

# FIT Grand Rounds: Cardiovascular Training in Rwanda

Hanan Kerr, MD

Associate Professor of Clinical Medicine

Cardiovascular Division

University of Cincinnati College of Medicine



# OHIO ACC FIT COUNCIL (CINCINNATI)

Ohio-ACC FIT Council Program Hosts:

## UNIVERSITY OF CINCINNATI MEDICAL CENTER

- Maryam Saleem (Co-chair)
- Nick Biondi

## CHRIST HOSPITAL

- Hanad Bashir



[Maryam Saleem, MD](#)



[Nick Biondi, DO](#)

We welcome Dr. Hanad Bashir (1<sup>st</sup> year fellow) at Christ fellow to Ohio ACC FIT council. We would also like to congratulate Christ Hospital on starting an Adult Cardiology Fellowship Program.



[Hanad Bashir, MD](#)

# Hanan Kerr, MS, MD

Associate Professor of Clinical Medicine

University of Cincinnati College of Medicine

University of Cincinnati Medical Center/ VA Medical Center

Director of the University of Cincinnati Rwanda Initiative

Medical Degree: Ohio State University

Residency: Virginia Commonwealth University, Medical College of Virginia (Internal Medicine)

Masters in Public Health: Ohio State University

Fellowship: University of Cincinnati/University Hospital (Cardiology)

Fellowship: Allegheny General Hospital (Cardiology)



# Disclosures

- No conflict of interest

# Questions:

- **Why** get involved in Global health projects/SSA ?
- **How** do we contribute with intention?
- What is the **VALUE** of local and academic partnerships?
- How do we evaluate the **impact** of our actions?
- Overview of UC Rwanda Initiative

# Objectives

1. Identify the burden of cardiovascular disease in Sub-Saharan Africa
2. Identify the health care work shortage in Sub-Saharan Africa
3. Describe the benefits of academic partnerships in Global Health
4. Explain ways we can evaluate our impact with global intervention

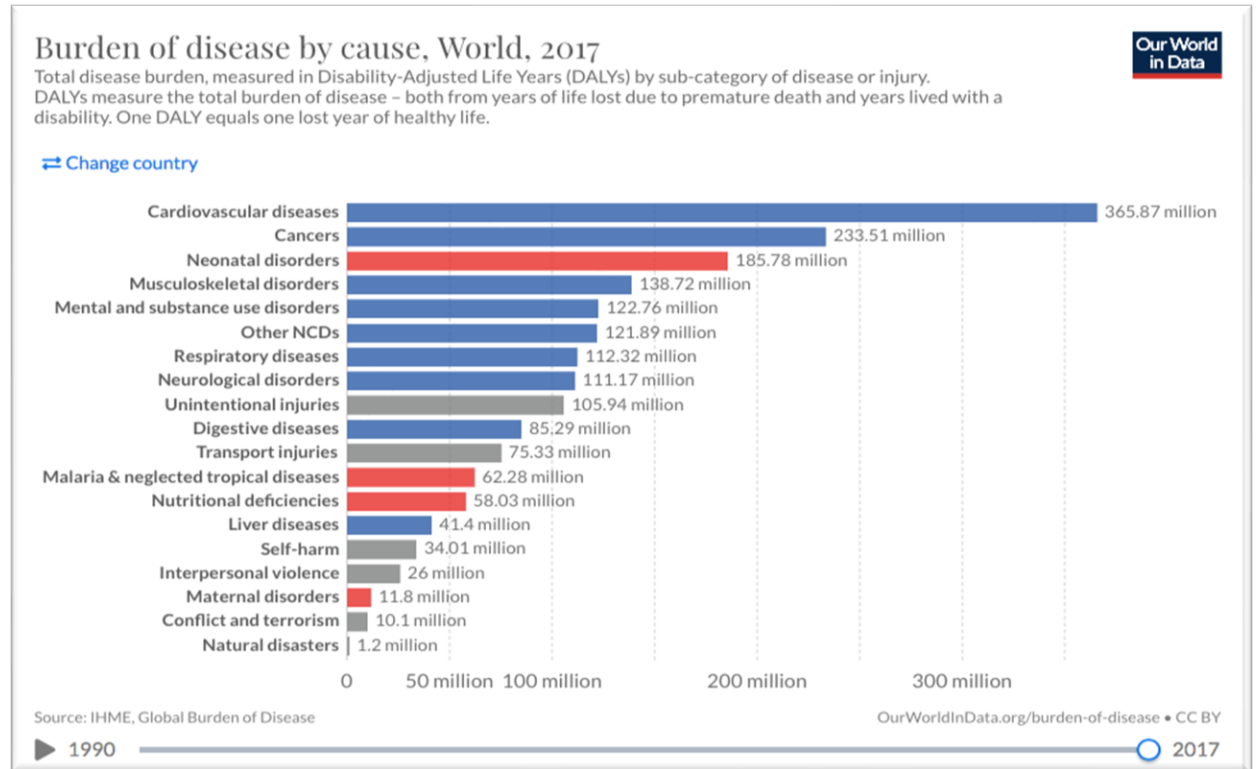
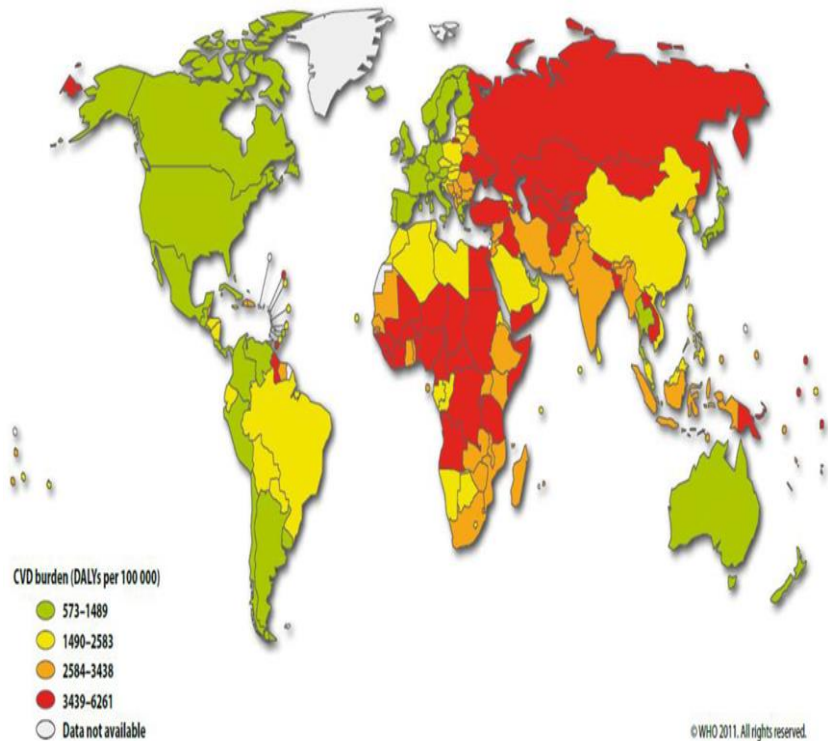
# Case- my GH story

