

# **Bridging the gap between public health and surgery:**

## *Access to surgical care in low- and middle-income countries*



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**T**raditionally, public health in low- and middle-income countries (LMICs) has focused on low-cost, low-technology, preventive measures and primary health care. In contrast, surgery is perceived as a higher-cost, higher-technology, curative, individually focused intervention. Recent evidence, however, has documented the cost-effectiveness of essential surgical care in LMICs, and the concept of surgery as a population-based, preventive strategy is slowly becoming acknowledged within the public health community.<sup>1,2</sup> The overall burden of disease that may be cured, palliated, or treated with surgical intervention is large and, arguably, rapidly growing—therefore, the utility of essential surgery must be revisited. Prominent public health experts, as well as surgeons, have also recently called attention to the longstanding neglect of surgery within global health and its crucial role in meeting the United Nations Millennium Development Goals (MDGs).<sup>3-5</sup>

With growing interest among the surgical and public health communities and publications stressing the need for additional evaluation, a working group of physicians, economists, epidemiologists, public health specialists, and other scholars formed over the last several years and convened in Seattle, WA, April 16–18, 2008. This Burden of Surgical Disease Working Group (BoSDWG) included members primarily from North American academic institutions, not-for-profit humanitarian organizations, and the World Health Organization (WHO), all engaged in research, training, and delivery of surgical services in LMICs. The major goals of the BoSDWG were to initiate discussion of essential questions related to global surgery, including the following:

1. What is the burden and distribution of surgical disease in LMICs?
2. What fraction of this burden is met by services currently provided, and what is the resulting unmet surgical need?
3. What contribution in training and service delivery is specifically made by the humanitarian sector?
4. What is the cost-effectiveness of surgical care and what additional resources (human, financial, physical) would ensure that patients in LMICs have more equitable access to surgical care?

5. How can essential surgical services be integrated into routine health systems surveillance and evaluation to measure “surgical indicators” for health services?

This article points to recent literature that begins to address these questions; summarizes conclusions, recommendations, and actions of the first BoSDWG meeting; and invites the global surgical community to engage in these efforts.

### *Global surgical initiatives*

The questions concerning global surgery require a multidisciplinary approach, and a number of initiatives are already under way. The inclusion of chapters on surgery, emergency medical systems, and injury in the second edition of *Disease Control Priorities in Developing Countries* indicate that these services are recognized as essential components of health systems.<sup>1,6</sup> Emergency obstetric care and essential trauma guidelines have also both been used to evaluate surgical needs in LMICs.<sup>7,8</sup>

The WHO Global Initiative on Emergency and Essential Surgical Care coordinates collaborations and reviews progress on universal access to emergency, surgical, and anesthesia services in LMICs. The WHO Integrated Management for Emergency and Essential Surgery toolkit provides guidance on policies, training technologies, and research focused on health systems strengthening through primary health care.<sup>9</sup> Meanwhile, the recently launched WHO Safe Surgery Saves Lives initiative will review and promote policies, personnel, and equipment to improve patient safety.<sup>10</sup> In addition, the Bellagio Essential Surgery Group—co-organized by the University of California—San Francisco, the Karolinska Institute, and several African centers—met again in July 2008 to discuss improving access to surgical services in Africa.<sup>11</sup> The Center for Surgery and Public Health at Harvard University and Partners in Health are developing programs in global surgical delivery, training, and research.<sup>5,12</sup> Global Partners in Public Health Informatics at the University of Washington has also focused on informatics in low-resource settings.<sup>13</sup> The BoSDWG seeks to complement these and other initiatives in addressing the aforementioned questions.

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## The global burden of surgical disease

The initial Global Burden of Disease (GBD) Study was intended to evaluate the causes and consequences of 109 conditions and was unique in estimating not only mortality but also morbidity for designated conditions in disability-adjusted life years.<sup>14</sup> Data from the GBD study have been updated and extended to 140 conditions and allowed for estimation of burden by selected risk factors (such as tobacco consumption, alcohol, and air pollution).<sup>15</sup> Another round of estimates is under way and will maximize what can be learned from these data.

Previously, the GBD has been measured by the burden of specific conditions rather than by intervention category—in other words, the burden of disease avertable through specific interventions as opposed to the burden resulting from specific conditions. Surgery represents one of the many possible intervention categories; others include vaccinations, antimalarial treatment, and anti-retroviral chemotherapy. Estimates of disease burden addressable by vaccination are comparable to current estimates addressable by surgical services.<sup>16</sup> Measurement of the burden of disease avertable by surgery would allow comparison with other priority health interventions in LMICs.

