6%
Cataracts and glaucoma	5%
Perinatal conditions	4%
Other causes	19%

DALY: disability-adjusted life-year.

Data from the Disease Control Priorities Project, 2nd Edition, 2006 [3].

options available to them; this being of particular importance when conditions are complex and management requires numerous operations and long-term follow-up. There also exist social and cultural barriers to seeking care for surgical diseases, such as stigma [9] and traditional beliefs about disease processes [10]. In addition, the absence of social support in poorer settings may hinder access to care [11], particularly when long-term rehabilitation is required. Patient-related barriers to accessing care also include the existence of indirect costs to the patient, such as loss of earnings during the peri-operative period, and rehabilitation and transportation costs. A study by Kazibwe and Struthers in Uganda found a significant association between compliance to treatment and transport costs in the context of the management of clubfoot deformity [12]. Steps have been taken in some LMICs to mitigate the effects of transport costs, for example by offering travel vouchers [13].

In order to access healthcare in many LMICs, patients often have to pay for that care directly to the service provider [14]. These expenses are typically borne by the patient and not subsidised or reimbursed by state or insurance schemes. As such, those who are unable to afford care are often deterred from seeking it, even if they feel compelled to do so [15]. Efforts to overcome these financial obstacles have been made by some health providers in LMICs, for example fee subsidisation in Aravind Eye Hospitals, India. The model of care employed by Aravind uses cross-subsidisation whereby those patients who are able to pay do so and receive higher standards of comfort (e.g. beds as opposed to mats) [16]. Those patients who cannot afford to pay receive heavily subsidised or free care made possible because of the fee-paying patients. This strategy results in Aravind being able to offer more than 60% of their procedures for free [17].

## 3. Physician-related barriers

Health worker shortages or a lack of adequately skilled professionals can hinder ability to cope with the demand of the surgical disease burden [18]. As a consequence of the limited surgical workforce, a multidisciplinary team approach to the management of complex surgical cases, such as malignancies, is lacking. Studies assessing the availability of surgical providers suggest that paramedical professionals, including non-physicians, and nurses make up the majority of the surgical workforce in LMICs [19,20]. As such, the specialist surgical skills needed in order to manage complex cases may not be available. In 2006, the World Health Report called for a rapid up-scaling of the global health workforce [21]. Despite this, a profound human workforce crisis still exists in LMICs and this is often further complicated by a lack of continued professional training. In order to ensure a sustainable approach to capacity building in surgery, investment in education, skills training and maintenance is required. Continued professional development in surgical skills is particularly significant given the complexity of surgical cases that may present in LMICs, with the potential for surgeons to feel poorly prepared to handle these cases.

The burden of surgical disease in LMICs is considerable and thus it confers a sizeable workload. This workload, coupled with poor remuneration and the untimely emigration of surgeons and allied health professionals to other countries, presents a particular challenge to the delivery of surgery in this context. Even when qualified physicians are present, poor communication with the patient or the patient's family (due to language barriers or misunderstanding) may hinder timely access to care [22]. Task shifting has been suggested as a possible cost-effective and sustainable solution to addressing the unmet burden of surgical disease [23]. Examples of where task shifting in surgery has been shown to be successful include Niger [24], where general practitioners are trained in

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