- AS a cardiologist went to Belize mission trip in 2006, with surgical and IM team. UC anesthesia was involved in the trip. I was in private practice looking for more purpose in my work .
- We traveled with 40 people, MD's , pharmacist, nurses and set up clinic in one of the schools and proceeded to see patients for 5 days. We saw close to 400 locals in one day. Treated HTN, DM, Skin infections, I was absolutely out of my element as a private practice cardiologist.
- No prep for the culture, the needs, the local health system
- I felt that I may have helped but did not know



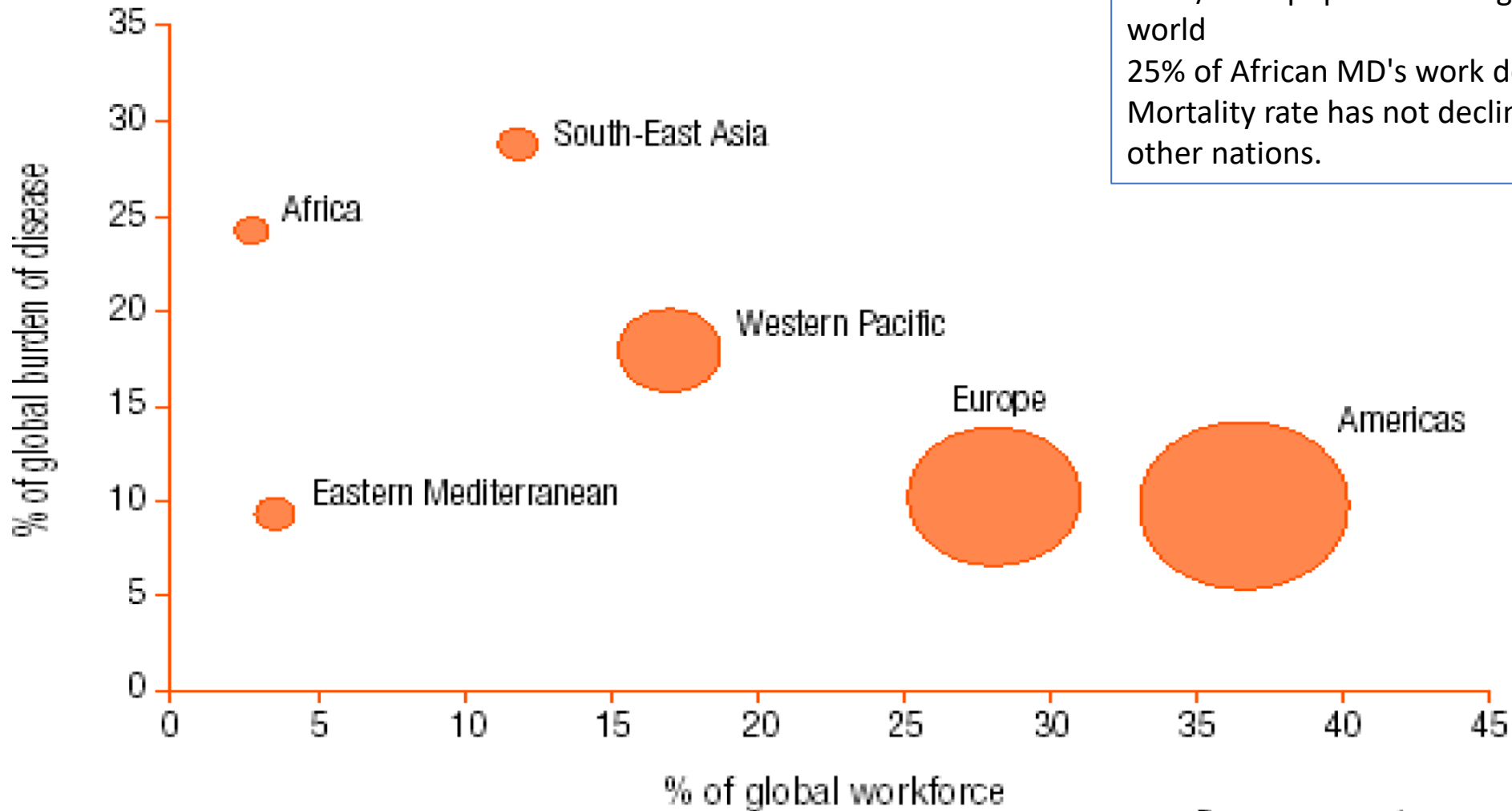
# Global Disease Burden-CVD

- SSA is the only region where death from CVD is on the rise.
- 11% of all deaths in SSA is due to CVD vs 5% globally





