

Viewpoint

Academic careers in global pulmonary and critical care medicine: perspectives from experts in the field

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Academic global pulmonary/critical care medicine (PCCM) remains a relatively novel concept not fully embraced by all training programs, so PCCM early-career professionals may have little guidance in building successful careers in this field. To highlight various approaches used by current PCCM faculty to incorporate global health into their academic careers, speakers from a global health careers mini symposia held at the 2017 and 2018 American Thoracic Society International Conferences were invited to submit perspectives reflecting on academic PCCM and global health. The collection of essays was collated into a single manuscript. Eight current global PCCM faculty from diverse geographic and professional backgrounds provide experiential guidance for early-career professionals interested in global academic PCCM. Trainees and junior faculty interested in academic global PCCM will find innumerable obstacles to developing this non-traditional career pathway, but there exist diverse pathways to success.

The past decade has witnessed tremendous growth in global health opportunities for North American medical trainees. Traditionally defined as “an area for study, research, and practice that places a priority on improving health and achieving health equity for all people worldwide,”¹ global health is rapidly becoming a core focus for many universities.² Several pulmonary and critical care medicine (PCCM) training programs already offer dedicated global health tracks.^{3–5} Similarly, institutional academic partnerships between high-income and low- and middle-income countries (henceforth, HICs and LMICs, respectively) provide opportunities for fellows and faculty to engage in international work.^{6–8} Professional societies also play an important role in expanding the reach of global health outside the university setting. Programs such as the American Thoracic Society’s Methods in Epidemiologic, Clinical and Operations Research (ATS-MECOR) program⁹ and International Health Committee^{10,11} promote respiratory health worldwide through advocacy, education and research. While these opportunities are promising, they tend to be restricted to individual institutions and geographic regions.

Moreover, academic global PCCM remains a relatively novel concept a relatively novel concept not fully embraced by all training programs¹² and with no previously published professional guidance in the literature. Consequently, PCCM fellows and junior faculty at institutions with limited global health mentorship may have little guidance in building successful academic global health careers.

Herein, we offer advice from and highlight various approaches used by current PCCM faculty to incorporate global health into their academic careers. Ranging from traditional academic medicine to private practice, professional societies to transnational health policy bodies, these experts touch upon the challenges of balancing international work with family, clinical, and other professional demands to provide trainees and junior faculty interested in global academic pulmonary and critical care medicine with potential pathways to career success.

APPROACH

Two mini symposia, targeting early-career professionals

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and dedicated to academic global PCCM careers, were conducted at the 2017 and 2018 American Thoracic Society International Conferences in Washington, D.C. and San Diego, respectively. Symposia speakers and collaborators, all current PCCM faculty with global health-oriented careers, were invited to submit written summaries of their presentations. These faculty represent diverse geographic (HICs and LMICs; three World Health Organization regions) and professional (academic, private and faith-based practices; education, research, policy) backgrounds. Individual summaries were organized into a cohesive manuscript.

CAPACITY-BUILDING (RESEARCH)

Building health research capacity in LMICs is paramount to fill the gap in research output and generate locally relevant health research necessary to inform and improve practice, health policy and population health.¹³ The need for training the next generation of young investigators in LMICs and for adequate mentoring is increasingly recognized,^{13–15} and recent international collaboration initiatives have been successful in filling that gap.⁹

The Methods in Epidemiologic, Clinical, and Operations Research (MECOR) Program is a capacity building course intended for clinicians, investigators, academicians, and public health professionals who primarily work with respiratory diseases, critical care and sleep medicine to conduct research that is relevant to LMICs.⁹ The program was created by the ATS in 1994 in Latin America. Since then, it has organized annually in seven countries/regions globally together with local partners. The MECOR footprint is now truly global, with more than 1,800 graduates over 25 years of experience.^{9,16}

