Data for the sustainable development of surgical systems: A global collaboration

WDI surgical indicators data collection 2016

Contributors

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INTRODUCTION

Universal access to surgical care in low and middle income countries (LMICs) is inadequate and far behind that in well developed countries. Over 5 billion people lack access to safe and affordable surgical, anaesthesia and obstetric care.(1) Even in areas where some surgical facilities are present it is highly debatable that safe and adequate surgical care can, or is, provided on a continuous basis. In 2010, an estimated 16·9 million lives (32·9% of all deaths worldwide) were lost from conditions needing surgical care.(2, 3) In recognition of this, the Lancet Commission on Global Surgery (LCoGS) was formed in October 2013.(2, 4) A collaborative partnership, this commission consisted of clinicians, researchers and policymakers working with advisors and associates from over 110 countries and aimed to assess the current state of surgical care around the world and make concrete recommendations to improve the situation. The LCoGS set out to determine the number of people in the world lacking access to surgery, how to improve such access, and the economic benefits for countries when doing so.

The LCoGS report, entitled "Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic growth", was released in April 2015.(3) A key element of the report was the recommendation for the adoption of six core indicators of national surgical system strength. These six indicators measure the preparedness of a surgical system to deliver care (indicators 1 and 2), the volume and quality of care provided (indicators 3 and 4), and the financial impact of the care provided (indicators 5 and 6).(2-6)

Indicator 1 - Access to timely essential surgery. This is the Proportion of the population that can access, within 2 hours, a facility that can do caesarean delivery, laparotomy, and treatment of open fracture (the Bellwether Procedures)
Indicator 2 - Specialist surgical workforce density. The Number of specialist surgical, anaesthetic, and obstetric physicians who are working, per 100 000 population
Indicator 3 - Surgical volume. This is the surgical volume per 100,000 population each year.
Indicator 4 - Perioperative mortality. This is the perioperative mortality ratio per year.
Indicator 5 - Protection against impoverishing expenditures for surgical care. This examines the risk of impoverishment that people might experience by seeking surgical care.
Indicator 6 - Protection against catastrophic expenditures for surgical care. This examines the risk of catastrophic expenditure that people might experience by seeking surgical care.

Together, these indicators and time-bound targets, allow a thorough assessment of the strengths and weaknesses of surgical systems, highlighting opportunities for improvement for key stakeholders.

In July 2015, after the LCoGS report was published, Commission members in Harvard began to collect nationally-representative data for each indicator in the 215 countries and independent economies recognized by the World Bank. This collection was led by the Program for Global Surgery and Social Change (PGSSC) based at Harvard Medical School. This was the first attempt to systematically and comprehensively gather primary data on surgical systems on a global scale, to improve on previously modelled estimates. In November 2015, the first report on the six surgical indicators was created, with data received from 64 countries. Data were collected for all indicators and volume of data was enough for primary data for indicator 2, and modelled data for indicators 3, 5 and 6 to be included in the 2015 World Bank Development Indicators.

To assess longitudinal changes in these indicators, in 2016, we repeated the process of collecting these six indicators pertaining to surgery for each country worldwide. Under the supervision of Mr. Andy Leather and Dr. Justine Davies at King's College London, and in collaboration with Dr. John Meara at Harvard University, and the WHO GIEESC (Global Initiative on Emergency and Essential Surgical Care), between July 2016 and January 2017, selected members of the International Student Surgical Network (InciSioN) took a mixed methods approach to collect this data.

METHODS

This year's core team included 5 members of Incision. Data collectors for this year's process were selected from a pool of highly motivated student applicants. In June 2016, a call for student data collectors was sent out through the International Student Surgical Network (InciSioN)[*], the International Federation of Medical Students Associations (IFMSA)[†] and Medsin[‡] student networks.

Participants were selected from the pool of applicants based on merit, suitability for the role, geographical location, and language spoken. Selection was done by supervising team

[*] http://incisionetwork.org/
[†] www.ifmsa.org
[‡] www.medsin.org

members from InciSioN and collaborators from the LCoGS and GIEESC. A total of the 218 applications were received. Ten applicants were accepted and trained for this project. Data collectors received three sessions of rigorous training on the rationale and the methodology of data collection. Each data collector had a direct supervisor that they could contact with questions or problems. An online group meeting was held each week to update on the progress of each data collector between July and December 2016.

Data Retrieval:

Data retrieval process from each of the World Bank's list of 215 countries and independent economies (hereafter referred to simply as "countries") consisted of thee main strategies: 1) Direct contact with official bodies 2) Systematic reviews of published literature and, 3) Internet searches of the grey literature.

Direct contact with official bodies

The 215 countries were divided between the 10 data collectors. Division of the countries and allocation to data collectors was based on their geographic location and the languages spoken. Official contact letters were drafted in English, Arabic, French and Chinese (Attachment 1). Two types of letters were drafted: 1) letter for countries that provided data last year, and 2) letter for countries that did not provide data last year. The letters were sent with an explanation of each indicator. Between August and November 2016, we contacted ministries of health, country embassies, United Nations offices, WHO offices, statistical bodies, and personal contacts of each country by email. Follow-up emails were sent each week, up to three times for each non-responding email address. In cases of non-response, the World Wide Web was utilized to find an alternative contact e-mail address of the respective Ministry of Health officials, and contact by telephone was attempted.