# Health Care Worker Shortage in SSA

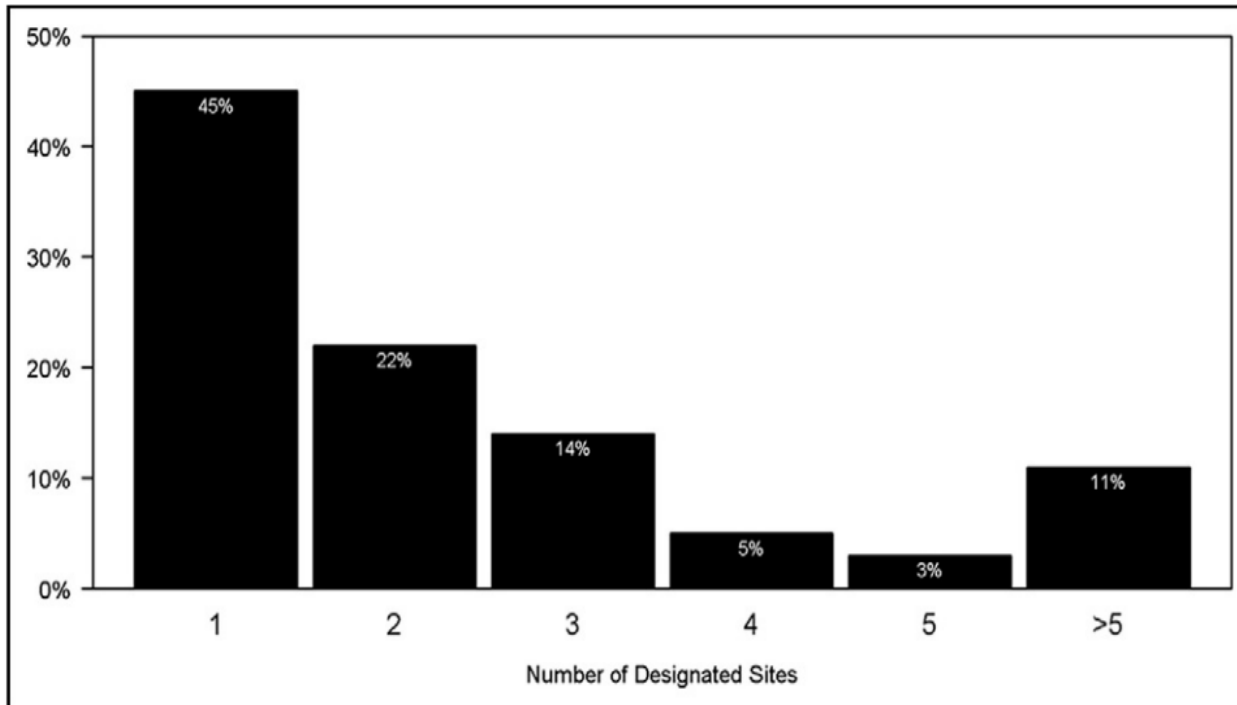


**SSA has 25%** of the global disease burden, only **3%** of the world's health **care worker**  
60% of SSA countries do not meet WHO minimum of 2.3 HCW/1000 population. Largest HCW shortage in the world  
25% of African MD's work developed countries  
Mortality rate has not declined in SSA as seen across other nations.

Physician per 10,000 population	
SSA	1.3
UK	27.4
USA	26.7

# What is "in it for us"?

## Global Training in US IM Residency Programs



**Figure 1** Number of designated sites. Of the 160 (57.3%) programs allowing residents to rotate outside of the US, 65 (40.6%) utilize designated sites. The figure displays the distribution of the number of designated sites across these 65 programs. Percentages may not sum to 100 due to rounding.

- 57% of 279 programs offer their residents international rotations 57%
- Higher number of programs in Pediatric and ER offer International rotations ( 60%, 70%)
- The majority of PD believe that experiences in resource-poor cultures enhance curriculum and important for recruitment
- Limitations: funding, covering services at home institutions,

# Benefit for IM Residency Program- Increasing Interest

Table 1  
A Summary of Resident Surveys about Global Health

Survey years	Respondents	Global health program	Percentage of residents who felt that international opportunities influenced their residency selection	Percentage of residents who wanted to pursue an international clinical rotation	Comments from resident participants of international clinical rotations
1982 - 1996 (Gupta 1999) <sup>2</sup>	192 of 352 (61%) internal medicine residents/graduates at Yale University	Four to eight weeks in Haiti, Tanzania, Zimbabwe, Fiji, New Mexico, or Arizona	28% (53/192)	N/A	81% (153/190) agreed that "residency training should include voluntary electives in developing countries"
1988 - 1995 (Miller 1995) <sup>2</sup>	281 of 303 (93%) internal medicine residents/graduates at Duke University	12 weeks in Tanzania, Taiwan, China, or Brazil	24% (68/280)	55% (55/100) of residents planned participation	On average, international elective "had the most significant positive impact on their medical training"
1992 - 1998 (Haskell 2002) <sup>22</sup>	17 (sample size not specified) orthopedic surgery residents at University of California - San Francisco	One month in South Africa	N/A	N/A	Based on responses, faculty had "embraced the elective as part of an ideal orthopedic resident curriculum"
1994 - 2003 (Bazemore 2007) <sup>10</sup>	69 of 90 (77%) family medicine graduates at University of Cincinnati	Includes work in developing country and didactics in tropical medicine and public health	Most significant factor for choosing residency among international health track participants	N/A	N/A
2000 - 2001 (Dey 2002) <sup>11</sup>	408 of 1,205 (34%) first-year emergency medicine residents at	N/A	47% (173/369) (68% [104/152] among those with	86% (350/406)	77% (313/407) would "like to see more

58% of NYU surgical residents, 67% of University of Colorado pediatric interns identified global health opportunities as a significant factor in their selection of a residency program

Residents are 2 times more likely to choose a program a program with global health than a decade ago

-87% of Yale residents participants surveyed that International rotations should continue to be offered.  
-81% described the rotations as having the most significant positive impact during their medical training.

# Lasting benefits to residents-surveys of participating residents

- Broaden medical knowledge
- Disease not seen in the U.S.
- Late stage of common diseases
- Physical examination
- Appreciation for public health issues, professionalism, cultural sensitivity
- Awareness of cultural/socioeconomic factors

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2000 - 2004 (Federico 2006) <sup>12</sup>	22 pediatric residents at University of Colorado Health Sciences Center	Four weeks in Guatemala or Peru	67% of 2005-06 interns (sample size not specified)	96% of 2005-06 interns (sample size not specified)	"Feedback from resident and faculty evaluations of the elective was uniformly positive."
2004 - 2005 (Ozgediz 2005) <sup>21</sup>	28 of 40 (70%) surgical residents at University of California - San Francisco	Six weeks in Uganda	N/A	90% (25/28)	"A developing country surgical experience... should be an essential component of surgical training programs"
2006 (Powell 2007) <sup>13</sup>	52 of 63 (83%) general surgery residents at New York University	In development	58% (30/52)	98% (51/52) (73% [38/52] prioritized global health elective over all other electives)	N/A



# Case-my story

- 2016 Traveled to Rwanda with Team Heart, non-profit .
- Team of Cardiologist, CT surgeons, cardiac anesthesia, OR nurses, cardiac sonographers
- Screen 100 patients and choose 30 for open heart surgery.
- Beautiful country, and people with an inspiring history- The 25-year struggle and resilience after genocide.
- Did not interact with local physicians
- Did not understand the culture
- Was this the best way to get involved?
- Treating 30 patients per year, but how are we impacting the future of the CV health care?



# How do we contribute with clear intention and how do we measure our impact?



# Academic partnerships

- Collaboration between an organization or government from an underserved country with a domestic academic institution



*Pan African Academy  
of Christian Surgeons*



HUMAN RESOURCES  
FOR HEALTH PROGRAM

REPUBLIC OF RWANDA





# Partners In Health

Boston-based non-profit healthcare organization  
Founded in 1987 by Paul Farmer, Ophelia Dahl, Thomas J. White, Todd McCormack, and Jim Yong Kim



## Our Theory of Change

PIH's approach is one of accompaniment; we work side-by-side with our friends and colleagues at the community, local health authority, and global advocacy levels to show what is possible in global health delivery. We take our best practices and conduct research to demonstrate our impact and to educate current and future leaders at the local, national, and global levels. We are an organization that is diverse, nimble, and rises to the challenges we encounter with optimism, compassion, and tenacity.





# Partners In Health



- Mass General Brigham
- Massachusetts General Hospital
- University of Pennsylvania
- University of Washington
- Yale University
- Harvard Medical School
- Boston Children's Hospital
- The George Washington University

# Partners in Health- Milestones

## 2004

PIH co-founds [OpenMRS](#), an open source electronic medical records software tailored for use in developing countries. Today, organizations and governments in 64 countries use OpenMRS.

## 2005

PIH expands to [Rwanda](#) and partners with the government to bring high-quality health care to three of the country's poorest regions. This includes oncology care at the [Butaro Cancer Center of Excellence](#), which we open in 2012 to provide accessible, lifesaving cancer treatment to patients from Rwanda and east Africa.

