

## Global safety in anaesthesia and surgery: Implications for anaesthesia in Pakistan

Fauzia Anis Khan

### Abstract

The Lancet Commission report in 2015 highlighted the role of safe surgery and anaesthesia. They also gave a framework of recommendations, indicators and targets to achieve universal access to safe surgery. This article explores the applicability of these indicators in Pakistan namely; access to timely surgery, specialist surgical workforce diversity, surgical volumes, perioperative mortality rate, protection against impoverishing expenditure and protection against catastrophic expenditure.

**Keywords:** Safety, anaesthesia, surgery, indicators

**DOI:** <https://doi.org/10.47391/JPMA.1207>

### Introduction

Access to safe surgery and anaesthesia has now become a global issue. The report of the Lancet Commission on global surgery in 2015 discussed the role of safe surgery and anaesthesia. This report was titled "Global surgery 2030; Evidence and solutions for achieving health, welfare and economic development" and aimed for a safe effective and economical solution especially for delivery of safe surgery and anaesthesia in lower and middle-income countries (LMICs).<sup>1</sup> This Lancet Commission Report was developed with the collaboration of 110 countries and presented findings on surgical care in LMICs. They also recommended a framework of indicators, and targets to achieve universal access to affordable surgical and anaesthesia care when needed.

The World Health Assembly (WHA) is part of the World Health Organization (WHO) and is the global health policy setting body. It has its annual assembly in Geneva, Switzerland every year<sup>2</sup> which has representation from all member states including health ministers. In May 2015, one of the resolutions passed was to strengthen emergency essential surgical care and the affiliated anaesthesia services. They recommended better access to surgical services in order to improve quality. This further strengthened the message from Lancet Commission

The key messages in the Lancet Commission report 2015 were five, namely:

Department of Anaesthesiology, Aga Khan University, Karachi, Pakistan.

**Correspondence:** Fauzia Anis Khan. e-mail: [fauzia.khan@aku.edu](mailto:fauzia.khan@aku.edu)

**Table-1:** Core surgical indicators prepared by Lancet Commission.

1.	Access to timely essential surgery
2.	Specialist surgical workforce density
3.	Surgical volume
4.	Perioperative mortality rate
5.	Protection against impoverishing expenditure
6.	Protection against catastrophic expenditure

  

- Five billion people lack access to safe, affordable surgical and anaesthesia care when needed.
- 143 million additional surgical procedures are needed each year to save lives and prevent disability.
- 33 million individuals face catastrophic health expenditures due to payment for surgery and anaesthesia each year.
- Investment in surgical and anaesthesia services is affordable, saves lives and promotes economic growth.
- Surgery is an indivisible, indispensable part of health care.

This report also gave 6 core surgical indicators for monitoring universal access to safe, affordable surgical and anaesthesia care. These are shown in Table 1.

### Text and Discussion

This article will assess the applicability of these indicators with reference to Pakistan.

#### Access to Timely Essential Surgery

The target that is being recommended by the Lancet commission is a minimum of 80% coverage of essential surgical and anaesthesia services per country by 2030.<sup>1</sup> Some papers from Pakistan have explored issues related to this topic. Irfan et al published a quantitative systematic review of barriers to access surgical care in Pakistan and selected 64 papers for their review.<sup>3</sup> They divided the barriers to patient-related, environmental barriers relating to health system, and provider-related barriers.

Zafar et al looked at surgical patients who had undergone abdominal surgery (AS). Their cohort represented 59 million adults in the country. They also looked at factors that affected surgical access. They calculated an annual rate of 85.9 abdominal surgeries / 100,000 population. Patients

residing in cities were twice as likely to undergo abdominal surgery compared to those living in rural areas. Economic status was another associated factor. In the urban population, female gender and community development index (CDI) had an important role to play. They concluded that physical access to surgical care was inadequate and national health policy should address this on priority basis.<sup>4</sup>

Samad et al explored the role of philanthropy in provision of free, high-quality care in low-income countries and looked at models of partnership between governments and philanthropists for providing better surgical care.<sup>5</sup>

Unfortunately, there is no publication related to expansion of anaesthesia services in Pakistan to meet this target.

### Specialist Surgical Workforce Density

The Lancet Commission defined the specialist surgical workforce density as the number of surgical anaesthetic and obstetric physician (SAOs) per 100,000 population and recommended that by 2030, 20 per 100,000 population of surgical workforce density is required in LMICs to provide surgical care.<sup>1</sup>

In 2017 the World Federation of the Societies of Anaesthesiologists (WFSA) came up with a publication and an interactive map on global anaesthesia workforce survey.<sup>6,7</sup> There are 436,596 specialist physician anaesthesiologists in the world but only 12% of these works in LMICs. This number needs to be doubled by 2030. The numbers of physician anaesthesiologists provided for South Asian countries are given in table 2.

