



Expanding Access to Orthopaedic Surgical Services in Northern Tanzania: Creating a Durable Strategy to Reach the Most Underserved

Neil P. Sheth, MD, FACS

Interest in Global Health—My Mentors

In 2003, as an Intern in the Department of Orthopaedic Surgery at the University of Pennsylvania, Dr. Enyi Okereke was assigned to me as a faculty mentor—a Foot and Ankle surgeon that had been on staff at the Hospital of the University of Pennsylvania (HUP) for 13 years. We met periodically to discuss clinical rotations, research, career goals, and keys to being a successful Penn resident. It wasn't until 2005, as a PGY-2 on the HUP trauma service, that I learned of Dr. Okereke's global health efforts. We were routinely prompted by the OR staff to hand over all removed implants to be re-sterilized for Dr. Okereke's next teaching trip to Nigeria.

Dr. Okereke traveled to Nigeria 4-5 times annually to treat patients with orthopaedic lower extremity deformities—his focus was on changing the system so that the local team could treat their own patients in a timely fashion. I was interested in accompanying him on his next trip—at the time, I was the first resident to make such a request. He offered me to join him when I was a more seasoned resident—so we went to Nigeria for 10 days in January 2007 when I was on his rotation as a PGY4. The experience was life changing! As an adjunct to my inaugural global experience, I benefitted locally from the guidance and wisdom of Dr. David Spiegel and Dr. John Esterhai—Penn Attendings with a keen interest and deep understanding of global surgery.

Focusing on Tanzania

In November 2008, Dr. Okereke tragically passed away in Nigeria from a myocardial infarction due to a lack of the appropriate medications to resuscitate him—he was age 54. Although utterly shocked, I was honored to be selected to deliver a part of his eulogy at his memorial service. That day, I made a pledge to continue his work life's work—***building capacity in underserved countries through creating sustainable systems***. Following his demise, I traveled to Nigeria twice in 2011. During our last visit, we were confronted by a group of individuals that threatened our security - that was my last trip to Nigeria. In June 2012, I was invited to be a part of the first Operation Walk to Africa in Arusha, Tanzania. I fell in love with the country and the people—this was the right place for me to immerse myself in global health as so many people were in need of help.

Changing the Paradigm

At the conclusion of the Operation Walk trip, the team was ecstatic and felt good about what we had accomplished—50 total joint replacements in 4 days. But for some reason, I didn't feel great. I returned to Tanzania in February 2013 and spent time with Dr. Kabira, the local Orthopaedic Surgeon in Arusha. What he said to me changed my entire thinking and was the impetus for our current project. He stated that his team was not very happy when we had visited during the prior year. We were technically excellent and could treat a lot of patients in a short period of time, but we left him with problems that he could not handle. Four total knee replacements had gotten infected and one total hip replacement was chronically dislocating. More importantly, after we left, he had no patients for three months—patients came to his hospital during our trip for free care from US surgeons. Following our departure, patients were unwilling to pay for care from an African surgeon, until they realized that the US team wasn't returning anytime soon.

It was clear to me that the traditional approach of blitz surgery had to change. Even with the best intentions in mind, parachute medicine has untoward, unintended consequences in the host country, which we would never understand without asking the right questions. As a result of my conversation with Dr. Kabira, I spent the next two years scouring the globe to learn about existing global health care models throughout the developing world. I learned a great deal and interfaced with several people through this process, and I was able to envision a solution that would mitigate the effects of one-off orthopaedic trips to developing nations.

The Foundation for an Orthopaedic Center of Excellence - Studying Your Target Market

In 2014, we started a relationship with Kilimanjaro Christian Medical Center (KCMC)—the largest medical, nursing, therapy, and allied health school located in Moshi, Tanzania. Prior to pitching a potential solution, I sat down with two orthopaedic surgeons at KCMC and asked what the three major barriers were to delivering timely orthopaedic care. Without hesitation, they delineated that the barriers were: (1) lack of capacity (this included space (only one orthopaedic theater) and work force (only four orthopaedic surgeons)); (2) an absence of a consistent supply of orthopaedic implants (they relied heavily

on donated implants); and (3) patients didn't have the ability to readily pay for orthopaedic care.

These barriers formulated the foundation for our project in Tanzania and set the stage for collecting data regarding the current state of affairs - market research is critical when creating a system within a system. Guatemala or Cambodia are different than Tanzania - failure is guaranteed if data from one market is extrapolated to another on the basis of population size without understanding the nuances of the specific target market.

Starting in 2015, students from across Penn's campus (Perelman School of Medicine, the Wharton School, Leonard Davis Institute of Economics, and the School of Public Health) joined our team to start conducting research remotely and on the ground in Tanzania. Our research has focused on the burden of orthopaedic disease, defining systems issues that prevent care delivery, the finances and economics of care delivery, and increasing care access for patients that are unable to pay. These research endeavors have served as the foundation for a new orthopaedic center of excellence and have resulted in several publications which have helped to define the current landscape in Tanzania.

Progress Towards Implementation

Over the past six years, a plan has been devised to address the three major barriers identified by the local team. We are embarking on building an orthopaedic center of excellence in conjunction with KCMC on their campus - a center with

four operating theaters and 100 beds. Twenty-five university orthopaedic programs from around the globe have joined the University of Pennsylvania to donate 2-weeks per year to cover the center, work with the local team at KCMC, and participate in 2-way education/knowledge transfer at every level. We have partnered with Nebula Surgical, an implant company based in India with a distribution center in Tanzania, that can provide orthopaedic implants at 1/9th the cost of what is encountered here in the US. Through a robust collaboration with GE Healthcare Africa, GE Capital, and the Wharton School, a financial plan has been created to treat all patients. This plan allows for the delivery of democratized care - care that is independent of the patient's ability to pay, and paying patients would help cross-subsidize non-paying patients.

Challenges due to the COVID Pandemic

The global pandemic has presented significant challenges for this project. Over the past two years, the President of Tanzania as well as one of the former orthopaedic residents passed away due to the coronavirus. The inability to travel to Africa has prevented students from across Penn's campus from continuing to perform research locally in Tanzania. Funding that had been secured to build the center of excellence has been repurposed for COVID. But with the hopes of travel restarting and the continued support from our critical partners, opportunities continue to be present to secure additional funding and get back on track.