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## 2010

PIH expands to [Kazakhstan](#) to support the government's fight against multidrug-resistant [tuberculosis](#).

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## 2013

PIH opens [University Hospital](#) in Mirebalais, Haiti, a 300-bed teaching hospital that provides advanced, high-quality care and offers specialized residency programs to train the next generation of clinicians.

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## 2015

PIH begins leading a partnership called [endTB](#), which expands global access to [new treatments](#) for multidrug-resistant tuberculosis and conducts clinical trials to find shorter, less toxic, more effective drug regimens across multiple countries.

# Partners in Health- Rwanda



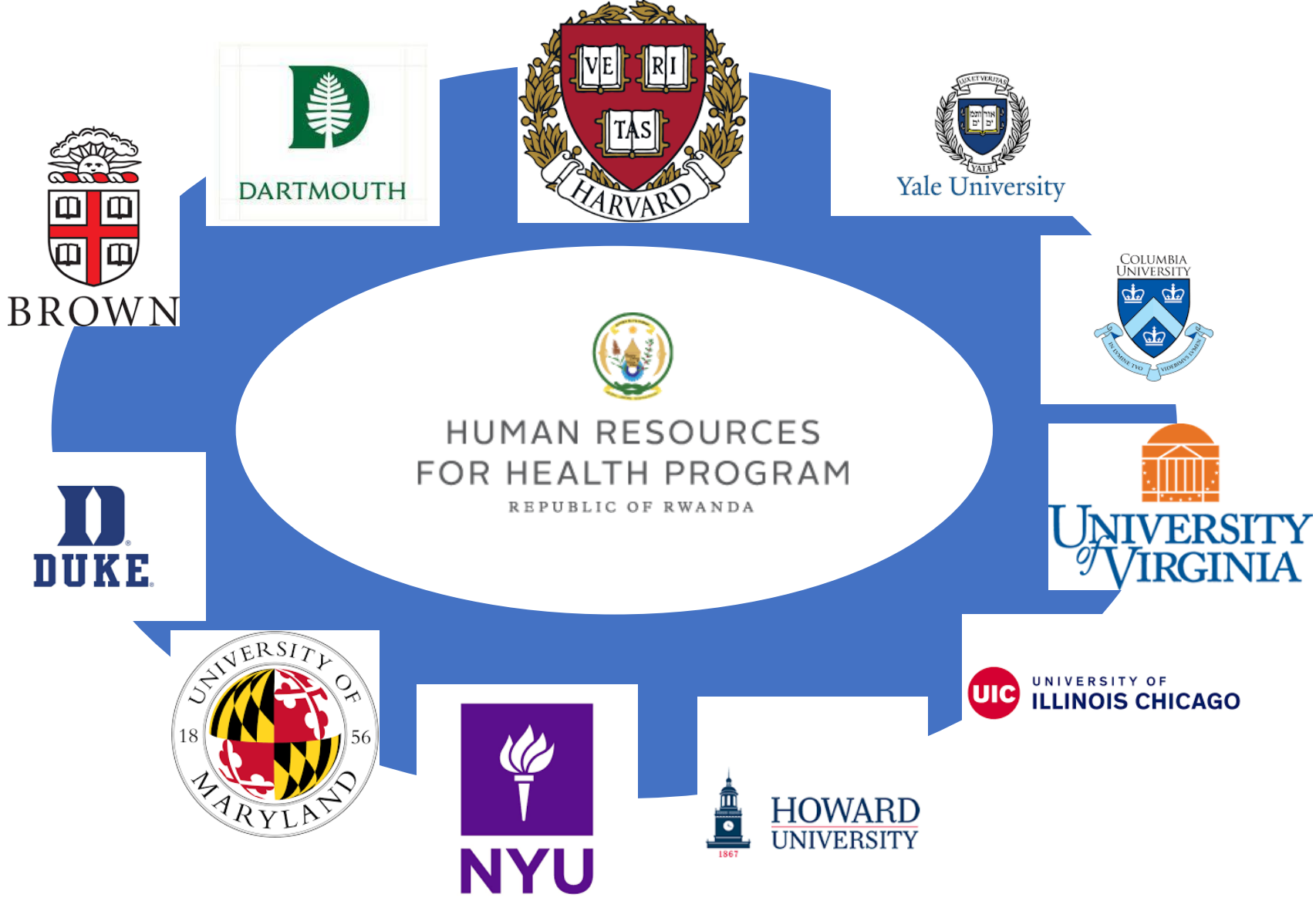
UNIVERSITY OF  
Global Health  
EQUITY

- First class of Rwandan medical students -2019
- 6-year program
- Full scholarship in return for 6-9 years of service in underserved regions



“What a great vision, and one that squares with the Rwandan vision of pulling people up by building a ‘knowledge’ economy while delivering care— and what better way to promote peace, justice, and development in the region

# Human Resources for Health Program-HRH



Program started in 2012 by the Government of Rwanda and Clinton F. to build health education infrastructure and workforce  
Vision: focuses on knowledge transfer, sustained collaboration, and the establishment of new medical residency, nursing specialty, health management, and oral health programs within the Rwandan education system.

