



Neurosurgery in East Africa: Innovations

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In the last 10 years, considerable work has been done to promote and improve neurosurgical care in East Africa with the development of national training programs, expansion of hospitals and creation of new institutions, and the foundation of epidemiologic and cost-effectiveness research. Many of the results have been accomplished through collaboration with partners from abroad. This article is the third in a series of articles that seek to provide readers with an understanding of the development of neurosurgery in East Africa (Foundations), the challenges that arise in providing neurosurgical care in developing countries (Challenges), and an overview of traditional and novel approaches to overcoming these challenges to improve healthcare in the region (Innovations). In this article, we describe the ongoing programs active in East Africa and their current priorities, and we outline lessons learned and what is required to create self-sustained neurosurgical service.

INTRODUCTION

In the previous articles, we discussed the burden of surgical disease in East Africa and the specific challenges facing neurosurgery and the treatment of neurosurgical pathology.

Of the 313 million surgical procedures performed worldwide annually, only 6% occur in low- to middle-income countries (LMICs). The largest deficit is in sub-Saharan Africa, where approximately 9 in 10 people are without access to safe and affordable surgery.¹ Although neurosurgery has been developing in East Africa since the 1940s, it has always been considered tertiary and expensive.

Although the specific burden of neurosurgical disease in East Africa is difficult to estimate and neurosurgery has been considered a niche specialty, it has become evident that head injury, spinal cord injury, and pediatric neural tube defects and hydrocephalus have significant implications on mortality and morbidity in LMICs.

These conditions result in a significant loss of productive years, and they create a burden on society due to disability.² The recently published Disease Control Priorities, 3rd edition, acknowledged the importance of access to neurosurgery, and for the first time it included emergency burr holes and cerebrospinal fluid diversion among the “44 essential surgical procedures.”³

Key words

- Development
- East Africa
- Global health
- Innovations
- Neurosurgery

Abbreviations and Acronyms

CNIS: Canadian Network for International Surgery
COSECSA: College of Surgeons of East Central and Southern Africa
CPC: Choroid plexus cauterization
ETV: Endoscopic third ventriculostomy
FEAST: Fluid Expansion as Supportive Therapy
FIENS: Foundation for International Education in Neurological Surgery
iPATH: International Program to Advance the Treatment of Hydrocephalus
LMIC: Low- to middle-income country
MOI: Muhimbili Orthopedic Institute
NED: Neurosurgery Education and Development
NSF: NuVasive Spine Foundation
TBI: Traumatic brain injury
WFNS: World Federation of Neurosurgical Societies

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The objective of this review is to describe means for development and innovation of neurosurgery in East Africa, both in terms of current service provision as well as, neurosurgical education to build and sustain neurosurgery programs. Specifically, we address the processes needed to overcome the challenges that East Africa is facing with respect to neurosurgical care delivery and neurosurgery education previously described in The Lancet Commission on Global Surgery 2030³ and the preceding articles in this series.

The challenges for neurosurgery include: surgical workforce crisis, demotivation, lack of formal training, and “brain drain”; significant burden of neurosurgical disease that largely surpasses the throughput of the service and its workforce; deficiency in adjunct services required to sustain a neurosurgery practice, such as anesthesia and intensive care; lack of equipment, both basic (e.g., pulse oxymetry) and specialized (e.g., C-arm X-ray), and its maintenance. There is also failure of primary care and district hospitals to provide emergency care, leading to an overwhelming volume at tertiary centers. Finally, the lack of specific data to support the influence of neurological surgery provision on society, and therefore its cost-effectiveness, hinders the attainment of funding from governments, big donors and multinational programs.

STATE OF NEUROSURGERY IN EAST AFRICA

Currently, Kenyatta National Hospital and the Aga Khan University Hospital in Nairobi, the Coast Provincial General Hospital in Mombasa, Moi Teaching and Referral Hospital at Eldoret and

Kijabe Mission Hospital in the Rift Valley, all in Kenya; the Muhimbili Orthopedic Institute (MOI) and the Aga Khan Hospital in Dar es Salaam and Bugando Medical Center in Mwanza, and Mnazi Mmoja Hospital in Zanzibar, all in Tanzania; and the Mulago Hospital in Kampala, the Mbarara Regional Hospital in Mbarara, and the CURE Children’s Hospital in Mbale, all in Uganda; perform regular neurosurgical operations. Furthermore, Tenwek Mission Hospital in Bomet and Consolata Mission Hospital in Nyeri near Mt. Kenya both have full time volunteer neurosurgeons from abroad who provide neurosurgery services (Figure 1).

