

Challenges in healthcare delivery in developing nations

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Abstract

The Lancet Commission outlines a vision of universal access to safe emergency and essential surgery. Global disparities in perioperative outcomes are recognized, with resource poor environments and a workforce crisis particularly challenging low- and middle-income countries to provide safe surgical and anaesthesia care. Bridging the gap to achieve universal access is a substantial undertaking and requires collaboration with high-income countries. Global partnerships are abundant and mutually beneficial, aiming to alleviate the workforce crisis, provide education, training and expertise and raise standards of care in host developing countries. Clinical, leadership and management experience gained in low resource settings is valued by healthcare systems in high-income countries, acknowledged by curriculum for developing world anaesthesia. Further challenges to healthcare delivery, training and implementation of change are influenced by government policy, cultural traditions, expectations and work ethic. This article describes challenges through reflection on personal experience in Zambia.

Keywords Anaesthesia; developing nations; low- and middle-income countries; Zambia

Royal College of Anaesthetists CPD matrix: 1H01, 1H02, 1I01, 1I02, 1I03, 1I05, 3J00, 3J02

Introduction

The Lancet Commission on Global Surgery, 2015, quantified the extensive, growing, unmet surgical burden of disease, recognized that surgical management of surgical conditions prevents disability and death and proves cost-effective. They published recommendations for universal access to safe, affordable perioperative care by 2030.¹ Concurrently, the focus of global healthcare initiatives progressed from population or disease-specific Millennium Development Goals (MDG) to Sustainable Development Goals (SDG) with an expanded focus on improving healthcare for all by investing in anaesthesia and surgical care.¹

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Learning objectives

After reading this article, you should be able to:

- summarize global disparities in healthcare and surgical workforce
- identify and address challenges to delivery of healthcare, education and training and implementation of change in developing countries
- discuss opportunities for global partnerships
- pursue your interest in global anaesthesia

The vision of 'universal access' is essential and emergency surgical and anaesthesia care (EESC) reachable within 2 hours by populations throughout the world.¹ The capability of healthcare facilities to perform 'Bellweather procedures' (laparotomy, caesarian section and compound fracture fixation^{1,2}) is an indicator that EESC is achieved.¹

Global disparities underpin challenges to achieving this:

- Five billion of the world's seven billion population cannot access safe, affordable surgical and anaesthesia care.^{1,2}
- 75% of operations worldwide are performed in the world's wealthiest third countries;^{2,3} 3.5% are performed in the poorest third.²⁻⁴
- Resource maldistribution exists between and within countries, especially low- and middle-income countries (LMICs).^{1,4}
- Surgical workforce density and skill is insufficient to safely meet surgical demand in LMICs.^{1-3,5}
- Anaesthetic-related mortality is significantly higher in LMICs, figures as high as 1 in 150 cases in parts of Africa.³

The global community has collective responsibility for achieving universal access. Global healthcare partnerships (GHP) have expanded opportunities for collaboration between high and LMICs through voluntary and funded projects. Health Education England recognizes benefits to the NHS of experience gained in LMIC and the Royal College of Anaesthetists' (RCOA) curriculum includes developing world and remote anaesthesia.⁵ This article describes personal experience in Zambia, discusses the challenges to healthcare delivery in developing nations and aims to encourage trainees and consultants to pursue their interest in global anaesthesia.

Zambia

Zambia is a developing country in southern Africa. University Teaching Hospital (UTH) in the capital city, Lusaka, is the tertiary healthcare centre providing adult, maternal and paediatric subspecialty medical, surgical, emergency and intensive care.

The UTH's ambitions include expansion of specialized clinical services and better accessibility to Zambians, negating the necessity and costs of transfer for treatments abroad. While these ambitions are commendable, the government recognizes development of specialist skills requires a significant financial commitment and necessitates temporary loss of staff to undertake training in other countries. The strain on human resources is mitigated by UTH's engagement in GHP, hosting external faculty

to train local staff in a cost effective, culturally sensitive and sustainable way.

Zambia anaesthetic development project (ZADP) (<https://zadp.org>)

ZADP was established in 2012 as a partnership between UTH and the Association of Anaesthetists of Great Britain and Ireland (AAGBI) to support the new physician anaesthetist training programme. ZADP competitively recruits fellows from countries with specialist programmes (largely the UK) to work alongside Zambian colleagues. This partnership is mutually beneficial and encourages bi-directional learning, with guest trainees gaining experience in resource-limited environments, developing lifelong skills including teaching, quality improvement, leadership and management, while the host department is supported with education, mentorship, development of governance activities, for example, audit, morbidity and mortality review and advocacy for improving safety and standards of perioperative care. ZADP extends to rural areas in 2019.