Kudsk-Iversen et al explored how to address this issue and gave recommendations on how to increase the number of safe anaesthesia providers.<sup>8</sup> They recommended strategies were to focus on improving and supporting competencies of both existing and new workforce, team-based training, prevention of burnout and encouraging the retention of anaesthesia providers. Wayne et al reported on how to design and run educational programmes to train leaders, local teachers and the workforce.<sup>9</sup> Educational

programmes should be appropriate for the local environment as there is no one size that fits all. They recommend using a variety of interactive techniques like interactive lectures, small group and, case-based discussions, low fidelity simulation, and video modular teaching. Subspecialty courses in paediatric anaesthesia, obstetric anaesthesia, and pain are already being run in several LMIC countries under World Federation of Societies of Anaesthesiologists (WFSA).<sup>10</sup>

### Surgical Volume

Surgical volumes are the number of times a hospital has done a specific surgical procedure in a defined time period.<sup>1</sup> Studies of cancellation rates have shown a relationship between the number of times a hospital performs a surgical procedure and outcome of patients.<sup>11</sup> The surgical volume as defined by Lancet Commission is the number of procedures done in an operating room per 100,000 populations per year.<sup>1</sup> The target for 2030 is 100% counter tracking surgical volumes and a minimum of 5000 procedures/ 100,000 populations. Mechanism of collecting such data lacks in LMICs including Pakistan. Except for a few large hospitals, no electronic records are kept.

Ali et al looked at record keeping practices in referral hospitals in Khyber Pakhtunkhwa and Punjab provinces of Pakistan and looked at 170 health facilities in 19 randomly selected districts in Punjab and North West Frontier Province.<sup>12</sup> They found poor practice and recommended a need to rectify the system specially record keeping. The also stressed upon the need for a mechanism to provide feedback to health workers to improve the quality of data gathered. Better data gathering provides opportunities to improve planning and management.

Some work has been done in the Punjab province regarding this. The Punjab Health Care Commission (PHC) was founded by the Punjab government in 2010 and is an autonomous health regulatory body for health centers. It is responsible for developing and enforcing minimum service delivery standards (MSDS) at all levels. These standards are applicable to all services.<sup>13</sup> PHC requires hospitals to collect and report data of the number of surgeries performed.

### Perioperative Mortality Rate (POMR)

This is defined as the number of hospital deaths from any cause in patients who have undergone a procedure in an OR (numerator) divided by the total number of procedures (denominator).<sup>14</sup> It is recommended as an indicator of access to the safety of surgery and anaesthesia. POMR allows comparisons within countries and regions. Two time periods can be considered first mortality on the day of surgery (including death in the OR) and second mortality

**Table-2:** Physician Anaesthesia Providers Workforce Density in South Asia.

Country	Population	Physician Anaesthesia Providers
Afghanistan	32,527,000	6
Pakistan	188,925,000	3100
India	1,300,000,000	16,500
Nepal	28,514,000	235
Bhutan	775,000	7
Bangladesh	160,996,000	1279
Sri Lanka	20,715,000	410
Maldives*	428,000	NA

<https://www.wfsahq.org/workforce-map> (Accessed on 08/11/2018)

\*source: WHO country profile; NA: not available.

within 30 days of surgery whichever is sooner.<sup>14</sup> Collection of POMR is expected from every member country and WHO region. Reliable data is non-existent in LMICs including Pakistan.

There are two publications on anaesthetic mortality from Pakistan from a tertiary care teaching institution. Khan et al described the crude mortality rate (i.e. combined surgical and anaesthetic mortality) as 3.14/10,000 anaesthetics.<sup>15</sup> They reviewed all patient deaths occurring in a tertiary care university hospital between 1992 - 2003.<sup>15</sup> The pure anaesthesia related mortality was estimated as 0.359/10,000. This audit helped identify human errors, inadequate pre-operative preparation; inappropriate care and lack of supervision as preventable factors. They also looked at mortality in ASA 1 and 2 patients in another publication.<sup>16</sup>

Nearly 200 women die in Pakistan/ 100,000 live births as compared to 8/100,000 live births in Europe.<sup>17</sup> These figures include death under general anaesthesia. However, no publication on POMR in obstetric anaesthesia has been published from Pakistan. There are publications that report on maternal and neonatal outcomes but not specifically on maternal mortality related to anaesthesia and surgery. Amer et al made an attempt to survey anaesthesia practice in 17 teaching hospitals and 24 district hospitals in Punjab and found evidence of poor practice.<sup>18</sup> They did not look at anaesthesia related mortality.

