Technology, Innovation, and Surgical Care in Africa

Despite having the largest burden of conditions amenable to surgical care, Africa's population receives only about 3.5% of the approximately 234 million major surgical operations performed globally. Such disparity has devastating consequences for vulnerable surgical patients who need care for conditions such as cleft lip and palate, clubfoot, management of obstetric complications, treatment of traumatic injuries, cancers, and more. Lack of infrastructure and resources, insufficient surgical workforce, limited surgical care access, and insufficient data place a significant strain on specialty surgical practice in Africa. In addition, the lack of attention to applicable technology and innovation in surgical care for the African context constitutes a significant barrier to surgical access.

Healthcare in Africa has come a long way, but there is still a significant gap in terms of access to quality healthcare services across the continent. One area that shows promise for bridging this gap is innovation and the use of technology in surgical care and surgical education. Innovation in surgery has the potential to improve healthcare outcomes for millions of Africans by improving access to quality surgical care. Innovation presents itself in two dimensions: invention (focused on new and cutting-edge technologies) and improvisation (focused on the use of locally available alternatives). While improvisation innovation is embraced as critical to surgical care in much of sub-Saharan Africa (due to scarcity of resources, and challenges with supply chain), cutting edge technological innovation is often neglected and perceived as unnecessary, unreachable, unfeasible, and purely aspirational for the Low or Middle- Income African country context.

Costs have been perceived as the key limitation to uptake of technology and innovation- as revolutionary technology often comes with 'revolutionary' price tags. With this comes the question of health equity, and the exacerbation of existing health disparities. Are these technologies selectively benefiting the rich and wealthy, to the neglect and detriment of Africa's poor? Steep learning curves, and costs of training for the surgical practitioner in the global South are additional challenges. In addition, the social consideration of technology and machines replacing personal interaction raises concern. Further, might cutting edge technology eventually completely obviate the need for a human surgeon or a surgical educator?

On both fronts, surgical innovation is undeniably economically beneficial and socially feasible. Advances in technology and medicine have greatly impacted the field of surgery, allowing for more precise and less invasive procedures. Minimally invasive surgery with cutting edge technology reduces the patient's recovery time significantly, allowing reduced hospital expenses and fewer leave days for the patient. Transplant surgeries, the applicability of robotic and telesurgery, use of state-of-the art equipment and resources and other innovative approaches to surgery have enhanced surgical accuracy,

permitted distance expert interventions, and have saved millions of lives around the world. Moreover, these innovative technologies reduce the required doctor-patient interaction time, availing the doctor to others while allowing the healthcare system to benefit financially. However, African surgical care facilities have generally lagged behind in embracing these technologies and innovations.

However, is it wise to invest in resources and training for modern surgical techniques when we are still unable to provide enough resources and skilled healthcare workers for essential life-saving surgeries? The argument can be made that innovative technology might be the answer to Africa's uphill task of ensuring sufficient SAO density. Can technology reduce the need for 20:100,000 specialist surgical providers that no African country Is currently truly on the trajectory to achieve by 2030? Can innovative technologies amplify the number of surgeries that can be performed per year in Sub-Saharan Africa by improving accuracy, reducing provider fatigue, and reducing the need for super-specialization in order to perform procedures? What is the role of technology and artificial intelligence in surgical education in sub-Saharan Africa?