Literature Review

We systematically reviewed PubMed and Medline for the most recent annual papers, using each countries name along with the following keywords and phrases: "surgery", "procedures", "national surgical volume", "national surgical rate", "access to surgical care", "surgeons", "anaesthetists" "anesthesiologists" and "obstetricians". Literature searches for each country were conducted by two independent team members. References cited in retrieved articles were also assessed and included if appropriate. Publication language other than English was assessed and translated by the data collectors for French, Spanish and Arabic. We excluded all papers based on modelled data, those from which data were

extracted for the 2015 report, and any papers that were older than data collected from that country in last year's collection. We also excluded all papers with data prior to 2011.

Search of the grey literature

We utilised public databases from the World Health Organisation, Eurostat, as well as country-level surgical societies. We systematically reviewed the official websites and the worldwide web to identify official ministry of health websites and statistical bodies of each individual country. Previously recorded and reported surgical data was obtained if possible. Emails were sent to the official healthcare statistical supervisor if the data was sufficiently granular to include the indicators required.

Major surgery was considered to be any intervention occurring in a hospital operating theatre involving the incision, excision, manipulation, or suturing of tissue, and that usually requires regional or general anaesthesia or profound sedation to control pain.(7, 8) If caesarean sections or other invasive gynaecological and obstetric procedures were reported separately, they were included in the cumulative volume data. We also included outpatient operations meeting our inclusion criteria for major surgical procedures. For countries for which we obtained the yearly nationwide volume of major surgical procedures, we calculated the surgical rate per 100 000 people on the basis of the WHO reported population size.

We extracted data on each indicator in each country reported for the past 5 years. The sources of each are summarized in the tables of the appendices. We used the most recent year's data for this report. The definition of each indicator is previously extensively described elsewhere.(3) In short: Indicator 1 includes the population within two hours of travel to a hospital performing caesarean delivery, open fracture repair and exploratory laparotomy (Bellwether procedures[§]). Indicator 2 included the number of surgical, anesthetic and obstretic specialists per 100,000 population. This was defined as those who have completed a medical degree and undergone formal postgraduate training. Where data for different providers was available over multiple years, we took the most up-to-date number for each practitioner type to calculate the total. For indicator 3, surgical volume was calculated as the surgical volume per 100,000 population each year. The numbers provided by each country included both inpatient and outpatient surgery, unless otherwise stated. Indicator 4 shows perioperative mortality, defined as all-cause death rate before discharge in patients who have undergone a

[§] Caesarean delivery, also known as C-section, is a surgical procedure used to deliver a baby through incisions in the mother's abdomen and uterus. An open fracture repair includes all those that underwent a "complicated" open fracture repair including the need of anaesthetic. And finally, laparotomy was as defined by the Ministries of Health, to include all emergency open abdominal surgery.

procedure in an operating theatre, divided by the total number of procedures, presented as a percentage. Population data was obtained from the World Bank for the same year as the data provided by each country.

RESULTS

The number of countries providing data for each indicator is listed in Table 1. 17 countries with indicator 2 data and 5 countries with indicator 3 data, were excluded from the collection due to data being collected from 2010 or earlier.

Given the paucity of data points for indicators 1, 4, 5 & 6, whilst we are working on more reliable methods of modelling globally appropriate data, we will focus this report on indicators 2 and 3.

Full details of country data is provided in the appended data sheets. For surgical volume data (indicator 3), 15 of the 61 countries that provided data only contain the number of inpatient procedures (these are noted with an asterix in the data set). However, we believe that this is a reasonable proxy for emergency surgery in LMIC countries where such procedures are likely to incur a hospital stay. It is untested whether this is a reliable proxy for surgery in other, HIC, settings, but only three countries which only had inpatient procedure numbers available were HICs.

Please see appendices for the tables containing data for indicator 2 and 3.

Table 1

Indicator	Number of countries providing data for at least 1 time-point in the last 5 years
Indicator 1 - Access to timely essential surgery.	33
Indicator 2 - Specialist surgical workforce density.	71
Indicator 3 - Surgical volume.	60
Indicator 4 - Perioperative mortality.	29
Indicator 5 - Protection against impoverishing expenditures for surgical care.	16

Indicator 6 - Protection against catastrophic expenditures for surgical care.	16

CONCLUSIONS

Using a mixed methodology, we have measured surgical capacity worldwide in an attempt to better understand surgical health systems. Using the surgical indicators defined in the Lancet Global Surgery Commission, data were only available from a large number of countries for indicators 2 and 3. We are still attempting to raise awareness amongst partners for the collection of other indicators and will provide updates for those in years to come. Surgery remains an underrepresented part of the global health landscape, and more resources are required to support countries in collecting this data for further developments in surgical care.

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