



CHIEF> **PAUL FARMER, M.D., PH.D.** (2003–2005, 2009–PRESENT)

Division of

GLOBAL HEALTH EQUITY

The Division of Global Health Equity is committed to strengthening healthcare delivery, training, and research; to reducing disparities in disease burden; and to improving treatment outcomes for the most needy, both domestically and abroad. Established in 2001, the division works in close collaboration with the nonprofit Partners In Health (PIH) and the Department of Global Health and Social Medicine (DGHSM) at Harvard Medical School (HMS). Recognizing the complex social determinants of health, division faculty aim to reduce health disparities by undertaking essential research using insights from anthropology, history, sociology, epidemiology, economics, and other social sciences to improve medical care in the world's poorest areas. The division focuses on infectious diseases such as human immunodeficiency virus (HIV), tuberculosis (TB), and Ebola Virus Disease (EVD), cholera, as well as non-infectious diseases such as coronary artery disease, diabetes, and substance use disorder. Under the leadership of Division Chief Dr. Paul Farmer, the division works to improve care delivery globally and strengthen health systems.

STRENGTHENING HEALTH SYSTEMS

Domestic Initiatives

Anansi Health

Anansi Health was launched in January 2014 as a collaboration between Drs. Heidi Behforouz and Clemens Hong. Dr. Behforouz previously led the Prevention and Access to Care and Treatment (PACT) project, which provided care through a community-health model in the Dorchester neighborhood of Boston. Building on their community health experience, Drs. Behforouz and Hong developed Anansi Health to provide training, consulting, and direct service operations for community-based complex care management for vulnerable populations. By leveraging community-health workers (CHWs) and integrating them within healthcare delivery teams, Anansi Health aims to transform health delivery through community engagement and to improve health for high-risk and high-need individuals in the U.S. Under Anansi Health's guidance, projects to establish CHW models as components of Patient Centered Medical Homes are underway. This year Anansi has implemented a CHW program to improve the care of chronically ill patients in the Mississippi Delta of Arkansas, continued providing technical assistance to Community Solutions in North Hartford, Connecticut, as they build out a CHW workforce to address social determinants of health, and supported the Calgary CHW project, a partnership for research and innovation in the health system.

Navajo Nation

Founded in 2009, Community Outreach Patient Empowerment (COPE) is a collaboration among the division, the Navajo Nation Community Health Representative (CHR) Program, the Navajo Area Indian Health Service, and PIH. Led by Dr. Sonya Shin, COPE is based in Gallup, New Mexico. COPE is committed to eliminating health disparities in American Indian and Alaskan Native populations, working at the invitation of tribal leadership. COPE establishes partnerships with healthcare providers and

community advocates to address structural barriers to good health, to respond to the burden of disease, and to fill gaps in the healthcare delivery system identified by patients, families, and providers.

COPE provides technical assistance to a diverse group of local stakeholders working to build more-effective healthcare delivery systems and increase food access in Navajo communities. Specific projects include the formation of interprofessional community health teams that meaningfully integrate CHRs in healthcare delivery and case management processes; delivery of robust, community-based outreach; and implementation of multi-level strategies aimed at transforming regional food systems.

This year, under COPE Associate Director Dr. Sara Selig's leadership and with funding from the Patient Centered Outcomes Research Institute (PCORI) as well as an HMS Eleanor and Miles Shore Fellowship Award, COPE developed a Cancer Patient and Family Advisory Committee, some of whose members are engaging in qualitative, community-driven research on cancer services on Navajo Nation. This work also engages local, regional, and national stakeholders to



Dr. Morgan Esperance, Global Health Equity resident.

increase collaboration and improve cancer outcomes on Navajo Nation. Additionally, this year, Dr. Selig and her team hosted the 2nd Annual COPE- Navajo Cancer Survivorship Conference in partnership with the Navajo Department of Health.

With the Indian Health Service, country stores, and grocery stores, COPE also operates the Fruit and Vegetable Prescription Program. Doctors “prescribe” fruits and vegetables to families addressing the issue of being overweight by giving families certificates for free produce. In this model, small local shops stock fruits and vegetables and patients use the coupons to procure newly stocked items. Launched in 2015,

the program aims to make produce available to three quarters of the population by 2017.