Nevertheless, access to neurosurgery for the general population is suboptimal. Public healthcare in East Africa uses a referral system hierarchy that is applied across all specialties (Figure 2). Hospitals constitute 13% of available healthcare facilities; however, referral hospitals typically constitute less than 1% of those facilities.⁴ Furthermore, although tertiary referral hospitals provide comprehensive service for a majority of neurosurgical pathology, performing more than 90% of all operations, they are located urban areas, where only 16%–31% of the countries’ population resides.^{5,7}

Neurosurgical services are provided by a limited number of physicians. The neurosurgeon to population ratio in East Africa is approximately 1:6,000,000 compared with the international ratio of 1:230,000 or 1:80,000 in North America (Table 1). Furthermore, neurosurgeons typically work in one centralized tertiary center. For example, of the 9 practicing neurosurgeons in Tanzania, 6 practice at MOI in Dar es Salaam (and 2 work only privately). In addition to

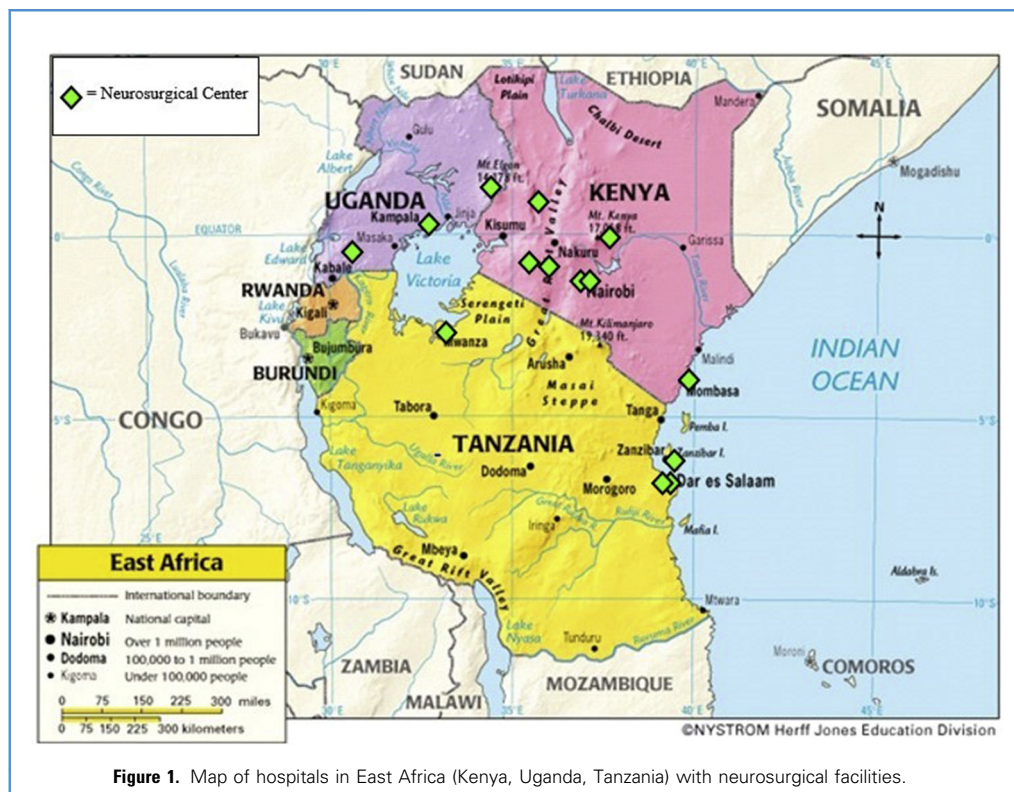


Figure 1. Map of hospitals in East Africa (Kenya, Uganda, Tanzania) with neurosurgical facilities.

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