As a first estimate, 11 percent of the GBD can be treated with surgery. This figure comprises injuries (38 percent), which account for the greatest surgical burden; malignancies (19 percent); congenital anomalies (9 percent); complications of pregnancy (6 percent); cataracts (5 percent); and perinatal conditions (4 percent).<sup>1</sup> As part of this study, 18 surgeons around the world estimated the fraction of each disease in the GBD that was amenable to surgical treatment. While this was a useful first estimate, a more formal evaluation is necessary. Subsequent population-based surveys have suggested a potentially greater burden, which corresponds to observations of clinicians in the BoSDWG.<sup>3</sup> Furthermore, road traffic crashes and noncommunicable diseases—such as cardiovascular diseases, diabetes, and some cancers—in LMICs are projected to rise rapidly, depending on their rates of epidemiologic transition.<sup>17</sup>

Some conditions that can be treated with surgical intervention were not part of the initial GBD study, and these conditions require a more

comprehensive review. For example, it may be possible to estimate the burden of some common emergency surgical conditions, such as incarcerated hernias, bowel obstruction, and intestinal perforation.<sup>18</sup> As part of further assessment of surgical burden, it will also be important to identify (and perhaps reclassify) problems such as obstetric fistulae that the GBD classifies as “sequelae” rather than “conditions.”

Measurement of surgical burden cannot begin without definitions, as emphasized in a recent feature in the *Bulletin*.<sup>3</sup> The BoSDWG suggested a modification to the definition of a surgical condition from the Disease Priorities in Developing Countries study as follows: “any condition for which the most potentially effective treatment is an intervention that requires suture, incision, excision, manipulation, or other invasive procedure that usually, but not always, requires anesthesia.” This definition must be reviewed by a more globally representative group, and the implications of the definition must be carefully considered.

The proliferation of “vertical” programs in public health (including child health, maternal health, cancer, and trauma), many of which include effective surgical care, has also made it difficult to develop a coordinated approach. Surgical care intersects with many disease-focused programs. For example, a prospective study of children extrapolated that 85 percent of children will require surgical care by age 15.<sup>19</sup> Of all surgical conditions, there has been considerable attention paid to emergency obstetrical care, in part because of the MDG to reduce maternal mortality. The cross-cutting nature of surgery suggests that improved surgical care will strengthen health systems overall and enhance progress toward achieving the MDGs.

### Access to surgical care in LMICs

The burden of disease avertable through surgical care is a major unknown. In addition, there has been no systematic measurement of the met and unmet need for surgical care.

Rates of major surgery per unit population in low-income countries lag far behind high income countries (less than 1 percent).<sup>20</sup> In LMICs, measurement is often limited to a hospital logbook

## Global Burden of Surgical Disease Working Group

The ACS is pleased to host the second annual meeting of the Global Burden of Surgical Disease Working Group (BoSDWG) in Chicago, IL, May 20–22, 2009. The BoSDWG is a collaboration of multidisciplinary professionals committed to establishing and maximizing the role of surgical care in addressing health care disparities in developing countries. The BoSD and ACS Operation Giving Back share a common commitment to enhanced global health through strategic engagement of the surgical community and strongly complement each other.

Kathleen Casey, MD, FACS, Director of Operation Giving Back, has been involved with the BoSD since its inaugural meeting. In her view, “The ACS is blessed with thousands of members who are passionate about the role of surgery on the global stage. With so many who are actively involved in international partnerships and outreach efforts, our collective wisdom can contribute to a better understanding of the scope of the situation, the utility of existing efforts, and where additional work or new approaches are needed. Surgical volunteers are well positioned to actively contribute to this work. We look forward to the deliberations of the 2009 meeting to identify ways to engage ACS members in the ongoing assessments of need and implementation of solutions.”

Thomas R. Russell, MD, FACS, Executive Director of the ACS, concurs: “The ACS advocates and works for access to quality, safe and appropriate surgical care. We support these dedicated professionals who have come together from an array of disciplines to examine and implement ways to execute that goal across a spectrum of health care settings.”

If you would like to join the ongoing efforts of this group, please contact Dr. Casey at [kcasey@facs.org](mailto:kcasey@facs.org) or 312/202-5458, or Kelly McQueen, MD, at [kamcqueen@gmail.com](mailto:kamcqueen@gmail.com).

that records procedures and immediate perioperative mortality. As a first step, retrospective data have recently been used to estimate the volume, composition, and global distribution of operations, using modeling techniques, but only 29 percent of countries had data on surgical volume.<sup>21</sup>

With the exception of cesarean sections, there are no reliable estimates of the unmet need for routine operations, such as hernia repair, appendectomy, or bowel obstruction. Since the incidence, natural history, and epidemiology of these conditions has not been studied in LMICs, the incidence from high-income countries is extrapolated.<sup>7,22</sup> Meanwhile, studies documenting varied disease epidemiology in high-income versus low-income countries challenge the validity of this extrapolation.<sup>23</sup> A further limitation of facility-based data collection is that the majority of patients with surgical conditions never reach a health facility. For example, surveys have shown that only one-third of injured patients reach a health facility in rural areas of LMICs.<sup>24</sup> Surveys could be performed for specific “tracer” surgical conditions, such as hernias, or for other surgical conditions in aggregate. A significant challenge is that mortality data are much more available than morbidity data, as very few studies capture long-term disability associated with surgical conditions. The augmentation of mortality data with morbidity data should also be a focus for future efforts.<sup>25</sup>

