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Rachel W. Davis

*Michael E. DeBakey Department of Surgery, Baylor College of Medicine*

Walter D. Johnson

*Emergency and Essential Surgical Care Program, World Health Organization*

Larry H. Hollier

*Michael E. DeBakey Department of Surgery, Baylor College of Medicine*

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# Addressing the Surgical Deficit: A Global Imperative for Plastic and Reconstructive Surgeons

Rachel W. Davis, MD\*

Walter D. Johnson, MD, MPH,  
MBA, FACS, FAANS†

Larry H. Hollier Jr., MD, FACS\*

**Summary:** Despite poor access to quality surgical and anesthesia care for the majority of the world's people, with greatest impact on low- and middle-income countries, surgery has only recently begun to gain acceptance as a necessary component of global health. As a leader in global surgical funding, the field of Plastic and Reconstructive Surgery is uniquely positioned to influence change in global policy and financial support. For improvements in surgical access and outcomes worldwide, investment in surgical systems, commitment to national surgery, obstetric, and anesthesia planning, and continued evaluation and improvement of care delivery should be pursued. (*Plast Reconstr Surg Glob Open* 2019;7:e2454; doi: [10.1097/GOX.0000000000002454](https://doi.org/10.1097/GOX.0000000000002454); Published online 16 October 2019.)

Beginning as early as World War I, the field of Plastic and Reconstructive Surgery (PRS) has been a leader in the provision of surgical care to low-resourced areas worldwide.<sup>1</sup> Even as global surgery as a whole has suffered under public misconceptions regarding its cost-effectiveness for austere environments, PRS has managed to navigate these obstacles and succeeded in the provision of surgical care for many who would otherwise not have access. By capturing funding and support from a broad range of sources, PRS has creatively and persistently made a place for itself in a global health landscape that has primarily been dominated by focus on communicable disease.

In fact, approximately one-fourth of funding by international surgical charitable organizations is allocated for cleft lip and palate (CLP) surgery alone.<sup>2</sup> This is significant, particularly considering that from 2007 to 2013, 55% of surgical care in some low- and middle-income countries (LMICs) was provided through charitable organizations. Of the total revenue and expenditures for the 160 international surgical charitable organizations identified by Gutnik et al<sup>2</sup> within this time period, the 25% allocated for CLP was surpassed only by the large share of 48% dedicated to ophthalmology. Reconstructive surgery was classified separately with 2% allocation, trailed distantly by others including general surgery, anesthesia, burns, and trauma (0.03%, 0.01%, 0.02%, and 0.00%, respectively).

From the \*Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, Tex.; and †Emergency and Essential Surgical Care Program, World Health Organization, Geneva, Switzerland.

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Yet despite efforts by PRS organizations and individually led teams, it is clear that the surgical deficit remains immense. Surgical disease, classified as disease processes in which patients would benefit from the involvement of a surgeon in their management, has been estimated to account for up to 32% of global mortality.<sup>3</sup> But even still, surgery has been dismissed in public health dialog with enough consistency to achieve the oft-cited moniker given by Farmer and Kim,<sup>4</sup> “the neglected step-child of global health.” Paucity of economic and financial data has contributed to the problem, leaving policy makers and non-governmental organizations (NGOs) worldwide to assume that provision of surgery and anesthesia care is prohibitively complicated and expensive.

Although barriers to surgical access are a challenge for countries at all income levels, residents of LMICs are disproportionately affected with the region of greatest unmet need extending across Sub-Saharan Africa.<sup>5</sup> Even after overcoming severe lack of surgeons, anesthesiologists, and obstetricians, geographic and transportation-related impediments, and impoverishing health care costs, those patients in LMICs who are able to access surgical care still face poor outcomes. According to the 2018 African Surgical Outcomes Study of 11,422 inpatients across 25 countries, despite younger age and lower-risk profile, when compared with global postsurgical outcomes, patients undergoing surgery in Africa were twice as likely to die.<sup>6</sup> Complications were documented in almost 1 in 5 patients, with death in 2.1%. The median time of death was 5 days postsurgery, implicating inadequate perioperative care. Limitations in perioperative management impact a broad range of PRS conditions, and less extensive injuries sustained in low-resource settings often