Starting in 2015, COPE began working beyond Navajo Nation supporting local partners on the Rosebud Reservation in South Dakota to help strengthen the healthcare system of the Sicangu Lakota Nation. 27,000 Sicangu live in the 2,000-square-mile Nation in southern South Dakota. The expansion is an innovative example of collaboration between two strong Native communities and reflects COPE’s unique, culturally attuned approach to improving health. It also will bring much-needed resources and expertise to the Nation’s healthcare system.

International Initiatives

Guatemala

Division faculty member Dr. Peter Rohloff co-founded Wuqu’ Kawoq | Maya Health Alliance, a nongovernmental health services organization in Guatemala. The organization is one of the largest providers of primary healthcare and related social services in indigenous Maya communities in central Guatemala. Maya Health Alliance addresses the many cultural, linguistic, and logistical barriers that prevent indigenous patients in Guatemala from receiving the health services they need. All of the services, including physician visits and medications, are provided at no cost. In collaboration with academic and community-based institutions, Maya Health Alliance also conducts implementation and outcomes research focusing primarily on non-communicable chronic diseases such as adult Type 2 diabetes and child stunting.

Haiti

The division, working with PIH, has a long history in Haiti. For over 25 years, division faculty have collaborated with Zanmi Lasante (ZL), one of the main healthcare providers in the country. ZL’s mission is to increase access to health services for the poorest individuals and to improve the health and the overall standard of living for residents of the country’s rural central plateau. Today, ZL ranks as the main provider of healthcare in central Haiti and the only provider of

comprehensive primary care, regardless of ability to pay. The number of patient visits to ZL’s 12 sites grew to more than 725,000 in 2015. Many division faculty began their international work at ZL and continue to be closely involved in the project.

Another focus of division collaborative efforts in Haiti is the Hôpital Universitaire de Mirebalais (HUM). In partnership with Haiti’s Ministry of Health, HMS, and other partners, division faculty work with PIH and ZL to provide care and medical education at the hospital in Mirebalais. HUM serves as a regional referral facility and teaching hospital that grew from the near-destruction of Haiti’s main teaching hospital in Port-au-Prince in the devastating 2010 earthquake. The 300-bed hospital offers services never before available at a public hospital in Haiti, including computed tomography (CT) scans, advanced surgical care, and endoscopy. HUM has a 24-hour emergency department, a women’s health clinic, general medicine clinic, infectious diseases clinic, and specialty clinics for orthopedic surgery, general surgery, non-communicable diseases (NCDs), mental health, internal medicine, pediatrics, urology, oncology, and ear, nose, and throat (ENT) care. A neonatal intensive care unit opened in 2013. Clinical services are supplemented by pharmacy, radiographic services, and clinical laboratories, and the hospital is staffed by over 800 people.

Liberia

The division began working in Liberia in 2010 through Last Mile Health (LMH), a nongovernmental organization founded by faculty member Dr. Raj Panjabi and other survivors of Liberia's civil war. LMH is committed to saving lives in Liberia's most remote villages. LMH addresses the global inequity of access to healthcare that afflicts the most remote places in the world by training and deploying cadres of community health professionals to provide life-saving care at the last mile. LMH aims to deliver high-quality primary health services to more than one million people in the most-remote communities by partnering with the government of Liberia to design, demonstrate, scale, and advocate for national networks of community health professionals. Over the past year, LMH has trained over 300 community health professionals to deliver care in over 300 Last Mile communities spread across Rivercess and Grand

in Grand Gedeh County, and has recruited, trained, and supported FHWs in more than 264 communities and 400 FHWs. At the national level, LMH is providing technical support to the Ministry of Health and Social Welfare Ministry in Liberia to marshal a comprehensive EVD outbreak and transition response that strengthens the health system. Under the leadership of the Ministry, and in coordination with other partners, LMH is supporting national plans to strengthen community health systems and to help deploy FHWs in remote communities across Liberia. Currently, LMH is supporting the Liberia Ministry of Health to develop and deploy a historic National Community Health Assistant Program that will serve the 1.2 million Liberians who live more than 5km from the nearest health center.

In 2015, in close collaboration with LMH, division faculty and PIH began working directly in Liberia initially to deliver care during EVD outbreak.

FOLLOWING THE EBOLA VIRUS DISEASE OUTBREAK, THE LIBERIA MINISTRY OF HEALTH REQUESTED THAT THE TEAM FROM THE DIVISION, PIH AND LMH STAY TO HELP BUILD AND REVITALIZE THE HEALTH SYSTEM.

