Global Health Education in Nephrology: The Time has Come

Rebecca Ingenhoff 1, Ursula Brewster, 2 Asghar Rastegar, 2 Robert Kalyesubula 3, 3, 4 and Felix Knauf 1, 2

1 Department of Nephrology and Medical Intensive Care, Charité - Universitätsmedizin Berlin, Berlin, Germany
2 Section of Nephrology, Department of Internal Medicine, Yale University School of Medicine, New Haven, Connecticut
3 African Community Center for Social Sustainability (ACCESS), Nakaseke, Uganda
4 Department of Physiology, Makerere University College of Health Sciences, Kampala, Uganda

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PROBLEM AND NEEDS

At no time in history has it been more apparent that our own health is affected by the health of others around the world. The coronavirus disease 2019 pandemic has forced the realization that the health of one nation affects all nations. Moreover, for several decades the global burden of non-communicable diseases (NCDs), such as kidney disease, has been rising, notably on the African continent. 1 As global citizens and nephrologists, we are reminded of the critical importance of global health and the need to equip the next generation of health care workers at home and abroad with the necessary skills, mindset, and experiences to care for patients with kidney disease.

Nephrology as a medical subspecialty is severely underrepresented in low- and middle-income countries (LMIC). For example, in Uganda only one nephrologist is available for kidney care for four million people; in the United States, the ratio is one kidney doctor for 70,000 people. 2, 3

Academic institutions need to take a central role in bridging the gap among nations in nephrology care coverage by building joint educational programs that will enhance nephrology training globally. 4 Over the last 20 years, universities in the United States have significantly increased global health educational opportunities. These include, but are not limited to, global health courses either as part of the core curriculum or as an elective, and structured international electives. 5, 6 In the United States, 39% of medical schools offer coursework in global health, whereas 47% offer experiences abroad. 5 Institutions in Europe and LMIC are slowly following suit. Presently, only a third of German medical schools offer global health learning modules, and mutually beneficial exchange programs featuring a clinical experience between high-income countries and LMIC are more limited. 6 We are unaware of any specialized global health nephrology career tracks.

Although there are many excellent academic partnerships in global health, bidirectional academic exchange opportunities in nephrology remain particularly scarce. In this brief commentary, using the knowledge gained from our experience with an equitable exchange program between Makerere University and Yale University (MUYU), we describe potential opportunities for, and benefits of, bidirectional global health exchanges. Our lessons learned from the MUYU program between Uganda and the United States form the basis of this commentary. We propose concrete recommendations for building a sustainable, bidirectional, and mutually beneficial exchange program network for nephrology training within academic institutions.

BENEFITS AND LIMITATIONS OF CURRENT EXCHANGE PROGRAMS

The International Society of Nephrology (ISN) has vast experience in developing education and training programs between high-income countries and LMIC. These endeavors, such as the highly successful fellowship programs, have proven tremendously successful in training nephrologists from LMIC in relevant skills and in the development of clinical and research networks. Additionally, medical centers in LMIC have built their research and training capacities notably by participating in the ISN fellowship program and the ISN Sister Renal Center program, which initiates long-term partnerships between LMIC and high-income country nephrology institutions. 7 However, these programs have focused primarily on the training needs of nephrologists in LMIC.

Bidirectional educational opportunities in LMIC for fellows from high-income countries are quite limited. In 2020, the ISN inaugurated the first...
program that sponsored two fellows from high-income countries in a 1-year rotation in an African partner country. This is a laudatory undertaking. We believe bidirectional programs that academic institutions run are mutually beneficial and have the highest effect on LMIC through the continuous sharing of resources. Through overarching frameworks, academic institutions can build sustainable programs that go beyond the enthusiasm of individual groups.

**OCCUPATIONAL AND BENEFITS OF BIDIRECTIONAL ACADEMIC EXCHANGE PROGRAMS**

The benefits of undertaking a global health rotation are clear. Medical students and physicians-in-training who have participated in such exchange programs report enhancement of their clinical skills and confidence. Furthermore, they note improved ability for cross-cultural communication and develop greater sensitivity toward working in resource-limited settings under cost restrictions. To empower trainees to build their careers in global health, interinstitutional collaborations between high-income countries and LMIC have proven valuable, especially in the fields of education and research. In addition, global health programs encourage multidisciplinary approaches. Medical professionals can connect with specialists from various fields, such as social scientists, health economists, and policymakers, and consolidate efforts through joint programs.

Balanced partnerships promote health equity, create opportunities, and ensure the long-term strengthening of both health systems by addressing transnational issues. The benefits of educating students and physicians-in-training from high-income countries in LMIC are frequently debated. These benefits include activities that have academic value, such as joint research projects in implementation and integrative science, with relevant publications. Another benefit is the creation of highly structured and supervised collaborative sites for training of students, residents, and fellows in global health. Academic and funding institutions are increasingly recognizing these activities as valuable.

International experiences sensitize health care professionals to global health challenges. An exchange may inspire future leaders to build global programs in or beyond their own institutions. The formation of joint programs that benefit all participants will allow for global health career tracks in nephrology. Therefore, the effect of these programs, and the benefits to students and fellows, transcend the benefits to the individual. Partners from these high-income institutions can utilize their strengths by sharing resources according to the needs of LMIC. Better access to joint funding can facilitate developing shared standards and structured programs to distribute resources that advance patient care in LMIC.