**Disclosure:** Dr. Davis completed a global surgery fellowship at Baylor College of Medicine. Dr. Johnson is the Lead of the Emergency and Essential Surgical Care Program at the World Health Organization. Dr. Hollier is the Chairman of the medical advisory board for Smile Train.

lead to greater morbidity and mortality than equivalent injuries sustained in high-income settings. This is clearly evidenced in burn injuries, where children with burns of only 20% total body surface area in Sub-Saharan Africa often die, and survival is rare among those with total body surface area exceeding 45%.<sup>7</sup>

When considering challenges to care delivery in LMICs, it is unsurprising that surgical outcomes are poor. Surgical teams must overcome inadequate or unavailable power, water, lighting, instruments, and sterilization. Anesthesia care is often hindered by limited medication availability, monitoring equipment, and severe shortages in trained providers. And postoperatively, nursing volume, diagnostic laboratory availability, and blood supply are frequently insufficient. This complexity of infrastructural elements, including adequate health workforce, available essential medicines, and equipment, that is necessary for safe surgery has long dissuaded global health organizations from taking on the vast global burden of surgical disease.

However, since 2015, a series of events has urged the re-evaluation of surgery as a global health priority. Together, the 2015 publications of both the Lancet Commission on Global Surgery's (LCoGS's) landmark report, *Global Surgery: 2030*, and the World Bank's Disease Control Priorities, Edition 3, Volume 1: *Essential Surgery*, changed the landscape of global surgical data and discussion. With the consolidation of statistical and epidemiologic studies, the LCoGS transformed disparate data into a focused challenge: to improve global health and economic wellbeing, the world must invest in surgical access.

Core to the LCoGS report is that a stunning 5 billion people lack access to safe, timely, and affordable surgery and anesthesia care, with an additional 143 million procedures needed annually, primarily in LMICs.<sup>5</sup> The commission asserts that provision of surgical care has "an incontrovertible, cross-cutting role in achievement of local and global health challenges," and that urgent investment in surgical systems between 2015 and 2030 is necessary to avoid economic losses estimated at \$12.3 trillion (2010 USD). Quantifying the economic drain created by operable disease supports the claim by Meara and Greenberg<sup>8</sup> that "surgical marginalization has a cost that is only projected to increase."

In combination with the LCoGS, Disease Control Priorities, Edition 3, Volume 1, *Essential Surgery*, led to a surge in the availability of health systems data. *Essential Surgery* was notable not only for its detailed financial content but also for the World Bank's decision to, in a series of 9 volumes, publish a surgical volume first. Through precise analysis of cost, impact on global morbidity and mortality, and ease of implementation, the authors identify a surgical platform of 44 essential procedures that alone could prevent 6%–7% of deaths in LMICs.<sup>9</sup> In addition to providing practical recommendations for system development, *Essential Surgery* helped shift the view of surgery within the global health community that, rather than prohibitively expensive, essential surgical procedures in fact "rank among the most cost-effective of all health interventions."

This movement toward incorporation of surgery and anesthesia platforms as a necessary component of global health systems has continued to gain momentum among international and national policymakers. With the unanimous passage of Resolution 68.15 at the 2015 World Health Assembly, that group unequivocally declared that surgery and anesthesia care is foundational to its primary goal, the achievement of health care for all people.<sup>10</sup> This was followed in 2017 by the passage of World Health Assembly Decision 70.22, mandating the biennial reporting of surgical and anesthesia data by the World Health Organization (WHO) Secretariat.<sup>11</sup>