Gedeh Counties – extending primary care to 50,000 people. Working in outlying jungle communities cut off from even basic health services, LMH is building a health system that reaches remote populations by bringing healthcare to villagers' doorsteps. LMH trains community members to be health practitioners for their villages and then connects them with rural health clinics to offer every person access to the care they deserve. These frontline health workers (FHWs) are able to prevent, diagnose, and treat the ten most-life-threatening health conditions in Liberia. Following the 2014 EVD epidemic, LMH implemented infection prevention and control mentorship and supported services to each of the 18 health facilities

Following the outbreak, the Liberia Ministry of Health requested that the team from the division, PIH and LMH stay to help build and revitalize the health system. Since June 2016, PIH has renovated J.J. Dossen Hospital and Pleebo Health Center in Maryland County and has set up a comprehensive health system including the deployment of CHWs, and improving the quality of care in the health centers and the referral hospital. In addition to improving the workforce by hiring nurses, pediatricians, obstetricians, and internal medicine physicians, PIH has built an imaging department at J.J. Dossen Hospital with digital x-ray and ultrasound capacity and a comprehensive lab. In addition, PIH is working

closely with the Ministry to build the TB and MDR-TB program in Liberia. PIH is co-managing the only MDR-TB hospital in the country, which is located in Monrovia, and assisting in the development of MDR-TB, Pediatric TB, and HIV/TB co-infected expansion plans and guidelines. By being the recipient of a European Union grant and a CDC grant, PIH is also working in two other counties, Grand Kru and Grand Gedeh, delivering mental health services, nurse mentorship, and strengthening the delivery of the Essential Health Service Package at over 20 facilities.

Madagascar

Division faculty member Dr. Michael Rich and his team have been working on health-system strengthening efforts in the Ifanadiana district of Madagascar since 2013 through the global health nongovernmental organization PIVOT, which they established. PIVOT's mission is to work in partnership with communities and to combine accessible and comprehensive healthcare delivery with rigorous scientific research, saving lives and breaking cycles of poverty and disease. PIVOT provides an evidence-based, research-supported health-system model for rural Madagascar. Collaborating directly with Madagascar's Ministry of Health to strengthen health centers, a district hospital, and community health, PIVOT also engages in poverty-alleviation initiatives, conducts monitoring and evaluation of health-system strengthening activities, and supports research.

PIVOT is active throughout the district in public health facilities, serving a population of 180,000. Key clinical programs include maternal/child health, malnutrition, pharmacy reimbursement (eliminating point-of-service payments for all patients), and emergency care. Resources have been dedicated to strengthening essential health-system infrastructure, including facility renovation, equipment, and hiring and training of PIVOT, MoH, and community health personnel. To date, PIVOT's ambulance referral system, the district's first ever, has transported over 3,800 patients to care. Due to the removal of user fees, over 60,000 patients have benefited, and utilization of supported facilities has tripled.

PIVOT has initiated a full-scale monitoring and evaluation system to inform and complement its research agenda while generating information for dissemination on best practices in global health delivery. The dashboard integrates Ministry facility data and tracks health system and intervention outputs and its impact in real-time.

Malawi

In January 2007, at the invitation of the Ministry of Health in Malawi, division faculty and PIH first began working in Neno, Malawi. Malawi is the world's fourth-poorest country and also has one of the world's highest mortality rates at 55 years of age. This country of 16 million has one of the world's highest prevalence rates of HIV/AIDS (11%). Malawians also have one of the highest ratios of maternal mortality globally – an estimated 680 maternal deaths per 100,000 live births.

Division faculty are committed to strengthening the health system and improving outcomes in Malawi. The Malawi project, called Abwenzi Pa Za Umoyo (APZU), has made significant progress in Neno since its launch. Within the first few years, both a district hospital and a community hospital were constructed. Today, APZU supports healthcare delivery at these hospitals, as well as at 11 health centers. In 2013, the first-ever surgical suites were opened at both hospitals. In 2014, the hospital began operating the only publicly available oxygen plant in Malawi, and a 70-bed maternity ward opened in early 2015. Additionally, early 2015 saw the opening of Dambe Health Center, a facility serving one of the most remote areas of Malawi. With the help of division faculty, APZU supports the Ministry in running 13 HIV clinics, with over 6,000 HIV patients actively enrolled. The HIV program offers comprehensive treatment including nutritional support, socioeconomic support for the most-vulnerable patients, and a network of over 923 CHWs to provide accompaniment to all HIV patients. Due to the comprehensive and decentralized HIV program, the APZU's survival and retention numbers are some of the best in Malawi.