The MUYU collaboration that began in 2006 has focused on training faculty and consultants for Makerere University College of Health Sciences, while providing opportunity for Yale University trainees and faculty to develop further expertise in global health. This program, working with Makerere University College of Health Sciences and its teaching hospitals, nongovernmental organizations, and the Ministry of Health, has also established two independent organizations focusing on NCD management in both urban and rural Uganda.

In 2019, the Yale Nephrology Fellowship program received approval from the Accreditation Council for Graduate Medical Education for an elective rotation in Global Nephrology using the MUYU template, developed with colleagues in Uganda. The goal of this rotation is to familiarize fellows with challenges nephrologists face in Uganda in providing care to patients with kidney disease, and to experience the role they play in educating the public and the front-line health care workers in recognizing and treating common diseases that are responsible for kidney diseases. Fellows rounded on inpatient wards and rotated through outpatient clinics with their Ugandan mentors, participated in teaching conferences with Ugandan house officers, and set up a quality improvement project developing a urine microscopy lab that can be used for teaching and patient care. They forged relationships with colleagues that promise to well outlast their stay there. In recognition of the time and resources the colleagues in Uganda provided, the senior nephrology faculty member, who was previously an ISN fellow at Yale, has been appointed as adjunct faculty at Yale, and the Yale nephrology teaching conferences are available to all Ugandan colleagues.

**RECOMMENDATIONS FOR IMPLEMENTATION**

We propose a model for development of mutually beneficial exchange programs in nephrology between institutions in high-income countries and in LMIC to nurture a culture of global learning. Led by co-directors from LMIC and high-income countries, the participants would receive global health nephrology education in collaborative institutions. The institutions in both high-income countries and LMIC should integrate the participants in clinical and educational activities and familiarize them with medical and social variables affecting the individual and community health. Policies that boost global health education in high-income countries play a vital role in creating awareness of global health disparities.

The ideal collaboration should be on the basis of equitable partnerships and, although mutually beneficial, should preferentially respond to the needs of the LMIC partner. Short- and long-term metrics should measure success of these programs. For the short term, we should measure the number of physicians who receive global health training in clinical nephrology and the number of joint scientific publications that come out of bidirectional research collaborations. In
Phase 2: Definition of roles and responsibilities

- **Program Lead:** Assignment of Co-Directors
- **Lift burden off LMIC**
- **Faculty appointment e.g. adjunct**
- **Longitudinal monitoring & evaluation**
- **Embedding in larger program**

Phase 1: Program initiation

- **Development of structured curriculum**
- **Approval by a national agency**

The long term, the goals are grander: to affect the health of a community and develop free-standing nephrology training programs within LMIC to more adequately target their own needs. We call for inclusive, reciprocal academic exchanges that preserve the balance of power. To assure the decolonization of global health, LMIC stakeholders must have clearly defined leadership roles. Although both co-directors are responsible for designing the teaching content and modes of administration, directors from LMIC will frame specific areas of needs and deficits.

Academic institutions such as ours should build collaborative networks and work together to launch mutually beneficial nephrology exchange opportunities. We suggest development of a structure that utilizes a holistic training approach. Clinical training should be the major education target, because most LMIC have a substantial lack of clinical nephrologists.\(^7\) The focus of nephrology education programs in global health should be on the local needs of developing countries with constructive mentorship. In-classroom modules should be accompanied by exchanges through field visits and research projects in the partner countries. Sponsorship could either be obtained from the academic institutions or from external funding by private foundations or governments.

Financial support will depend on the breadth of such a program and the resources of the academic institutions. Programs should ensure senior leadership in those LMIC are not overburdened by the demands of such programs without adequate direct or indirect compensation. There is growing interest by governments and private-sector foundations to finance clinical partnerships in global health. Initiating long-term bidirectional networks ensures access to resources in a globalized world. Academic institutions in high-income countries are crucial partners in reducing financial program barriers through joint funding applications. We believe paving the path toward bidirectional global health education in nephrology led by academic institutions sets this example, as summarized in Figure 1. Physicians and programs in LMIC need to be empowered to have meaningful roles in defining the goal and the key policies that govern such collaborations. Ideally, collaborations in nephrology should be embedded in larger long-term projects designed to improve the care of patients with kidney disease, as implemented by the ISN.

In summary, now is the time for everyone in nephrology to rethink how we train individuals to practice in the world in which we live. We need to take advantage of opportunities to expand our trainees' horizons beyond their local institutions, and into the world at large. Trainees have an interest in this, and it is the right thing to do. Our academic institutions are key in establishing and sustaining these partnerships by leveraging their drive for research and innovation. Doing this in a responsible, respectful, and reciprocal way will benefit patients with kidney disease around the world in the decades to come.

**DISCLOSURES**

F. Knauf reports having consultancy agreements with Allena Pharmaceuticals, USA, Alnylam Pharmaceutical, USA, Chinox Pharmaceuticals, USA, and Oxthera Pharmaceuticals, Sweden; reports receiving honoraria from Advicenne, ECoR1, Fresenius Medical Care; Medice, and Sanoﬁ; reports patents and inventions with PocketDoktor Medical Books; reports being a scientific advisor or member via the Scientific Advisory Board of Oxalosis and Hyperoxaluria Foundation, NYC; and other interests/relationships as an employee of the nonprofit institute Charité - Universitätsmedizin Berlin, which recently filed a patent application for oxalate-lowering agents in patients on dialysis with F. Knauf as one of two inventors. All remaining authors have nothing to disclose.

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