The science of health metrics is gaining increased importance



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in global public health to measure the effectiveness of health systems as well as the impact of health reforms and donor programs on health service delivery.<sup>26</sup> The concept of “effective coverage” of essential health interventions is critical to this effort and its application to surgery has been explored by the BoSDWG, but further refinement and primary data are needed.<sup>27,28</sup>

### *Surgery as a part of humanitarian service delivery*

Many humanitarian nongovernmental organizations (NGOs) provide surgical services to vulnerable populations in LMICs. The impact of these organizations on the global burden of surgical disease has yet to be more formally evaluated. There have been preliminary estimates of the contribution of international volunteers to the health care workforce in Africa and of the impact of medical missions, but not all specific to surgical services.<sup>29,30</sup> The few private and volunteer organizations that track patient data and outcomes usually use this information for internal resource planning.<sup>31</sup> One U.S.-based organization has initiated electronic data collection and may soon offer this low-cost model to other NGOs.<sup>31</sup>

Understanding the collective contribution of the humanitarian community would further measure whether the need for surgical services is met and the humanitarian sector’s impact on the global health workforce. These organizations also can share their lessons for cost-effective, sustainable service delivery and training of local personnel in austere medical environments.<sup>32,33</sup> Greater coordination between these organizations would also identify regions with the greatest need and has the potential to provide primary data on regional rates of disease and outcomes of care.

### *Economic evaluation of surgical services*

Since surgical services have generally not been considered a cost-effective intervention in LMICs, recent studies documenting the cost-effectiveness of essential surgical care have kindled interest within the public health community. In fact, the 2008 Copenhagen Consensus included surgery in its list of priority investments for the world’s poor.<sup>34</sup>

These prospective studies of costs and outcomes of procedures in small hospitals must be more carefully evaluated and perhaps piloted elsewhere to validate these findings. This will also help define the role of surgery as part of the “minimum package” of health services to shape health policy in many LMICs. This package was initially estimated at \$34/capita by the Commission on Macroeconomics and Health, but this estimate included emergency obstetric care as its only surgical input.<sup>35</sup>

Another target for the BoSDWG is the development of “surgical indicators” to evaluate surgical services. These indicators could perhaps be integrated into a country’s health information systems, demographic health surveys, or the newer IN-DEPTH network of 37 international demographic surveillance sites.<sup>36</sup> The surveillance sites are newer prospective population cohorts in sentinel locations in Africa that monitor key public health indicators. Even if these surveys only included one or several tracer surgical conditions, it would be a starting point to evaluate access to surgical care more systematically.

### *Actions of the BoSDWG*

The BoSDWG hopes to collaborate with existing surgical initiatives to advance the evidence base for surgery as a component of public health. Several specific areas of focus included the following:

1. Definition of key surgical concepts with language meeting with consensus approval
2. Determining and advocating for methods to measure access to surgical care
3. Priority-setting for surgical procedures in resource-constrained settings
4. Evaluation of existing surgical evaluation tools and testing these tools with tracer conditions
5. Engagement of the NGO community to track and evaluate surgical data

A follow-up BoSDWG meeting is planned for spring 2009. To date, the BoSDWG has been a small U.S.-based group, and although many authors of this article and participants have contacts and relationships in LMICs, the BoSDWG recognizes the vital need to gain global partners in moving forward on these questions.

Several of the authors of this article are Fellows of the College, and other members of the BoSDWG interact closely with the leadership and members

of the ACS. Thus, the BoSDWG would also like to call on the ACS—along with surgical associations in other specialties, academic centers, and NGOs across the world—to promote greater research, training, and service delivery in LMICs. Specifically, Operation Giving Back provides a strong foundation for greater College involvement. More broadly, sustainable organizational partnerships focused on surgical care—both between and within countries—have the potential to have an unprecedented impact at this critical juncture in global health where daunting challenges intersect with great opportunities.

### The way forward

In the “Grand Challenges in Global Health” listed by the Bill and Melinda Gates Foundation in 2004, “problems” were carefully differentiated from “challenges.” The challenges were nearly all geared to infectious diseases, since it was suggested that these diseases accounted for “the greatest disparities in health between rich and poor countries.” Unfortunately, none of the grand challenges directly related to surgical care.<sup>37</sup>

However, there are significant global health disparities related to surgical conditions, and the vast knowledge gap related to surgery in LMICs limits our understanding of these disparities. Critical bottlenecks for surgery and for the other grand challenges must be overcome. We hope this work will challenge the common perception that surgical care is a luxury in poor countries—at the most basic level, poor access to surgical care is a human rights issue that requires both evidence and advocacy. 

### Authors' note

For further information on the Burden of Surgical Disease Working Group and the April 2008 meeting, visit [www.gsd2008.org](http://www.gsd2008.org). To join the working group listserve, send an e-mail to [bosdworkinggroup@gmail.com](mailto:bosdworkinggroup@gmail.com).

Two of the authors (CM, MC) are staff members of the WHO. The authors alone are responsible for the views expressed in this publication and they do not necessarily represent the decisions or policies of the WHO.

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