Faculty volunteers commit for a three-year period, during which they participate in three annual one-week intensive courses in one of the countries/regions and mentor their students in between courses. Faculty are not hired by and do not have a formal career within the program, but the ties are very strong. Working closely with highly selected students in an environment that mixes academic excellence, motivation, and friendship is rewarding. Witnessing students learn over the week and watching their careers being transformed over the years is a powerful reason to stay involved. Many faculty members have volunteered for second and third rounds, served as faculty in different countries, or become country directors. In many regions, faculty are now mostly composed of program graduates, fulfilling the program's mission to build local capacity in research and leadership.¹⁶ The ATS has recently improved the faculty recruitment program and applications are open for ATS members with interest in becoming course faculty or project mentors.¹⁷ Project mentorship offers the opportunity to get involved in education and research in LMICs by mentoring LMIC investigators on their research projects without time away from one's home institution.

CAPACITY-BUILDING (EDUCATION)

Ethiopia is a low resource country with a high burden of respiratory diseases and few specialized physicians to meet population demands. The East African Training Initiative (EATI) was founded in 2013 to create a cadre of well-trained Ethiopian PCCM physicians.¹⁸

The first phase of EATI (2013–2018) was mainly focused on clinical and research training through a 2-year intensive fellowship program. American and Swiss faculty provided continuous on-site clinical training. Pan-African Thoracic Society/MECOR established a foundation in clinical re-

search. Vital Strategies, the Swiss Lung Foundation, Addis Ababa University, and the Ethiopian Ministry of Health jointly sponsored the project. Twelve PCCM physicians have been trained and four are current fellows (two from other East African countries). Ethiopian leadership now directs the fellowship program.

The second phase (2019–2023) will add three components to the ongoing PCCM fellowship. The first is the Critical Care and Pulmonary Research Institute of Ethiopia (CA-PRIE), which will serve as a center for PCCM research throughout the country. The second is an advocacy component of the Ethiopian Thoracic Society, targeting public health reduction of risk factors for lung diseases. The third is Project ECHO, a telemedicine approach to disseminating PCCM knowledge throughout Ethiopia.

WORLD HEALTH ORGANIZATION

The World Health Organization (WHO) is a United Nations (UN) specialized agency that addresses health policy by focusing on underlying social, environmental and economic determinants of health, developing evidence-based guidance and standards, public health education and action for member states and overseeing implementation of the International Health Regulations. Although headquartered in Geneva, Switzerland, activities are organized according to regional geographic offices. Individual WHO country offices work directly with governmental agencies and Ministries of Health. While WHO has a global mandate, its engagement is often of particular relevance in LMICs that may not have the breadth and depth of health resources of high-income settings.

Areas of activity relevant to PCCM practitioners abound, especially as the evolving patterns of global burden of disease have increased attention to acute care¹⁹ and non-communicable illness. In addition to a focus on infections that have particular relevance for pulmonary disease (eg, tuberculosis, severe viral acute respiratory infection), the WHO has championed the elimination of tobacco-related morbidity and mortality, improved air quality,²⁰ injuries and transport-related morbidity and mortality²¹ and safe emergency and essential surgical care.²² While critical care traditionally has not been a focus of interest for the WHO, more recently it is increasingly viewed as an essential component of post-operative care and outbreaks of global significance. The recent World Health Assembly resolution on sepsis will focus attention on policy initiatives, clinical care, quality improvement, and globally relevant research for this highly lethal condition.²³

Mechanisms of clinician engagement with the World Health Organization include clinical care, research, and education and training. WHO generally does not employ clinicians to carry out direct patient care, but clinical expertise, multilingualism and geographic mobility are valued skills for full-time professional positions.²⁴ WHO frequently seeks temporary consultant positions for active clinicians with specific content or technical expertise and facilitates substantial public health, community-based, clinical and basic research.²⁵ Education and training, especially in LMIC environments with limited capacity, is a common WHO role. Examples relevant to pulmonary and critical care medicine include the Integrated Management of Adolescent and Adult Illness (IMAI) guidelines for clinicians working at district hospitals in resource-constrained settings.²⁶ For trainees (undergraduates, graduates and junior professionals) several opportunities also exist. Variable duration unpaid internships provide both broad organization and specific technical unit practical experience. Certain countries

sponsor “Junior Professional Officer” positions to provide early-career young professionals with practical experience in multi-lateral technical co-operation.