Given the strength of the HIV model, currently the APZU team is working with the MOH to integrate care for HIV and common noncommunicable diseases, initiating an “integrated chronic care clinic” that will combine the current HIV, TB, chronic care, and palliative care clinics into one model for comprehensive primary care at all health facilities in Neno. Patients with Kaposi’s sarcoma (KS) continue to receive chemotherapy and palliative care at Neno District Hospital, through an innovative program supported by the division and the Dana-Farber Cancer Institute (DFCI), which is the only provider of second-line chemotherapy for KS in Malawi. In addition, APZU is shifting its CHW program to support broader health issues in the district. Kicking off this effort is a maternal-health focus, and CHWs are currently being trained to work with pregnant women in the community and accompany them to health facilities for prenatal care and delivery. Learning from Lesotho’s experience, this project is supported by the construction of maternal waiting homes at two health facilities. APZU is focusing on building the next generation of healthcare providers by developing Neno as a rural primary care training site. This year saw the first cohorts of Malawian medical students rotating in Neno for their family medicine electives.

Mexico

In 2011, division faculty helped to launch Partners in Health/Compañeros En Salud (PIH/CES), a sister organization of PIH. Under the leadership of division faculty members including Drs. Daniel Palazuelos, Hugo Flores, and Patrick Elliott, PIH/CES revitalizes rural government clinics in the Sierra Madre de Chiapas – one of the most-marginalized regions in the country – to transform health outcomes and clinician education.

While Mexico’s health system has been celebrated for reaching near “universal coverage” by expanding government health insurance, accessing high-quality care remains elusive for the rural poor. In partnership with the Ministry of Health, PIH/CES currently operates in ten rural, public clinics providing over 30,000 patient consults yearly to vulnerable people who previously had no reliable health services. PIH/CES designed this service footprint as a learning

laboratory for effective and innovative primary care methods. Among the notable results to date, the organization has surpassed national benchmarks in chronic disease detection and outcomes and pioneered rural access to mental healthcare.

PIH/CES also educates Mexican and international medical trainees in global health delivery, both in the classroom and in the field. PIH/CES recruits top Mexican social service physicians to participate in a career-defining training experience so that they will be “agents of change” in creating a more equitable health system. They receive an accredited certificate course in global health equity, monthly onsite supportive supervision, and intensive mentorship from visiting residents. The majority of PIH/CES social service graduates to date have continued in global health, either pursuing graduate education, joining PIH/CES as a manager, or joining another global health group. PIH/CES offers elective rotations and in-depth collaborations for international medical residents and attending physicians.

PIH/CES is also spearheading high-impact implementation research that builds Mexican research capacity and tests clinical innovations with relevance across Mexico. The site has established a research committee that promotes equitable access to research leadership opportunities for staff, and mentorship in all aspects of the research process. As of spring 2015, the site is managing nearly a dozen potential investigations, ongoing research investigations, and concluded studies in manuscript or being submitted for peer review.

Nepal

Division faculty member Dr. Duncan Maru and residents Drs. Ryan Schwarz and Daniel Schwarz work in partnership with Possible, a nonprofit healthcare entity in rural Nepal that offers high-quality, low-cost healthcare integrating government hospitals, clinics, CHWs, and referral care. The organization’s innovative public-private partnership leverages the Nepali government, external development partners, and philanthropic funds to deliver durable healthcare to one of the poorest regions in South Asia. This year Possible’s work was

featured in a special three-part series in *The Atlantic*, “The Long Road to Healing: One nonprofit’s journey to build and rebuild healthcare in Nepal.”

Since its founding in 2008, Possible has treated over 387,000 patients and serves a catchment area population of 60,000 across 21 village clusters in Achham District. Possible has deployed a unique digital continuous- surveillance system that combines longitudinal care delivery by community health workers at the household level, a mobile phone application for vital events registration and care coordination, GPS location with unique household identifiers, biometrics integration, and a facility-based electronic medical record. Through this system, Possible measures population health outcomes for impact evaluation and implementation research; over the past 18 months, Possible has recorded a 12% decrease in under-two mortality and a 30% increase in post-partum contraceptive prevalence.

Following the devastating 2015 earthquakes, Possible responded by entering into a 10-year public-private partnership agreement with the Nepali government to expand to Dolakha District where over 85% of healthcare facilities were damaged or destroyed. There, Possible manages and delivers care at the district-level hospital and is rebuilding 21 village clinics.