# HRH-Strategy

**Table 2. Institutions Affiliated with the Human Resources for Health Program.**

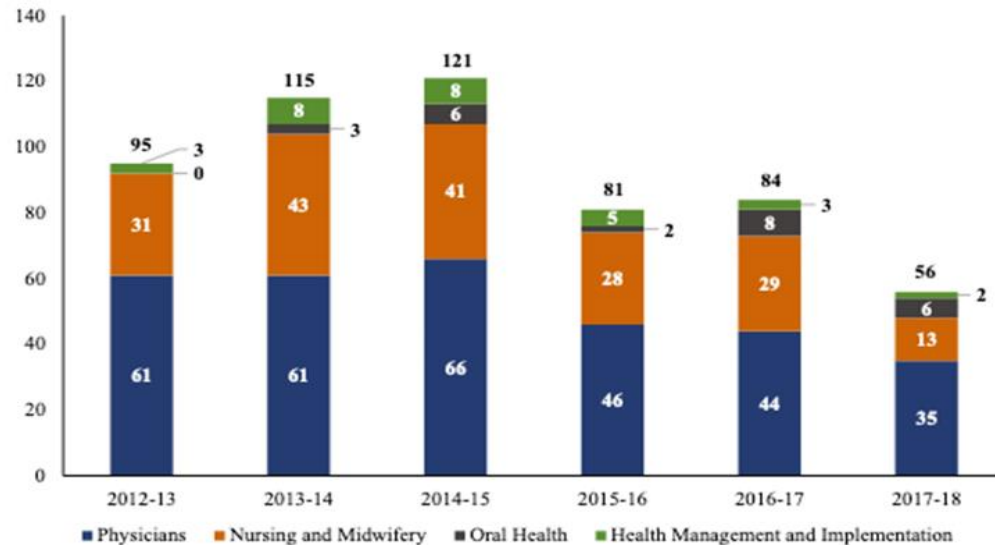
Focus of Collaboration	Rwandan Affiliates	U.S. Affiliates
Medical degree	National University of Rwanda National University of Rwanda Faculty of Medicine	Albert Einstein College of Medicine at Yeshiva University Beth Israel Deaconess Medical Center Boston Children's Hospital Brigham and Women's Hospital Columbia University Medical Center Duke University School of Medicine Geisel School of Medicine at Dartmouth Harvard Medical School Massachusetts General Hospital Rhode Island Hospital at Brown University University Emergency Medicine Foundation at Brown University University Medicine Foundation at Brown University University of Maryland School of Medicine University of Texas Medical Branch University of Virginia School of Medicine Yale School of Medicine
Nursing degree	Byumba Nursing and Midwifery School Kabgayi Nursing and Midwifery School Kibungo Nursing and Midwifery School Kigali Health Institute National University Faculty of Nursing Sciences Nyagatare Nursing and Midwifery School Ruli School of Nursing Rwamagana Nursing and Midwifery School	Duke University School of Nursing Howard University School of Nursing New York University College of Nursing University of Illinois at Chicago College of Nursing University of Texas Health Science Center at Houston University of Maryland School of Nursing
Health management degree	National University of Rwanda School of Public Health	Harvard Medical School Department of Global Health and Social Medicine Yale University Global Health Leadership Institute
Oral health degree	Kigali Health Institute National Dentistry Association	Harvard School of Dental Medicine University of Maryland School of Dentistry
General support	National Council of Nurses and Midwives Rwanda Medical Association Rwanda Nursing Association	Duke Global Health Institute

- Deploy ~100 US faculty members to Rwanda / year
- Faculty appointments for one year period to partner with Rwandan faculty-member counterparts in direct academic and clinical teaching
- “Twinning” model
  - Facilitate curriculum development, service delivery, research capacity
  - Slowly replace visiting faculty with graduated, Rwandan faculty
- Goal: Rwandan specialists will assume all teaching and care delivery
  - Additional of > 500 physicians with specialty and subspecialty training
  - ~5000 nurses will upgrade that qualifications from secondary school to 3 years post-secondary school (A1 level certification)





## Health Professional Training and Capacity Strengthening Through International Academic Partnerships: The First Five Years of the Human Resources for Health Program in Rwanda



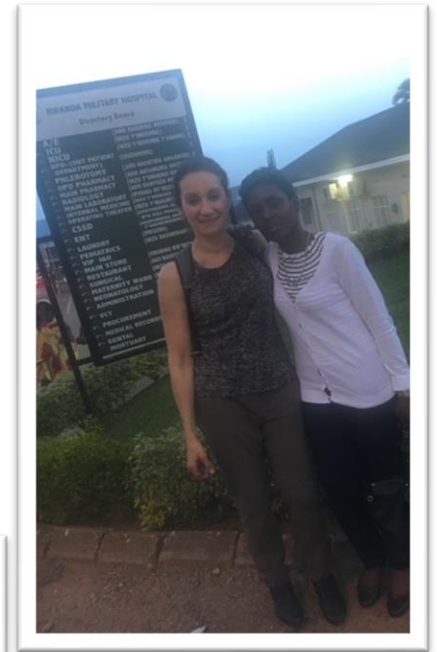
*“The establishment of additional academic partnerships and collaborations with the US academic institutions and eventually the launch of additional training programs (for example in sub-specialty areas) will be critical to ensure that the newly recruited Rwandan faculty are able to further develop professionally and thrive academically.”*

**Figure 4.** Visiting Faculty Deployment across 4 Health-Related Disciplines (2012-2017)\*.

\* Data for years 2012-2013, 2013-2014, and 2014-2015 presented in the Mid-Term Review of the Rwanda Human Resources for Health Program released by the Ministry of Health in 2016.

# Case- my GH story

- 2018-2019 Travel alone to Rwanda without a team
- First-hand knowledge of their needs, the strengths and weaknesses of their health care model- CHUB Teaching Hospital
- Traveled to Butare on local bus



# UC Rwanda Initiative



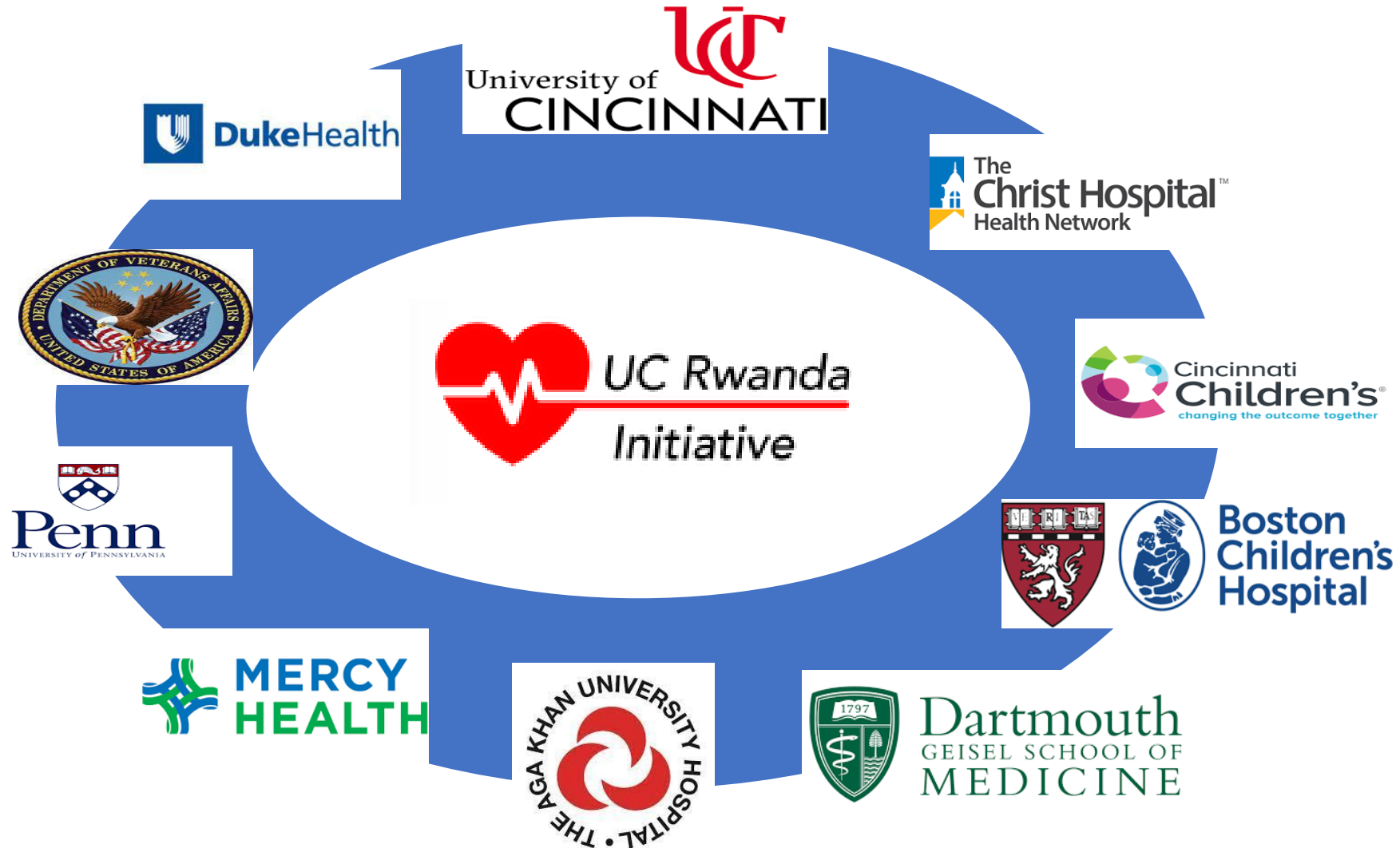
Vision: Increase Rwanda's capacity to diagnose and treat cardiovascular disease by supporting formal cardiology training program in Rwanda through Collaboration, Education and Research



