

Surgical capacity indicators in 2018 and beyond

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In the early part of the 20th century, Ernest Codman of the Massachusetts General Hospital described his 'end results system' that sought to identify poor outcomes and learn from them. It was the first formal 'morbidity and mortality' programme and for his efforts he was forced from the staff and out of his position. Modern forms of measurement have taken hold despite this early resistance, but realisation of the size and scale of this global undertaking is only just beginning. As we move to an era of Sustainable Development Goals (SDGs), Universal Health Coverage (UHC) and the integration of surgical services as an 'indivisible, indispensable part of health care', the importance of surgical surveillance has taken on increased urgency.¹ The global surgical, anaesthetic and surgical nursing community will not know the effect of care we provide and the advocacy we are engaged in if we neglect to attend to an understanding of capacity and outcomes of that care.

Surgical surveillance should aim to understand some essential components of care: the capacity to deliver surgical services, access to those services, the clinical needs of the population, the biological and functional outcomes of care and, in a nod to the SDGs and UHC, the economic outcomes of care. Although frequently neglected, surveillance should also seek to understand the quality of care and compliance with best practices and current standards of care.

In 2006, Debas and colleagues outlined the importance of surgical care and its cost-effectiveness in the second edition of *Disease Control Priorities*.² This was a remarkable body of work because, for the first time, an effort had been made to make a public health *and* economic argument for the value of surgical care in treating disease. Using disability-adjusted life-years (DALYs), an econometric measure of the value of healthy years of life, the authors noted that there were high-value services such as caesarean delivery, hernia repair, treatment of club foot and other congenital defects, and cataracts. DALYs resulting from diseases amenable to surgical correction or treatment were estimated to account for 12% of all disease burden. By the time the third edition of *Disease Control Priorities* was released, surgical burden was more accurately noted to be responsible for at least 18% of all disease burden, and perhaps as much as 30%;^{3,4} indeed, 6%

of the burden could be averted with a basic package of surgery.

At the same time as Debas was engaged in this work, the World Health Organization (WHO) was launching its Safe Surgery Saves Lives programme.⁵ As part of this effort, surgical surveillance was identified as a priority. The programme developed a working group to focus on surgical metrics, the results of which identified six specific indicators that might help inform surgical capacity, provision and outcomes: number of operating theatres, number of accredited surgeons, number of accredited anaesthesia professionals, number of operations, day of surgery death ratio and postoperative in-hospital death ratio.⁶ These were based on four primary guiding principles: that the proposed measures be simple, widely applicable and relevant to public health imperatives and that unintended negative consequences of measurement were minimised.

Early work from the WHO described the volume of surgery occurring globally. In 2004, 234 million operations were estimated to have taken place; in 2012, that number rose to 313 million, with massive growth noted in the poorest countries.^{7,8} This was followed by estimates of the distribution of operating rooms worldwide, and the resourcing of such infrastructure as a crude measure of safe capacity.⁹ Almost nothing was known about the provider landscape or mortality following surgery.

With the recent *Lancet* Commission on Global Surgery, an updated set of indicators has been identified; it includes measures of timely access, volume of surgical delivery, human resources for surgical and anaesthetic care, postoperative mortality and impoverishing and catastrophic expenditure.¹ However, 3 years following the publication of the Commission report, the global surgical and anaesthesia community is still struggling to deliver information on these basic indicators. A recent assessment by Commission members identified enduring gaps in information, with few countries able to report accurately on surgical access, volume of surgery or postoperative mortality.¹⁰ Definitions were variable, limiting their utility for comparative purposes. There was almost no information on impoverishment as a result of paying for surgical care.

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Of the indicators, only the surgical and anaesthetic workforce density indicator was fairly complete, as recent work has demonstrated.^{11,12}

Although enthusiasm is high amongst the global surgical and anaesthetic community, many threats remain. First, there is a lack of leadership at the highest level, particularly among convening and normalising bodies such as the WHO or the World Bank. The World Bank has expressed interest in the work and has provided a venue for distributing information that has been collected to date, but has not provided further structure or ongoing funding to enable or encourage sustainable data collection. This has led to a lack of collaboration and coordination aside from individual efforts and relationships between like-minded individuals working to fill the knowledge gap. A lack of funding severely impedes the work, as data collection takes effort, time and human resources. Few inroads have been made to engage the public to support, indeed insist on, such efforts. Finally, the potential perverse negative effects of data collection and reporting cannot be underestimated or overstated. Countries that have no incentives to understand what is happening or report truthfully on surgical services likewise have little interest in or appetite for data collection that will undoubtedly tap scant resources with marginal benefit and almost no clear direction for improvement.

Given recent advances in open source data, crowdsourcing of information and connectivity, and enthusiasm by medical students, policymakers, economists and the surgical and anaesthetic community more broadly, a number of opportunities have arisen. The first is the potential for real-time, user-generated, interactive data that can allow for end-user interfaces and exploration.^{13,14} The second is the use of geospatial data, many of which are open access, to explore resources, opportunities and barriers to care.^{15,16} Although the challenges remain substantial, the ability of our community to engage public health professionals, policymakers, economists, ministries, leaders at the highest level and the general public will ensure that surgical and anaesthesia care is no longer ignored as the 'neglected stepchild of public health'.¹⁷

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