The wider challenges of healthcare delivery in developing nations are outlined below.

Conduct of surgery and anaesthesia

Lack of resources underpins challenges in healthcare delivery in developing countries. Conduct of surgery and anaesthesia is influenced by workforce, equipment and infrastructure.

Surgical workforce

The specialist surgical workforce is measured as the density of surgeons, obstetricians or anaesthetists (SOA) per 100,000 population.¹ Disparities between LMICs and high-income countries (HICs) are evident;⁴ Table 1 compares Zambia and the UK.^{6,7} Upscaling the workforce requires substantial investment and time. A target density of 40 per 100,000 estimates a worldwide shortage of one million using 2015 data, with an additional 2.28 million needed by 2030 to account for predicted population expansion. The Lancet Commission acknowledges this is unrealistic and recommends scale-up to 20 per 100,000¹. The magnitude of scale-up required is greater in LMIC where demand for surgery greatly exceeds SOA workforce.^{1–4,9,10}

Higher SOA densities correlate with better patient outcomes, for example, maternal mortality rates decrease with increasing SOA densities, particularly between 0 and 20 per 100,000¹. Low

SOA densities exist in developing countries, with 77 countries reporting anaesthetic provider density <5 per 100,000 population in a survey of global anaesthesia workforce.⁶ Disparities and the workforce crisis are exacerbated by migration of skilled workers to HIC; skills and expertise concentrating in urban areas while rural anaesthetic practitioners are usually non-physicians working in isolation;^{1,2,9} busy, challenging clinical environments adversely impacting on recruitment and retention.^{1,2}

The WHO Situational Analysis Tool (WHO-SAT) collects data about infrastructure, resources and interventions from LMIC healthcare facilities to evaluate availability of EESC for the population served.^{1,3} WHO-SAT at first level (district and rural) hospitals in Zambia, 2007,⁸ identified lack of equipment, specialists, inadequate training and supervision and raised concerns about safety of surgical and anaesthetic care. In response, the Ministry of Health (MoH) established a committee for strengthening EESC via collaboration with WHO, the university and professional bodies of surgery and anaesthesia.

Equipment and infrastructure

The working environment must be suitably equipped to enable safe delivery of care throughout the operative period.¹ In LMIC, provision of safe perioperative care is challenged by;^{1–4,9,10}

- unreliable supplies, e.g. electricity, water, oxygen, medications, equipment, blood bank
- unreliable function, e.g. infrequent equipment calibration, maintenance and repair, re-use of disposable items
- inadequate patient monitoring, e.g. physiological parameters (lack of pulse oximeters and electrocardiogram electrodes), end tidal gas and volatile agent concentrations
- inadequate post anaesthetic care, e.g. recovery capacity, monitoring, intensive care beds
- hindered hygiene and infection-control practices.

Safe perioperative care is achievable with limited resources by using standardized anaesthetic techniques, a concise set of drugs and equipment, providers trained to a minimum standard that ensures competence in general, regional and local anaesthesia and management of complications.^{2–4} Medecins Sans Frontiers analysed their anaesthesia care in resource-limited settings over 6 years.⁴ Outcomes for more than 75,000 cases suggests EESC can be performed safely with a simple toolkit and adherence to strict guidelines and protocols.^{3,4} LMICs adopting this approach would empower their anaesthetists to achieve a safe standard of care.

In the wider context of infrastructure, patients in developing countries face multiple impediments to accessing healthcare, outlined in the '3 delay framework':¹

- delay in seeking care, e.g. financial, geographical, educational, cultural reasons
- delay in reaching care, e.g. transport, distance to facility
- delay in receiving care, e.g. hospital capacity, skills, resources.

First-level hospitals often function with fewer specialist staff and resources, making them unsuitable for management of complex cases. Necessary onward referral to tertiary centres leads to overcrowding, exceeding intended capacity by 200–300%.¹ Acute overburden reduces ability to proceed with elective procedures resulting in advancing pathologies and chronic conditions, which present additional complexities to

Global disparities in healthcare^{6,7}

	Zambia	UK
Population	16,212,000	64,716,000
Physician anaesthesia providers (PAP)	79	11,549
PAP density per 100,000 population	0.49	17.85
Non-physician anaesthesia providers (NPAP)	115	0
Total anaesthesia providers	194	11,549
Total anaesthesia provider density per 100,000 population	1.20	17.85
Healthcare expenditure (percentage of GDP)	2%	7.9%

Table 1

surgeons and anaesthetists and require longer hospital stays with poorer patient outcomes.^{1,2}

Universal access for all endeavors to provide Bellweather procedures in a facility reachable within 2 h by the patient; these delays must be addressed to optimize conduct and outcomes for EESC.