Russia

From a base in Tomsk Oblast, Siberia, division faculty and PIH have been working since 1998 in collaboration with the Russian Ministry of Health to combat one of the world’s most-severe epidemics of MDR-TB. The project has focused on improving clinical services for MDR-TB patients in Tomsk, while undertaking training and research to catalyze change in the treatment of MDR-TB across the entire Russian Federation. Key components of the clinical effort include improving diagnostics to detect cases earlier, developing a comprehensive strategy to strengthen the adherence to treatment among patients, and enhancing infection control in hospitals.

In February 2016, the team held an international seminar in cooperation with Tomsk Pulmonology Medical Center (TPMC) for TB nurses titled “Issues in

the programmatic and clinical management of DR-TB patients.” The training seminar was organized with support of the WHO Collaborating Training Centre in the Novosibirsk TB Research Institute. This was the third international training seminar for nurses conducted by the team in Tomsk. To date, they have trained 42 specialists from different regions of Russia and neighboring countries (Armenia, Uzbekistan, and Ukraine). For the first time, in 2016, the majority of participants were from Russia, in particular from the Siberian Federal District (Abakan, Barnaul, Irkutsk, Kemerovo, Kyzyl, Leninsk, Kuznetsk, Novokiznetsk, and Novosibirsk). These regions have challenging TB and DR-TB epidemiological situations compared to the rest of the country.

Rwanda

In 2005, division faculty and PIH launched their first project in Africa through an innovative partnership with the Rwandan Ministry of Health. Together with PIH’s Rwandan sister organization, Inshuti Mu Buzima (IMB), the project has brought high-quality healthcare to three rural districts that previously had some of the country’s worst health outcomes. Working closely with the Ministry of Health, the project provides direct services to a population of over one million people at three hospitals and 45 health centers, with the help of approximately 7,200 CWHs.

With funding from the Jeff Gordon Children’s Foundation and technical assistance from the Dana-Farber/Brigham and Women’s Cancer Center (DF/BWCC), the Rwandan Ministry of Health (MOH) and IMB opened the Butaro Cancer Center of Excellence (BCCoE) in 2012.

Building on IMB’s previous work in diagnosing and managing chronic conditions such as HIV and tuberculosis, IMB has continued to develop an innovative platform for delivery of services for noncommunicable diseases (NCD), such as hypertension, heart failure, diabetes, chronic respiratory diseases, and cancer. Led by division faculty members Drs. Neil Gupta and Paul Park, IMB is supporting a scale-up of district hospital-based NCD services throughout the country.

The BCCoE serves as a national referral facility, offering preventive care, pathology-based diagnosis, chemotherapy, surgery, referral for radiotherapy, and palliative care, as well as social and economic support. IMB supports the Rwanda MOH with national policy and implementation, and seeks to translate policy successes via NCD Synergies, a collaboration of African countries supporting NCD policy and innovation, established by division faculty member Dr. Gene Bukhman. In 2015, the BCCoE's services expanded through the Butaro Ambulatory Cancer Center, a facility newly built through support from the Cummings Family Foundation.

With support from the Doris Duke Charitable Foundation, IMB concluded a five-year grant focused on health systems implementation, training, and research capacity building, led by division faculty Drs. Peter Drobac, Lisa Hirschhorn, and Neil Gupta. A key aspect of this project included improving the quality of care delivered by nurses, who provide the majority of primary care in rural clinics throughout Rwanda. Initiated in 2010, the Mentorship, Enhanced Supervision, and Quality Improvement (MESH-QI) program aims to improve quality of care through intensive training, mentoring, and supervision of health center nurses across many types of care. The Rwandan government, with the support of IMB clinical nurse mentors, has scaled the program across the country in the areas of HIV/AIDS, maternal, neonatal, and child health (MNCH), and NCDs, and IMB has supported implementation across PIH sites globally.

In the area of MNCH, the Ministry and IMB have prioritized innovations in improving neonatal survival. Division faculty member Dr. Hema Magge has led a team at IMB to develop innovative neonatal care units, including the introduction of bubble continuous positive airway pressure, at several rural district hospitals, and to design National Neonatal Care Protocols to guide the care of newborns across the country. Furthermore, IMB successfully concluded the intensive phase of the All Babies Count Initiative, a combined clinical mentorship and quality-improvement approach at all health-system levels, which resulted in a 33% reduction in neonatal mortality. With support from the USAID "Saving

Lives at Birth" program, this model will be scaled to eight additional catchment areas in the near future.