RESEARCH IN LOW- AND MIDDLE-INCOME COUNTRIES

Why do research in LMICs? In a small mission hospital in southern Zambia, at 3.30 AM on a hot night in 1992, I decided not to come back to Africa if I couldn’t do research. I’d been called out of bed again to try and resuscitate a two-year-old dying of AIDS. There weren’t any antiretrovirals, there wasn’t any hope, I was one of three doctors and I was exhausted. Nowadays, HIV is treatable, and prevention of mother-to-child transmission has made what we saw then almost a thing of the past. The first and foremost reason to do research in LMICs is so that the next generation will be different. The nature of the research, however, is not so straightforward. Research in LMICs should be of the highest quality, clinically relevant to the local health needs, and have a major component of capacity development.

High Quality—There will not be the same volume of work done in LMICs as in many countries, such as the United States or European nations. Therefore, whatever is done needs to be done once, and very well. Your study may well be the first to address a question, and the last for 20 years. For example, a search for “pneumonia USA” gets nearly 21,635 hits, whereas “pneumonia Malawi” gets 181. Scott published on the causes of pneumonia in Kenyan adults in the 1990s.²⁷ The next study of that scale was completed only recently in Malawi.²⁸

Clinically Relevant—Our group studies alveolar macrophage function in HIV in Malawi. While working on this, however, we also noted high levels of carbonaceous material. Over 10 years, we found that this was related to cooking and lighting, and the levels of smoke exposure made it likely that the pollution would cause both childhood pneumonia and impaired lung function. These observations allowed us to test the largest cook stove trial to reduce household air pollution that has ever been conducted in Africa. Cook stoves did not work to prevent pneumonia.²⁹ The lung function deficit we see is small lungs, not classical COPD.³⁰ The questions now presenting around chronic lung disease are big. How can we reduce smoke exposure? Why are 40% of adults living with reduced lung function and a life expectancy of 63 years?

Capacity Development—There is no specialist training in Respiratory Medicine in most of Africa. There are exceptions (South Africa, Nigeria, Egypt and now Ethiopia)⁷ and these provide a good model. But researchers in Africa have an obligation to think of the next generation of research. Who will conduct the studies, implement the findings, translate the results into government policy? At the Malawi Liverpool Wellcome Trust Programme, the number of trainees has grown from four when I was a Fellow, to over 100 in a unit with 700 staff. We would like more people to be part of this Programme, which aims to develop People, Places and Policy as well as the traditional research products of Papers and Patents.

TRAINING PCCM PHYSICIAN-SCIENTISTS IN GLOBAL HEALTH

For physicians pursuing PCCM fellowship training with the objective of becoming independent physician-scientists focused on global health, there are several important considerations.

First, as global health is broadly defined, research in global health can take many forms and does not necessarily require time abroad to be conducted. For example, the

health of underserved populations within high-resource countries constitutes global health. Also, seminal contributions to global health can be made by locally performed analysis of global data, as evidenced by the SAILORS sepsis collaborative and the Global Burden of Disease project of the Institute of Health Metrics and Evaluation at University of Washington.^{22,31,32} International collaborations of all varieties are greatly facilitated by the widespread availability of data sharing, social networking, and videoconferencing tools. However, for many, spending time with the population at risk is an essential element of becoming a researcher focused on global health. Regardless of research topic or location, perhaps most important is that trainees maintain a broad worldview, an open mind, and heightened cultural awareness and sensitivity.