# Human Resources for Health Program



# UC Rwanda Initiative: Education



# UC Rwanda Initiative- Virtual Curriculum-2019

## Atherosclerotic Cardiovascular Disease

- Acute Coronary Syndromes
- ST Elevation Myocardial Infarction
- Complications of Myocardial Infarction

- Supraventricular Tachycardia
- Ventricular Tachycardia
- Introduction to Pacemakers

targeting human mutations in heart disease

- Calcium cycling pathways in cardiac physiology and pathophysiology
- Cell Signaling in Cardiac Health and Disease: From receptors to response

## Valvular Heart Disease

- Aortic Stenosis
- Mitral Regurgitation
- Mitral Stenosis
- Infective Endocarditis
- Surgical Perspective to Aortic Stenosis
- Surgical Approach to Mitral Valve Disease

## Heart Failure, Disease of the Myocardium, Pericardium, and Pulmonary Vasculature

- Heart Failure with Reduced Ejection Fraction
- Hypertrophic Cardiomyopathy
- Restrictive Cardiomyopathy
- Pericardial Disease and Cardiac Tamponade
- Right Heart Failure and Pulmonary Hypertension
- Introduction to Congenital Heart Disease

- Pathology of the vasculature, atherosclerosis and aneurysms
- Micro RNA, non-coding RNAs and epigenetic regulations in cardiac disease
- Regenerative Medicine: relevance to angiogenesis, fibrosis, and inflammation
- Myocardial Ischemia: genesis of myocardial infarction and mechanisms of cardioprotection

## Echocardiography

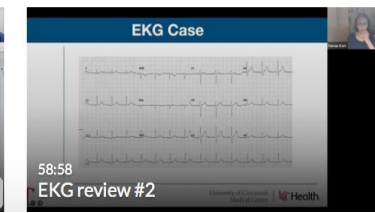
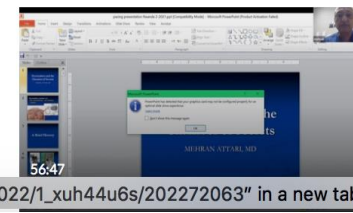
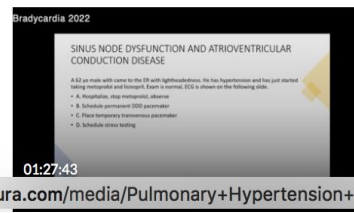
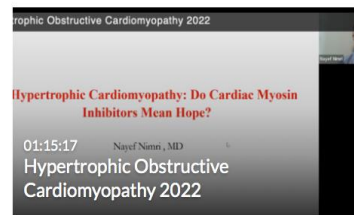
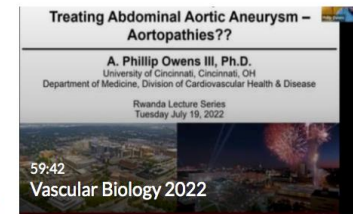
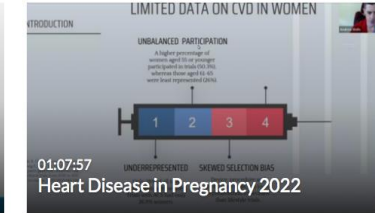
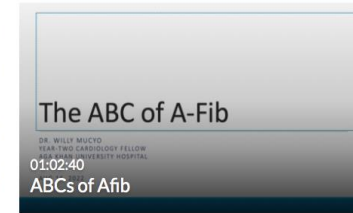
- Basics of Echocardiography
- Pericardial Disease and Tamponade

## Electrophysiology

- Atrial Fibrillation / Atrial Flutter

## Basic Science Series

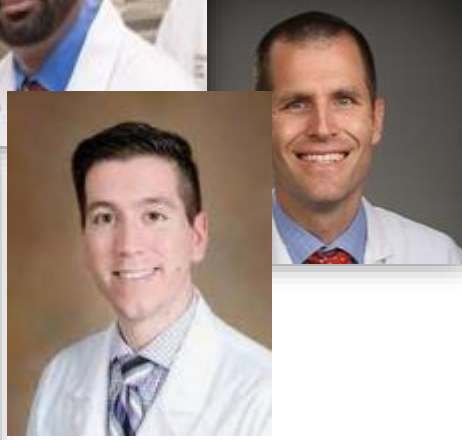
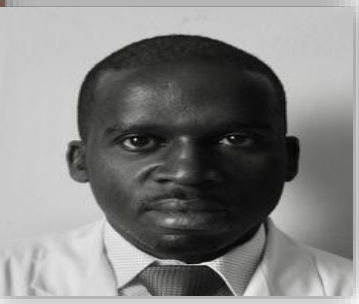
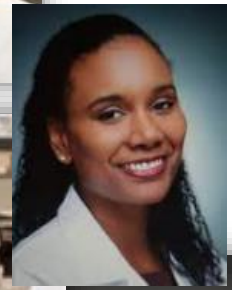
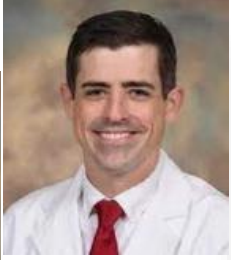
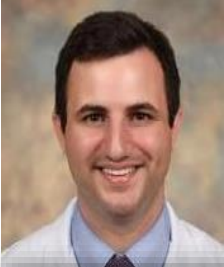
- Precision Therapy:



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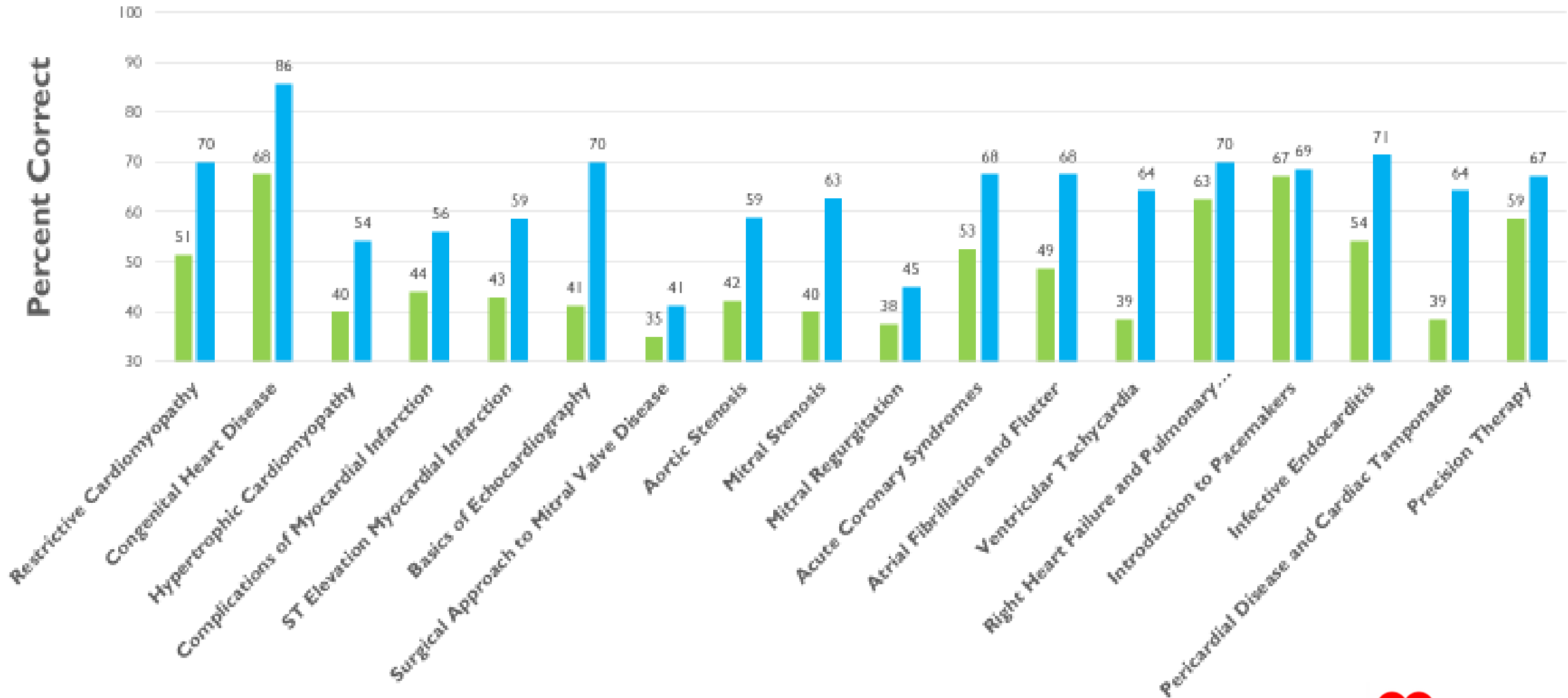


# UC Rwanda Initiative Education

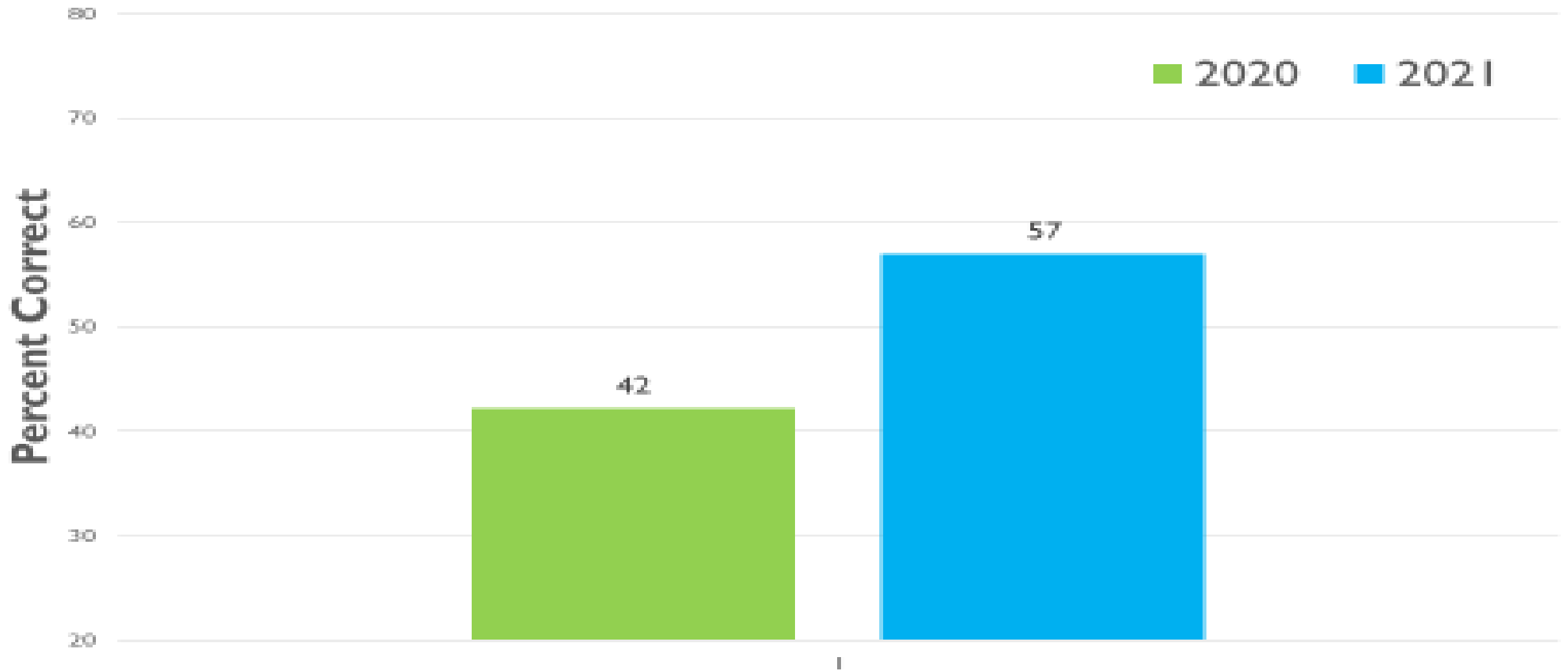


# UC Rwanda Initiative

■ Pre-Test ■ Post-Test



# UC Rwanda Initiative Aortic Stenosis Pre-Test



# THE EFFECT OF VIRTUAL CARDIOVASCULAR EDUCATION IN RWANDA: ONE YEAR FOLLOW UP FOR THE UNIVERSITY OF CINCINNATI RWANDA INITIATIVE