In a training initiative made possible through the division partnership, IMB's Center for Training and Operational Research in Rwinkwavu hosted a third session of the HMS course in Global Health Effectiveness in March 2014. Global health leaders from across Rwanda and the U.S. gathered to learn from each other and leading academics from Harvard University and the Rwandan Ministry of Health. Division faculty based at IMB continue to host, train, and mentor visiting BWH internists, pediatric fellows from Boston Children's Hospital (BCH), residents from the BWH Howard and Doris Hiatt Residency in Global Health Equity and Internal Medicine, and HMS students.

The Human Resources for Health (HRH) Program, launched by the Government of Rwanda in 2012 with support from division faculty, entered its fourth year of successful training future specialists in the country. BWH and HMS are partners in a consortium of 23 U.S. universities and academic medical centers participating in the program, which aims to support Rwanda's growing medical and educational capacity and help establish a world-class, self-sustaining national healthcare system. Division faculty, led by Dr. Corrado Cancedda with support from Drs. Marla McKnight and Gene Bukhman, helped to conceptualize and implement the HRH Program. Division and other U.S. faculty members are working with local institutions, colleagues, and trainees to train the next generation of doctors, clinicians, medical educators, nurses, and midwives across the main specialty and subspecialty areas over the course of seven years. In 2016, BWH hosted representatives from across the HMS-affiliated hospitals involved with the program, including BWH, Massachusetts General Hospital (MGH), BCH and DFCI, to share milestones and challenges of the program. The "Symposium on Rwanda Human Resources for Health Program: A Success Story of a True Partnership" was held in June and included an honorary panel discussion with Dr. Farmer and Ira Magaziner, CEO and Vice Chairman of the Clinton Health Access Initiative, and Dr. Agnes Binagwaho, Rwanda's Minister of Health, who joined via video conference.

Sierra Leone

Division faculty members Drs. Corrado Cancedda and Kerry Dierberg began working in Sierra Leone in the fall of 2014 focusing on responding to the EVD outbreak. At the request of the Ministry of Health and Sanitation, in partnership with PIH teams, division faculty worked primarily in the Port Loko District, an EVD hotspot outside the capital of Freetown, and in the remote Kono District, a day's drive to the east. In addition to hospital-based efforts, the faculty coordinated community health workers, including EVD survivors, who fanned out into the countryside

to identify the sick, help them find treatment, and combat stigma surrounding EVD survivors.

Division faculty are now working with local and national officials to map out the transition from EVD emergency response to health system strengthening, including the National Survivor Eye Care Program, recognizing that approximately 15 percent of survivors seem to contract uveitis, an inflammation of the eye that can lead to blindness. Faculty are involved in daily rounds in hospitals and clinics to treat patients suffering from malaria, malnutrition, and complicated pregnancies, and are developing models parallel to those at other PIH countries sites.



Division faculty member, Dr. Louise Ivers with a young patient in Haiti.

Vietnam

Dr. Lisa Cosimi studies ways to strengthen health systems and the quality of healthcare in resource-limited settings. She designed a model that trained public healthcare workers to provide mentoring in both clinical care and quality-improvement methodology to improve the quality of HIV care in clinics throughout a rural province of Vietnam. Lessons learned from this model are being used to help the Ministry of Health expand its national quality improvement initiative. Ongoing work includes examining acceptability and feasibility of novel modes of education such as e-mentoring to improve HIV clinical education and healthcare quality, and studying methods to reform undergraduate and postgraduate medical education in Vietnam.

The Global Health Delivery Project

The Global Health Delivery Project (GHD), under the leadership of Dr. Rebecca Weintraub, is based at BWH and HMS. GHD is generating new knowledge and professional networks in healthcare delivery through research, education, and virtual collaborations. GHD's web-based platform, GHDonline, comprises professional virtual communities designed specifically for global health professionals worldwide. GHDonline now hosts more than 20,000 members representing over 6,000 organizations from 188 countries. Members engage

across 10 public and over 70 private communities of practice, each of which is focused on a common challenge in healthcare delivery and guided by one of 25 expert moderators.

GHDonline continues to partner with UpToDate, a leading, peer-reviewed, clinical-information resource. Through this partnership, GHD manages the UpToDate donation program on GHDonline and has provided nearly 2,000 free UpToDate subscriptions to individuals and institutions in 114 countries.