### **5, 6. Protection against Impoverishing Expenditure and Protection against Catastrophic Expenditure**

Both above indicators relate to out of pocket payments for surgery and anaesthesia. The target by WHO is 100% protection by 2030.<sup>1</sup> The commission recommends focussing on equitable and high-quality care to accompany a commitment to financial risk protection.

Health care in Pakistan is provided by a system where the government provides a small amount of total health expenditure with remainder being predominantly provided by private sector where patient spends out of his/her own pocket. The spending on health sector by the government of Pakistan is still very low. In 2013-14 it stood at 0.40% and far less than what is recommended by WHO. According to WHO, US\$ 34/ capita is required for a package of fundamental health services whereas in Pakistan only \$18/ capita is being spent.<sup>19</sup> This shows the lack of commitment on part of the government. As far as private systems are concerned, they also lack effective bodies which monitor the quality of health care delivered to the patient.<sup>20</sup>

Global surgery 2030 clearly states that a successful change

must be locally driven by local leaders.<sup>1</sup> The governments should be committed to focus on a system which minimizes the direct costs to patients. Medical insurance is rare in Pakistan and most patients bear the expense of private medical care from their own pocket. Even in a government-run institution which provides free health care some of the costs e.g. those of medication are borne by the patient or the relatives.

### **The National Surgical, Anaesthesia and Obstetric Plans (NSOAP)**

WHO recommends that each country should develop a comprehensive plan for surgery anaesthesia and obstetric services adding to care delivery, education, and research. Framework should address the following:

- a. Infrastructure: This plan tracks surgical facilities, equipment, blood banks, access, and referral system. Each first level surgical facility should be staffed, equipped and able to do a laparotomy, Caesarian section and treatment of open fractures. These are called Bellwether procedures.
- b. Workforce: Should address surgical, anaesthetic and obstetric providers, and allied health workers.
- c. Service Delivery: Should address surgical volumes, system coordination and safety.
- d. Financing: Financial plan should address health financing, accounting and budget allocation.
- e. Information management: Development of robust information systems and funding of research agenda.

A system of assessment and continual monitoring of these plans is also proposed.

### **Conclusion**

There is an ongoing and urgent need to collect and publish data from LMIC including Pakistan. We lack data on access to timely surgery, details of our specialist workforce density especially the rural/ urban divide, surgical volumes, and POMR. The spending on the health sector by the Pakistan government is among the least in South Asian countries. There is also a disconnect between the government and clinicians practicing in the specialty in anaesthesiology. The gap needs to be bridged in order to develop effective National Surgical Obstetrics and Anaesthesia Plans (NSOAP) to provide safe and effective surgical and anaesthesia health care accessible to all by 2030.

This article is accompanied by a table ( Table 3) which provides the current status and recommendations for meeting these targets.

**Table-3:** Indicators, targets, current status and recommendations.

#	Indicators	Anaesthesia Targets	Current Status	Recommendations
1	Access to timely essential surgery	80% coverage of essential surgical and anaesthesia services/ country by 2030	<ul style="list-style-type: none"> <li>Limited information from Pakistan on access to surgery and anaesthesia</li> <li>A stakeholder's conference for National Vision for Surgical Care 2025 convened in 2018 and a consensus document created</li> </ul>	<ul style="list-style-type: none"> <li>National and provincial health policies to address this on urgent basis</li> <li>To identify current gaps for strengthening the systems</li> <li>National surgical, obstetric and anaesthesia plans (NSOAP) to be developed for all provinces</li> </ul>
2	Specialist surgical workforce density (Surgical density Includes surgeons, obstetricians, And anaesthesiologists	Five physician anaesthesiologists per 100,000 populations by 2030	According to a World Federation of Societies of Anaesthesia (WFSA) survey, the current density of physician anaesthesiologists in Pakistan is 1.64 per 100,000 population	<ul style="list-style-type: none"> <li>Plan a survey of existing anaesthetic workforce at national level</li> <li>National planning on increasing this workforce by different strategies</li> <li>Take input of stakeholders like professional organizations and acadamitions</li> </ul>
3	Surgical Volume	Number of procedures per 100,000 population per year	No information available	<ul style="list-style-type: none"> <li>Strengthen the information management systems and develop mechanisms of collecting such data from individual hospitals and centralize it at provincial and national level</li> <li>Time bound targets needed</li> </ul>
4	Peri-operative mortality rate	Number of hospital deaths from any cause following a surgical procedure within 24 hours	<ul style="list-style-type: none"> <li>No mechanism to collect this data at national level</li> <li>Limited availability at some hospitals</li> </ul>	<ul style="list-style-type: none"> <li>To find out what is currently being reported at district level</li> <li>Develop a mechanism of recording and collecting data of deaths within 24 hours of surgery in each hospital</li> <li>Collate this data at national and provincial level</li> <li>Strengthen the information management systems</li> </ul>
5 & 6	Protection against impoverishing and catastrophic expenditure	100% protection by 2030	<ul style="list-style-type: none"> <li>Health is a very small portion of national budgets</li> <li>Government medical insurance schemes</li> <li>Introduced in some provinces</li> </ul>	<ul style="list-style-type: none"> <li>More expenditure on health in national budgets</li> <li>Explore innovative funding mechanisms</li> <li>To expand medical insurance both government and private</li> </ul>

**Disclaimer:** None.

**Conflict of Interest:** The author is Chairperson of Safety & Quality of Practice Committee of World Federation of the Societies of Anaesthesiologists (WFSA).