David N. Pratt, MD<sup>1,2</sup>; Blair Suter, MD<sup>2</sup>; Emmanuel Izabayo, MD<sup>3</sup>; Niyigena Olivier, MD<sup>3</sup>; Laura F. Wexler<sup>2</sup>; Hanan Kerr, MD<sup>2</sup>

<sup>1</sup>University of Nebraska College of Medicine, Omaha, Nebraska, USA; <sup>2</sup>University of Cincinnati College of Medicine, Cincinnati, Ohio, USA; <sup>3</sup>University of Rwanda College of Medicine and Health Sciences, Kigali, Rwanda

## Background

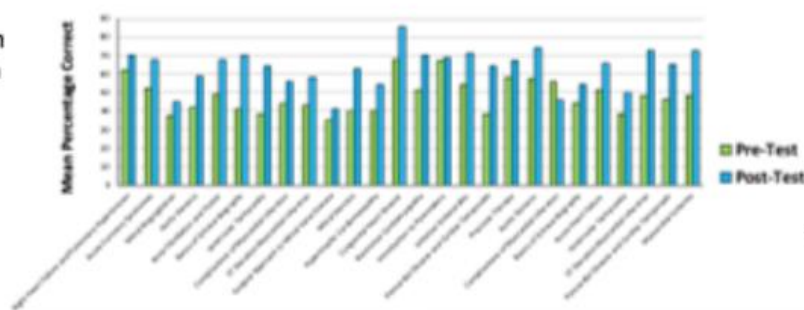
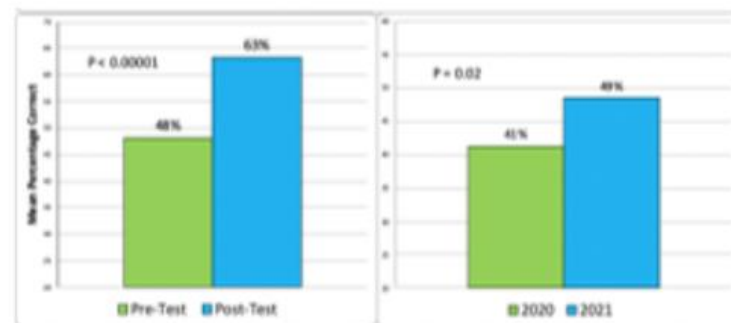
The University of Cincinnati (UC) Rwanda Initiative complements the Human Resource for Health Program to improve the healthcare provider shortage in Rwanda. We sought to assess whether a cardiovascular curriculum utilizing a virtual platform could improve Rwandan trainees' knowledge in cardiovascular diseases.

## Methods

Through partnership with the University of Rwanda College of Medicine and Health Sciences (UR/CMHS) Internal Medicine Residency Program, lecturers presented topics in cardiovascular disease using a virtual platform. A quiz with reading assignments was distributed to the trainees four days before the scheduled lecture. The quiz was redistributed to the trainees within one week after the lecture. We compared the mean quiz scores using an independent sample t-test.

## Results

Between May 2020 and September 2021, 31 lectures were given to 29 internal medicine trainees at UR/CMHS. Quizzes were collected on 26 lectures. The mean of the post-lecture scores was significantly higher than the mean of the pre-lecture scores (63% vs 48%,  $p < 0.0001$ ). Six topics were repeated with the new academic year. The mean pre-lecture scores were significantly higher with each repeated lecture (49% vs 41%,  $p = 0.02$ ).



## Conclusion

Virtual education is an effective means to improve cardiovascular education for trainees in resource poor countries, and the knowledge is retained with each subsequent year. The UC Rwanda Initiative is effectively improving cardiovascular knowledge for trainees in Rwanda.

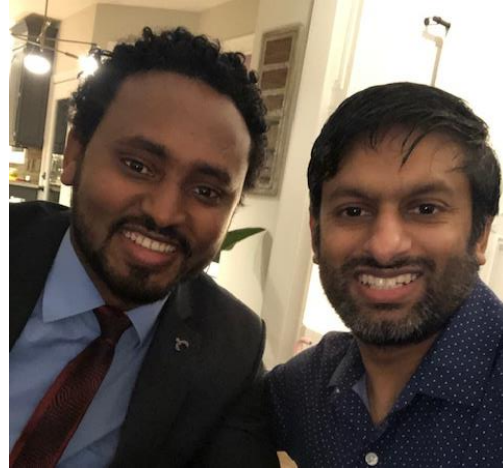


CENTRE  
HOSPITALIER  
UNIVERSITAIRE DE  
KIGALI



# Bi-directional Exchange- Faculty and Fellows

Dr. Amha's visit 12/2021  
to UC Cardiovascular  
Division





# Launch of Cardiology fellowship and 12 other medical subspecialties-2022

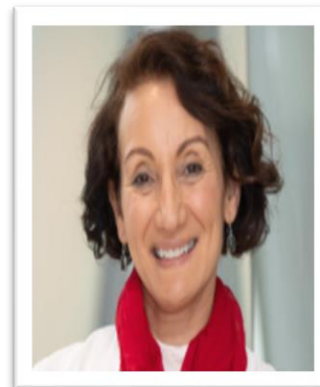
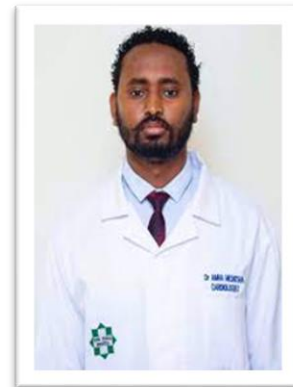
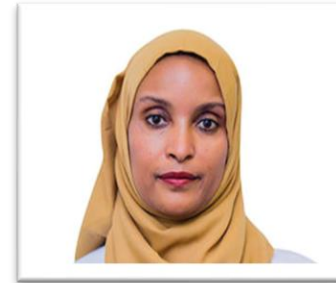


the @RwandaHRH, in collaboration with the @Uni\_Rwanda and other key stakeholders launch 13 new medical training programs including fellowships to sustain the quality of teaching of students both at undergraduate and postgraduate levels.



# Partnerships/Personal Relationships

- Pulmonary Critical Care: Dr. Sibomona and Dr. Elwing
- Nephrology: Dr. Yadapalli and *Dr. Momina Muhammed Ahmed*
- Cardiology Fellow: Dr. Blair Suter and Drs Bienvenue and Olivier
- Cardiology Faculty: Dr. Amha Meshesha and Dr. Kerr





With rare exceptions, all of your most important achievements on this planet will come from working with others- or, in a word, partnership.

Paul Farmer



# Questions/comments

How can fellows be a part of it?

What advice do you have for fellows/early career physicians that are interested in global health initiatives?

If you were to do all of it all over again, how would you approach it?

How has this experience changed you as a physician?

**CONTACT INFORMATION EMAIL**

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