Second, for fellowship training, select an institution with a track record of success in nurturing physician-scientists to independence. In the United States, most of these institutions will hold an NIH T32 institutional training grant that provide funding to support the development of post-graduate researchers. Equally important is to identify a qualified and supportive mentor (or co-mentors). While, ideally, these institutions and individuals will be familiar with global health research and have existing research infrastructure and capacity to support trainees in this area, this is not necessarily essential early in one’s research training because many fundamental research skills can be acquired in a variety of domains. Once acquired, this skill set can then be applied to global health topics and further refined to enhance global health-specific investigation. For example, a fellow may first obtain the necessary training in the epidemiology of chronic obstructive pulmonary disease (COPD) by analyzing existing datasets of COPD patients in high-income countries. Subsequently, the trainee can use this knowledge to design and implement studies of COPD in other areas of the world, where data are more limited. Trainees should also plan to acquire specific training in global health knowledge, leadership, and research ethics as appropriate.

Third, trainees should consider early-on how to be maximally productive (as demonstrated by first author abstracts and manuscripts), as well as the best strategy to compete successfully for small training grants followed by funding such as National Institutes of Health (NIH) K career development awards. Such awards are key mechanisms to promote one’s progression from mentee to independence as a physician-scientist. Moreover, writing grant applications is an important skill to master since most independent physician-scientists need to continually compete for research funding. The career development award application process takes substantial time and planning, requires selection of an appropriate mentor or mentors, development of a compelling and feasible research plan, and creation of an interwoven, enriching career development plan. Protected research time is short and precious, so crafting a realistic set of goals and timeline from the first days of one’s research training is essential. By keeping these considerations in mind, junior physician-scientists have the best chance to succeed in establishing a career addressing the many salient pulmonary and critical care research needs in global health.

FAITH-BASED ORGANIZATIONS IN LMICs

Virtually all major religions encourage caring for the poor and the vulnerable in society. Although exact figures are disputed, it is not surprising that faith-based organizations account for a substantial part of health care in many LMICs.^{33,34} Historically, faith-based hospitals and health institutions (FBH) have been associated with higher patient satis-

faction and perception of higher quality care.³⁵ The motivation for an expatriate physician to work in an FBH may vary widely but a common thread is the desire to serve the poor as a natural expression and as an integral component of one's faith. It is clearly not possible to represent the activities of all FBHs in this forum, so instead I describe one such place in Kenya, Kijabe Hospital, where I had the privilege of working for better part of 6 years.

Kijabe Hospital is owned and operated by the Africa Inland Church, a large Protestant denomination in East Africa. The leadership of the hospital, including the CEO and the board, is Kenyan. Kijabe's long-term presence has well-positioned the hospital for training nationals and providing culturally and economically appropriate medical care in that region of Kenya. Much of the goal has been to train African clinicians for Africa, so education and training of physicians, nurse anesthetists and clinical officers for long-term, sustainable, quality health care has been the strategy. Kijabe has had many successful training programs over the years, but one training program of special interest to the PCCM community is the Emergency Critical Care Clinical Officer program (ECCCO) Program.

Burden of illness, including critical illness, is high in LMICs, yet critical care services have been relatively neglected in Sub-Saharan Africa. ECCCO is an 18-month training program, started at Kijabe in January 2015, to help bridge this gap.³⁶ Numerous faculty volunteers from Vanderbilt, Mayo Clinic, University of Minnesota, Georgetown and others, as well as countless North American residents and fellows, have served in clinical and teaching capacities to enrich this training mission. The American Thoracic Society also contributed via the (now closed) Global Scholars Program.³⁷ The success of the ECCCO program has been officially recognized by the Ministry of Health of Kenya and there are considerations to expand the program to other institutions nationwide.

Of course, working or volunteering at an FBH is not for everyone. One should explore fully the beliefs and practices of the FBH to ensure that one is comfortable with those items, as there will be wide variations from one FBH to another. For example, Kijabe Hospital welcomes short term volunteers of any faith background, but everyone must agree to follow a code of conduct and show respect for the local culture, including the faith traditions. Other institutions may be more or less inclusive in this regard. Also, FBHs are not immune to issues that plague many hospitals in LMICs, such as poor states of repair, general lack of resources, high attrition of workers, poor governance and tremendous economic pressures. Nevertheless, for the physician who is comfortable working with these limitations and challenges, working at an FBH can be a rich, rewarding experience, as evidenced by hundreds of physicians who do so, often at considerable personal sacrifice of time and salary.