Increased political focus on surgical systems as not only a necessity for the health of citizens but also an investment in the economic future of nations has popularized the development of National Surgical, Obstetric, and Anesthesia Plans (NSOAPs) that are fully embedded within the National Health Policy, Strategy, or Plan. Although modifiable for the context of the authoring country, these policies are built around 6 domains: service delivery; infrastructure, products, and technology; workforce; information management; finance; and governance and leadership.<sup>12</sup> Initial steps include internal assessment of the current status of surgical care along the framework of facility and service delivery assessments, followed by gap analysis. This includes the 6 core surgical indicators as recommended by the LCoGS, which incorporate metrics of timeliness, capacity, quality, and affordability, by tracking 2-hour access, surgeons, anesthesiologists, and obstetrician density, surgical volume, perioperative mortality rate, and protection against both impoverishing and catastrophic expenditure. Because these 6 indicators have since been included in the WHO 100 Core Health Indicators, and 4 within the World Bank's 2016 World Development Indicators, collection and monitoring of standardized health data can be simultaneously performed.

NSOAPs function not only to facilitate the primary assessment of national health systems and initiation of routine data collection but also guide the strengthening of structural goals and the surgical, obstetric, and anesthesia service delivery platform. By uniting all stakeholders, including Ministries of Health, physicians, professional societies, political leaders, governmental administrators, and international organizations in conversation, NSOAPs encourage common ownership of surgical development. In addition to NSOAP training sessions facilitated by WHO and the Harvard Program in Global Surgery and Social Change, lateral sharing of experience by countries with published NSOAPs, such as Zambia and Tanzania, has generated international collaboration toward systemic improvement.<sup>13</sup>

With strong recent evidence showing that surgery and anesthesia care is not only cost-effective but also vital to the economic growth of LMICs, national health systems and NGOs have begun to respond. It is time for surgical specialists to respond in kind. As a frontrunner in global health resources and public interest, the field of PRS now faces the challenge and opportunity to utilize new data to maximize surgical impact and address the needs of a diverse global community.

With this mandate, the careful consideration of global surgical delivery mechanisms and practice type

is warranted. When compared with short-term mission-based models, permanent and semipermanent practice settings are generally associated with both lower cost and complication rate.<sup>9</sup> Interestingly, postoperative morbidity and mortality in low-resource settings have been found to correlate with operative volume not of the surgeon, but rather of the operating facility.<sup>14</sup> Thus, when feasible, operation in higher volume centers with consistency in surgical teams can be of benefit. Additionally, when possible, support of quality care measures and sustainable systemic monitoring and improvement should be pursued.

Investment in horizontal or diagonal, rather than vertical, approaches to surgical disease through investment in local surgical capacity, skills training and education, and partnerships is preferred.<sup>15</sup> Whereas a vertical approach commonly prioritizes the short-term mobilization of a team to target specific surgical needs, a horizontal approach emphasizes the overall development of health infrastructure. Diagonal strategies integrate the 2, by meeting surgical deficits while bolstering broader surgical capacity. In a 2018 review of organizations providing surgical care for CLP, 10% focused on a horizontal approach, with 40% considered to be primarily vertical and 50% diagonal.<sup>16</sup> One example of a NGO targeting CLP through a diagonal approach is Smile Train, which not only supports transfer of surgical skills and technology but also includes long-term involvement in communities with the end goal of sustainable care. As a mechanism to achieve this, the organization provides financial and structural support for long-term care of CLP patients, including speech therapy, dental and otolaryngology support, and child life specialists. Although operating under the goal of overall health system strengthening, Smile Train has been estimated to have provided over 1.2 million surgeries in over 85 countries, leading to an overall global decrease in prevalence of CLP. Additionally, the organization has specifically invested in CLP training, including sponsoring over 3,000 hands-on and 40,000 virtual training opportunities and 30,000 opportunities to attend educational conferences.<sup>17</sup>

Even as the international public health community has begun to rethink surgical care as a foundational component of achieving wellness for all, the PRS community should reexamine its role within global health. As a leader in global surgery productivity, finances, and capacity, the field is poised to influence policymakers and governments toward development of high-quality surgical systems. With 5 billion people without access to safe, timely, and affordable surgical care when needed, it is imperative that this opportunity not be wasted.

**Larry H. Hollier Jr., MD, FACS**

Michael E. DeBakey Department of Surgery  
Baylor College of Medicine  
Houston, TX  
E-mail: larryh@bcm.edu

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