**Funding Disclosure:** None .

## References

- Meara JG, Leather AJ, Hagander L, Alkire BC, Alonso N, Ameh EA, et al. Global surgery 2030: evidence and solutions for achieving health, welfare, and economic development. *Lancet* 2015; 386: 569-624.
- World Health Organization. WHO Report Finds Systems to Combat Antibiotic Resistance Lacking; 2015.
- Irfan FB, Irfan BB, Spiegel DA. Barriers to accessing surgical care in Pakistan: Healthcare barrier model and quantitative systematic review. *J Surg Res* 2012; 176: 84-94.
- Zafar SN, Fatimi Z, Iqbal A, Channa R, Haider AH. Disparities in access to surgical care within a lower income country: an alarming inequity. *World J Surg* 2013; 37: 1470-7.
- Samad L, Iqbal M, Tariq A, Shahzad W, Khan AJ. Equitable access to comprehensive surgical care: the potential of indigenous private philanthropy in low-income settings. *World J Surg* 2015; 39: 21-8.
- Kemphorne P, Morriss WW, Mellin-Olsen J, Gore-Booth J. The WFSA Global Anesthesia Workforce Survey. *Anesth Analg* 2017; 125: 981-90.
- Worldwide Web Home page WFSA [Homepage WFSA]. World Anaesthesiology Workforce. [Online] 2017. [Cited 2018 November 8]. Available from: URL: <http://www.wfsahq.org/workforce-map>.
- Kudsk-Iverson S, Shamambo N, Bould MD. Strengthening the anesthesia workforce in low and middle-income countries. *Anesth Analg* 2018; 126:1291-7.
- Morriss WW, Milenovic MS, Evans FM. Education: The heart of the matter. *Anesth Analg* 2018; 126:1298-304.
- Worldwide Web Home page WFSA [Homepage WFSA] [Online] 2017 [Cited 2018 November 8]. Available from: URL: [www.wfsahq.org/our-work/education-training](http://www.wfsahq.org/our-work/education-training)
- Patient Safety & Quality at Johns Hopkins Medicine. [Online] 2018 [Cited 2018 November 26]. Available from: URL: <https://www.hopkins.edu/patient-safety>

- kinsmedicine.org/patient\_safety/index.html
12. Ali M, Kuroiwa C. Accurate record keeping in referral hospitals in Pakistan's North West Frontier Province and Punjab: a crucial step needed to improve maternal health. *J Pak Med Assoc* 2007; 57: 443-6.
  13. Worldwide Web Homepage Punjab Government. Specialized Healthcare & Medical Education Department. [Homepage Health Punjab Government] [Online] 2018. [Cited 2018 November 26]. Available from: URL: <https://health.punjab.gov.pk>
  14. Watters DA, Hollands MJ, Gruen RL, Maoate K, Perndt H, McDougall RJ, et al. Perioperative Mortality Rate (POMR): A global indicator of access to safe surgery and anaesthesia *Word J Surg* 2015; 39: 856-64.
  15. Khan M, Khan FA. Anaesthetic deaths in a developing country. *Middle East Journal of Anaesthesiol* 2007; 19: 159-72.
  16. Khan MU, Khan FA Anaesthesia-related mortality in ASA 1 & 2 patients as a quality improvement indicator. *J Coll Physicians Sing Pak* 2011; 21: 234-6.
  17. Abbasi S, Younus M. Determinants of maternal mortality in Pakistan. *Journal Midwifery Reprod Health* 2015; 3:430-2.
  18. Amer I, Hafeez S, Rafique Z. A survey of obstetric anaesthesia practices in district level and govt. teaching hospitals in Punjab, Pakistan. *Anaesthesia Pain Intensive Care* 2017; 21: 212-7.
  19. Ali W, Tassadaq R, Asghar M, Khalid N. Health Care Services & Government Spending in Pakistan. [Online] [Cited 2018 October 26]. Available from: URL: <https://www.scribd.com/document/291830901/Health-Care-Services-Government-Spending-in-Pakistan>
  20. Anwar S. Health care delivery in Karachi-The worst of both worlds: up, close and personal. *J Coll Physicians Surg* 2008; 58: 595-6.
-