GHD's library of more than 35 teaching cases and companion teaching notes explores how leaders implement value-based principles. In 2015-2016, GHD developed seven new cases and accompanying teaching notes, as well as three new brief cases (also published in the *Lancet Global Surgery Commission*) and three new concept notes. Institutions in more than 125 countries have used the cases, and in 2015-2016 they were downloaded over 9,000 times.

The GHD team works with The Commonwealth Fund to crowdsource, discuss, and evaluate breakthrough opportunities in healthcare involving health IT to support patient engagement and innovative incentive models. GHD has also received support from the Bill and Melinda Gates Foundation to host a virtual expert panel on expanding access to global diagnostics, which has generated significant interest and engagement from the community.

EDUCATION

The division is committed to the education and training of future physicians through the Doris and Howard Hiatt Residency in Global Health Equity at BWH, residencies, and administrative fellowships at ZL partner site Hôpital Universitaire de Mirebalais (HUM) in Haiti, collaborations in education with colleagues at sites globally, and through courses, cases and online communities.

The Doris and Howard Hiatt Residency in Global Health Equity

With a commitment to increasing the number of young physicians who aim to dedicate their careers to improving health of impoverished people in the U.S. and abroad, the division, the Department of Medicine (DOM), and BWH created a unique residency program to address this growing interest. In 2004, The Doris and

Howard Hiatt Residency in Global Health Equity and Internal Medicine was established as a comprehensive program that includes training in internal medicine; coursework in research methods, public policy, global health advocacy; and research and patient-care experiences in impoverished settings at PIH sites around the world. The program adds an additional training year to traditional medical and med-peds residencies. The residency program honors division co-founder Dr. Howard Hiatt and his late wife, Doris.

Residents in the program maintain a demanding training schedule in Boston and are engaged in lifesaving efforts around the world. Response to the residency has been enthusiastic, attracting attention from universities and teaching hospitals throughout the world. Interest among young physicians is strong, and program enrollment has grown from two residents in 2004 to 16 in 2015. To date, of the 43 graduates of the residency, 85 percent have built careers in global health, while others have focused on primary care, health policy, research, and innovation in care delivery.

Accomplishments of recent residents include:

- Improving district-level health services in a rural district of Malawi.
- Improving healthcare delivery in a district hospital in rural Nepal.
- Co-directing medical services across three districts in Rwanda.
- Training community health workers in Chiapas, Mexico.
- Helping support the Ministry of Health in Guinea.
- Developing and implementing oncology treatment protocols in rural Rwanda.
- Documenting successful efforts in Haiti and Rwanda to prevent the transmission of HIV from mother to child.
- Building a graduate medical education program in Haiti, in collaboration with the Haiti Ministry of Health.
- Strengthening a community health worker program in Navajo Nation.
- Assessing health-service coverage in Liberia.
- Developing protocols for Ebola-treatment units.
- Education initiatives at Hôpital Universitaire de Mirebalais.

Continuing Medical Education Courses

In 2016 the division offered its first Continuing Medical Education (CME) Course. Attended by more than 50 clinicians from the U.S. and globally, the course, “Understanding Global Healthcare Delivery,” was taught by 15 division faculty. The syllabus addressed the biosocial determinants of health and disease and explored how programs to deliver healthcare in low-resource settings address these factors to improve the health of the communities they serve. Topics included the global burden of disease, HIV prevention and treatment, global tuberculosis control, non-communicable disease control, the role of community health workers, and human resource capacity building. The course was taught through lectures and interactive case discussions that provided participants with a rich understanding of the complexities of healthcare delivery in low-resource settings. Course evaluations were extremely favorable, and the division will offer the course again in 2017. Also in Boston in AY16, Dr. Ed Nardell taught a unique “Building Design and Airborne Infection Control” course to students from around the world, and has taught similar courses in Lima, Peru, and Pretoria, South Africa, in 2015-2016.

Monthly Grand Rounds

The division began offering monthly grand rounds in 2014 as an interactive forum for both speakers and attendees to keep abreast of their colleagues’ work, share best practices, and receive constructive feedback from peers in the global health community. In AY2015-16, topics included Global Health and the Built Environment (Nardell), Implementation Research & Public Sector Business Strategy for Accountable Care Systems in Nepal (Maru), and The Multi Regional Clinical Trials (MRCT) Center: Developing Standards and Improving the Conduct of Clinical Trials in LMICs (Bierer).