PRIVATE PRACTICE AND GLOBAL HEALTH

I completed a traditional PCCM fellowship at the University of California San Francisco (UCSF), with research studying the effects of indoor air pollution on the respiratory health of women and children. However, I felt uninspired to pursue a traditional research-focused academic career, and instead chose to stay on as junior faculty at San Francisco General Hospital with a focus on clinical medicine, medical education and quality improvement. After a few years, though, I felt that my career had something else to offer. I wanted to teach, but it seemed that the target audience I wanted to reach was different. Suddenly, an opportunity came that I

could not refuse. In 2009, I left UCSF to work at the WHO as a consultant during the influenza H1N1 pandemic, assisting in creating teaching materials on the clinical management of severe influenza infection in resource-limited settings. After that year, it became clear to me that my passion was to empower "intensivists" working in LMIC settings to better their critical care services in adapted and culturally sensitive manners.

Finding the balance between clinical work and global health has proven to be my biggest challenge. To do both, I focus on critical care as my clinical activity, as frequent traveling did not lend itself to an outpatient pulmonary practice. I was able to find a private practice group in San Francisco that gave me an opportunity to work part-time in a busy tertiary ICU and which also supports my busy global health career.

My global health work has been exclusively for the WHO. Between 2011 and 2016, I was a part-time consultant working for the Infectious Hazards Management Department (formerly Pandemic and Epidemic Diseases Department). I have remained as technical lead of the WHO Severe Acute Respiratory Infections (SARI) critical care training course. In this role, I also provide technical assistance on clinical management for other infectious disease outbreaks where critical care is needed. This work has enabled me to contribute to the training of over 1,200 doctors globally and to help strengthen the critical care response to severe acute respiratory infections through collaboration with international colleagues, members of health ministries and representatives of the WHO at the headquarters, regional and country offices.

Although this paradigm has served me very well, the sustainability of doing both clinical medicine and global health, when my offices are "thousands" of miles apart, remains unclear. For example, to advance the critical care agenda at the WHO, perhaps being on-site more is essential. To have a family and settle down, perhaps one needs to "put down roots" in a single location. Beyond such quandaries, I must admit that I have a career that I love and am so grateful to be able to contribute to global health in this manner.

PEDIATRIC CRITICAL CARE

All the above career paths are applicable across ages. Given the disease burden and population demographics, the requirements for pulmonary and critical care to focus on children are tremendous. International societies such as the World Federation of Pediatric and Intensive Care Societies (<https://www.wfpiccs.org/>) have made global training opportunities and capacity building a focus, given these needs. Additionally, individual training programs in North America have robust institutional linkages, given the well-established global health centers in most children's hospitals. Training programs for pediatric critical and emergency care have begun in Kenya (<http://www.pecc-kenya.org/>) and are starting to scale up in other regions to begin to address the human resources gaps. Opportunities for advocacy, education, research, and clinical provision abound, and interested early-career individuals can access these through any of these pathways.

CONCLUSIONS

There is no single pathway to a successful career in academic global PCCM. Specialist clinical skills, public health, research and teaching are all needed in government, international public health, NGO and faith-based settings. De-

termination and creativity during training are crucial and should feed into strategic thinking and a 5-year individual development plan, which can help to articulate specific goals and career strategies.³⁸ Participating in global health-focused professional society opportunities also provides face-to-face networking opportunities between trainees and potential mentors, who can provide career advice and potentially offer opportunities to join existing projects.³⁹ Trainees and junior faculty interested in academic global PCCM will find innumerable obstacles to developing this non-traditional career pathway, particularly in institutions where global health is less emphasized. However, the strategies outlined in this paper offer diverse pathways for success.

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