Training and education

Roles of the anaesthetist encompass treatment throughout the perioperative period including provision of anaesthesia, analgesia, management of physiological disturbance and resuscitation in critical illness.⁵ The knowledge, skills, procedural training and clinical experience underpinning practice must be sufficient to ensure competence and optimal patient outcomes. In HICs, the anaesthetist is understood to have an advanced level of specialist medical training, recognized as an advocate of patient safety and is a respected leader in healthcare. However, in developing countries medically qualified anaesthetists are a scarce resource^{1–5,9} and a robust curriculum, training and accreditation in anaesthesia are a relatively new inception.

The international anaesthetic community delivers training and education through:

- global partnerships, e.g. ZADP, World Federation of Societies of Anaesthesia (WFSA) fellowships
- courses, e.g. AAGBI 'Safe Anaesthesia From Education' (SAFE)⁹ courses in obstetric and paediatric anaesthesia, including training trainers and have trained more than 3000 anaesthetic providers in 30 LMICs
- online resources, e.g. 'e-SAFE anaesthesia' (www.e-safe-anaesthesia.org), developed by RCOA, AAGBI and WFSA provides e-learning and continued professional development for providers in resource-limited settings.

The World Anaesthesia Society (WAS) collates projects and achievements of many organizations contributing globally to education, training and improving standards of care. Their conferences gather the international anaesthetic community together. The WFSA is a collaboration of international societies of anaesthesia that produces educational resources and guidelines for patient safety, innovation and research. Publication of their newsletter disseminates global news, updates and objectives. They also fund overseas fellowships for trainees from developing nations. WAS and WFSA are an information hub for global anaesthesia: www.worldanaesthesia.org, www.wfsahq.org.

Quality improvement and implementation of change

Although global improvements are outlined in SDGs, specific targets and speed of progress will be heterogeneous between countries. Healthcare needs of populations must be understood for implementation of change to be responsible and effective. Quality improvement projects are most effective and sustained with local leadership, management and accountability. Informal leadership, unstructured management, ineffective allocation and inefficient use of resources, unclear or unachievable goals, dysfunctional relationships and communication between healthcare agencies are common barriers to collaboration and transformation. It is key that international partners understand clinical context, respect autonomy and empower local institutions to develop practice relevant to their environment. Expectation and

translocation of standards, practice and protocols underpinning healthcare in HICs is presumptuous, paternalistic and not appropriate in LMICs. The focus of quality improvement should remain relevant to providing the safest care achievable.

In accordance with SDG 3, Zambia aims to decrease their current neonatal mortality rate (NMR) of 24 per 1000 live births. The MoH strategy involves neonatal resuscitation training and equipment distribution nationwide. A quality improvement project at UTH commenced in 2017, with a multidisciplinary team of neonatologists, paediatricians, anaesthetists, nurses and midwives pursuing these aims:

- reduction in NMR to <12 per 1000 live births by 2021
- train 80% of doctors and midwives in neonatal resuscitation
- implement guidelines: 2015 Resuscitation Council UK algorithm
- audit and supply of equipment.

More than 320 healthcare providers have attended neonatal resuscitation training courses and 12 have trained as trainers. Meeting project aims necessitates ongoing outreach training in first level facilities, funding regular courses and equipment procurement.

Safety and security

Clinical experience in LMIC presents safety and security concerns to the visiting anaesthetist that act as deterrents for some. Considerations are:

- health, e.g. communicable diseases (malaria, HIV, hepatitis, TB, cholera, Ebola, Zika virus)
- insurance, e.g. travel and medical insurance policies should cover personal belongings, healthcare and repatriation
- road safety, e.g. drink driving, poor road infrastructure and vehicle maintenance mean increase risk of injury from road traffic accidents
- communication, e.g. mobile phone, internet access
- accommodation, e.g. location, house sharing.

Research about the country to be visited, foreign office and medical advice obtained prior to travel allows education and evaluation of risks, relevant vaccinations and opportunity to consider these issues.

Conclusion

Challenges in healthcare delivery, training and implementation of change in developing nations are numerous. This article discusses lack of resources, disparities in global healthcare and describes personal experience in Zambia. Further challenges may include governmental influence, different healthcare expectations, cultural traditions and work ethics, which are beyond the scope of this article but are areas for exploration by the interested reader. ♦

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