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## Lessons Learned From and Future Opportunities for Global Health Endeavors by 2 Academic Gastroenterology Units

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### INTRODUCTION

In many low and medium income countries, non-communicable diseases (NCDs) are important causes of morbidity and mortality.<sup>1,2,3</sup> While infectious diseases such as the human immunodeficiency virus (HIV), malaria, and Ebola remain important areas of focus, there is an urgent need to expand medical care to fully address NCDs, including gastrointestinal (GI) and liver diseases.<sup>4,5</sup>

Collaborations between gastroenterologists from low, middle, and high-income countries can accelerate the development of comprehensive gastrointestinal care in low and medium-income countries, and offer unique clinical, research, and educational opportunities for GI Centers from high income countries.<sup>6</sup>

In this commentary, we share our experiences in the creation of a new GI Unit in Uganda and expanding an existing GI program in Kenya. Integrating these experiences with existing literature and society recommendations, we provide a blueprint for future collaborations between GI Centers globally.<sup>7,8</sup>

### A Gastrointestinal Unit in Southwest Uganda: Creating a New GI Unit

Mbarara Regional Referral Hospital (MRRH) is the teaching hospital of the Medical School of Mbarara University School of Science and Technology (MUST). It is a 608-bed hospital serving four million people in Uganda, Rwanda, Tanzania, and the Democratic Republic of the Congo. Since 2013, the Massachusetts General Hospital (MGH) Gastroenterology Division has partnered with MUST/MRRH to provide gastroenterology services at MRRH

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(<https://www.massgeneral.org/gastroenterology/services/treatmentprograms.aspx?id=1912>). Prior to this, endoscopy was available only in Kampala, Uganda, 270 kilometers from Mbarara. This left a significant unmet need given the large burden of GI disease in the area. The Department of Medicine at MUST/MRRH identified this unmet need as a priority in 2012 and working under an existing relationship with MGH, tasked an MGH GI faculty member with global health experience, Dr. Corey, and a MUST/MRRH faculty member with an interest in GI, Dr. Okello, to lead the development of a GI unit.

To date over 900 endoscopies have been performed at MRRH resulting in the diagnosis and treatment of 313 (35%) patients with ESCC, 86 (9%) with PUD and 24 (3%) with portal hypertension. Future goals are to expand this program to provide a second gastroscope to expedite procedures (currently the 60–90 minute cleaning process between scopes is a barrier to efficiency), provide funding to lower endoscopy costs, expand the weekly GI Clinic to a daily occurrence, continue ongoing collaborative research projects for early detection of ESCC and expand research into liver disease.

### **AMPATH Gastroenterology: Progression from Basic to Advanced GI Care**

Beginning in the early nineties, as a collaboration to create Kenya's second state medical school, The Academic Model Providing Access to Healthcare (AMPATH) was created. The AMPATH represents a collaboration between a consortium of North American medical schools led by the Indiana University (IU) School of Medicine, Moi University School of Medicine, and the 991-bed Moi Teaching and Referral Hospital (MTRH) in Eldoret, Kenya (<https://www.ampathkenya.org>). The AMPATH has played a transformative role in the healthcare in this region. During the initial quarter century, the partnership largely focused on the HIV epidemic, but collaborations between MTRH and the AMPATH physicians have advanced care across multiple other specialties. Initially, GI procedures were limited to a single room endoscopy unit for upper endoscopies and colonoscopies. Over the last six years, resources were devoted to developing an advanced GI service. Dr. Carr, a GI faculty member from the IU, undertook a 3-month sabbatical in 2014 working in the endoscopy unit with Dr. Some, the chief of GI at MTRH. During this time, a 3-month study of endoscopy indications was performed (Table 1). This comprehensive study evaluated the indications for endoscopy, equipment needs and clinical processes. Currently, seven endoscopists perform over a thousand endoscopies per year with EGDs composing 70% of procedures. Through the AMPATH-MTRH partnership, the therapeutic interventions have expanded to include variceal banding, esophageal dilatation, and esophageal stenting.

### **Lessons Learned**

On assessment of our experiences and those of others in the literature, we have noted some generalizable lessons:

1. Support from political, academic, and financial partners in both the HIC and low and middle income countries (LMIC) countries is essential for the success and growth of endoscopy programs. AMPATH's program would not have been possible without the support of the Kenyan Ministry of Health, Moi University, and the North American AMPATH partners. Without the significant in-country support the program would have risked fading away when outside donor support

lessened. Similarly, support from the MRRH and MUST in Uganda were essential for the success of the GI Unit creation.

2. Early but flexible planning with continual reassessment of endoscopic needs is essential using the cascade method.<sup>8</sup> While we had anticipated, from prior experience, that peptic ulcer disease (PUD) and esophageal squamous cell carcinoma (ESCC) would be our most frequent diagnoses, in Uganda, we were surprised that 70% of initial upper endoscopies performed were ESCC presenting with complete or partial obstruction. We had not planned for endoscopic stent placement or comprehensive oncological service treatment. Our group partnered with the established group at Moi University/AMPATH to identify sources of training and supplies for esophageal stent placement which is underway. In addition, our findings highlighted the need for comprehensive cancer care including provisions for chemotherapy and radiation therapy at MRRH. The MRRH Cancer Center, with the support of the Uganda Cancer Institute, the MGH and the Rotary Club of Uganda opened in 2016 and now provides chemotherapy and radiation treatment for our patients with GI cancers.
3. Equipment maintenance and repair, while extremely important, is challenging in LMIC. For example, after a year of continuous use the donated, refurbished gastroscopes at MRRH required repair. Due to policy changes, no endoscopy vendor was able to repair or replace this scope leading to a gap in providing service. A private donation provided a new, refurbished scope and highlighted the need to develop a source of continual funding for the GI Unit. As a result, the non-profit organization, Health Uganda (HUG) was founded with the goal of providing medical care and supporting medical research with a focus on gastrointestinal disease in Uganda.

In Kenya, the AMPATH consortium has successfully partnered with the Government of Kenya, each providing ongoing financial support for endoscopic needs and repairs as well as the development of biomedical engineering training, an essential component to successful endoscopy units in LMIC.<sup>6</sup>

4. Research allows for quality improvement and expansion of knowledge. The frequency of ESCC diagnoses emphasized the need for rigorous data collection for all cases. This comprehensive data collection resulted in a publication on the population attributable risk of tobacco and alcohol use to ESCC<sup>9</sup>, a study examining biomass fuel of ESS risk in press and several more studies in preparation. In addition, this work resulted in the award of an NIH Emerging Global Leader Award (K43 TW010715 S.O.) to study polycyclic aromatic hydrocarbons exposure and dietary risk of ESCC in Uganda.
5. Teaching and medical care can expand beyond your region. Once our center in Uganda was operational, clinicians from around the region requested training. To date we have trained physicians and nurses from Kenya, Uganda and the Democratic Republic of Congo. The Moi/AMPATH unit has been essential at guiding the expansion of units such as the MRRH/MUST program.

6. Education and innovation are bidirectional. In 2014, a study in the United States (US) found that only 17% of the US GI training programs have a global health component.<sup>12</sup> Fellows from high income countries (HIC) can benefit from sharing their knowledge with their counterparts in LMIC and can learn about disease processes not seen in their country and the art of unsedated or minimally sedated endoscopy. In the Senegal experience, local training of gastroenterologists also allowed for formal education and resulted in a Certificate in Gastroenterology.<sup>10</sup> In Kenya we are in the early stages of designing a program to train Kenyan gastroenterologists using the fellowship training paradigm.

### Steps to Establish a Program

Based on our experience and review of the experiences of others, we would recommend the following course to establish a GI program:

1. Identify existing relationships between your institution and LMIC health centers and explore the interests and need to expand existing services to include gastroenterology. This allows utilization of existing infrastructure and relationships.
2. Develop relationships before you develop a plan. These relationships are essential for program building and overcoming unanticipated challenges.
3. Develop a comprehensive plan based on a careful assessment of the disease burden, local population needs and available resources in collaboration with all the parties.
4. Based on a comprehensive needs assessment, plan for an infrastructure to include space, equipment, maintenance, repair, and replacement.
5. Plan to start off with a large-scale initial effort after careful planning is complete. Either intensive “training camps” to start up the effort, as was performed at the MGH/Uganda program, or several month sabbaticals such as the Belgian/Senegal and AMPATH/Kenya programs help get programs off the ground and rapidly identify unanticipated needs and challenges.
6. Plan regular and frequent visits and interactions. This can include bi-directional rotations as well as electronic conferences. This is a long-term project requiring extended time and effort to build an effective program. Try to bring something new to add to the effort each time.
7. Plan to initiate study protocols and data collection early. This will allow review of diagnoses and tailor endoscopy services and equipment needs to the patient population and allow for research on the risk factors and disease process in your region.

### Conclusion

The development and advancement of these gastroenterology programs provide insight into the challenges and lessons of developing basic and advanced GI Care Centers in Sub-

Saharan Africa. Success requires collaboration with invested partners, support at the individual, local and national levels, patience, and adaptability. Partnering with existing programs such as the MRRH-MGH Program and the AMPATH Program can provide guidance for those interested in program development and expansion. Many academic medical centers have global health programs and, as in the two programs described, the best course is often to join an established global health collaboration with local GI partners. In addition, we invite interested individuals and organizations to contact us. We are enthusiastic about the future of GI care in LMIC countries and would be thrilled to participate in the creation and expansion of GI programs internationally.

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**Table 1.**

Endoscopic findings at Moi Teaching and Referral Hospital June-August 2014

<b>Diagnoses on Upper Endoscopy (N=230)</b>	<b>N (%)</b>
<i>Gastritis</i>	58 (25%)
<i>Gastroesophageal Reflux Disease</i>	55 (24%)
<i>Esophageal Cancer</i>	46 (20%)
<i>Peptic Ulcer Disease</i>	20 (9%)
<i>Duodenitis</i>	11 (5%)
<i>Esophageal Varices</i>	8 (3%)
<i>Gastric Outlet Obstruction</i>	8 (3%)
<i>Normal</i>	8 (3%)
<i>Other</i>	18 (8%)
<b>Diagnoses on Colonoscopy (N=41)</b>	
<i>Hemorrhoids</i>	16 (39%)
<i>Normal</i>	8 (20%)
<i>Ulcerative Colitis</i>	3 (7%)
<i>Non-specific Colitis</i>	3 (7%)
<i>Colon Cancer</i>	3 (7%)
<i>Colonic Polyps</i>	2 (5%)
<i>Other</i>	8 (20%)