Annual Victor Dzau Lecture in Global Health Equity

The endowed Victor Dzau Lecture annually invites a leader in global health to discuss research, clinical work or an innovative and replicable approach to improving healthcare delivery. In 2016, Dr. Ian Crozier gave a talk entitled "A Survivor's Story: Dual Citizenship at the Ebola Bedside." Dr. Crozier contracted EVD as a clinician and described the science and his personal experience with the disease as well as inequities in access to care.

Education Initiatives at Hôpital Universitaire de Mirebalais

Dr. Michelle Morse serves as deputy chief medical officer at HUM and has helped lead the creation of the residencies offered at HUM, which include general surgery, internal medicine, obstetrics, and pediatrics. In 2014, the country's first emergency-medicine residency program was launched with collaboration from the division and BWH faculty members Drs. Shada Rouhani and Regan Marsh. Emergency medicine is a new specialty in Haiti, and the residency will save lives and impact patient care in dramatic ways, ideally expanding these critical skills across the country.

Dr. Morse leads the HUM Department of Medical Education and Research to standardize academic training across HUM, as a leading facility for training and research for the country. Her department seeks to train an adequate number of Haitian health providers dedicated to vulnerable rural populations and to establish a locally relevant research strategy that promotes Haitian-led research in health-systems strengthening, implementation science, and clinical care.

In 2015, the division launched the David Walton Administrative Fellowship to develop the managerial and leadership skills of healthcare administrators working at PIH Haiti. In its first year, two members of ZL's finance team spent six weeks in Boston rotating through BWH and Partners HealthCare departments to gain a rich understanding of the functional areas and operations that might be transferable to their own. The second cohort, three administrators from

ZL, spent six weeks in 2016 rotating through meetings with BWH and PHS leaders to better understand program operations. The fellowship culminates with a month spent in Boston to develop a capstone project that is authentic and practical, while building internal administrative leadership capacity. Under the guidance of fellowship director Jennifer Goldsmith, fellows have undertaken projects that include monthly accounting and variance analysis improvement, unit-dose control pharmacy implementation and employee engagement in ancillary areas.

EqualHealth

In 2010, in the aftermath of the devastating 2010 earthquake in Haiti, then-GHE-resident Michelle Morse, and BWH medicine-pediatrics resident Zadok Saks saw a decimated clinical education system that they hoped they could help strengthen. They established the nonprofit EqualHealth, which works with clinicians across the career continuum including medical and nursing students, practitioners, master educators, and the population of providers and leaders in healthcare in Haiti. In AY15-16, under the continued leadership of Drs. Morse and Saks, EqualHealth offered a three-week intensive Social Medicine course for North American and Haitian trainees, a Haiti-wide Medical Education conference, and Visiting Professor and Teach the Teacher programs. In addition, in 2015, EqualHealth launched the Marshall Wolf Medical Education Fellowship, which enabled two Haitian clinicians to spend time in residence at BWH to gain increased mastery as teachers.

University of Global Health Equity – Rwanda

Dr. Peter Drobac leads efforts to establish the University of Global Health Equity (UGHE) in Rwanda. UGHE is a private institution designed to leverage expertise and resources from the government of Rwanda, BWH leadership, HMS, and key partners to create a forum for delivery-focused teaching, research, clinical care, and implementation. UGHE's academic programs aim to harness the best ideas in higher education and integrate cutting-edge technology platforms with immersion in complex healthcare delivery systems. Programs will be

fundamentally rooted in innovative pedagogy, with a focus on team-based and problem-based techniques, and will train the next generation of African and international leaders. UGHE enrolled students in its first academic degree program in September 2015. International and local experts in global health delivery, including DGHE faculty Drs. Peter Drobac, Joseph Rhatigan, Joia Mukherjee, Michelle Morse, and Paul Farmer, taught UGHE's first courses.

Center for Global Health Delivery – Dubai

Dr. Keshavjee has been leading the HMS Center for Global Health Delivery—Dubai since 2014. Under his direction, the center addresses some of the most pressing health challenges in the region by focusing on research, medical education, and training that promise to improve healthcare delivery systems and patient outcomes for diseases prevalent in the United Arab Emirates, Middle East, North Africa, and neighboring

regions. The center also provides opportunities for faculty and students to pursue research related to the delivery of existing or new interventions that can cure or prevent disease, specifically in the following priority areas: diabetes and obesity, infectious disease, mental health, and surgery.

Global Health Delivery Intensive Course

The Global Health Delivery Intensive Summer Program is a concentrated three-week session with classes in epidemiology, management science, and healthcare delivery. Now in its ninth year, the program has trained over 300 practitioners from around the world and serves as the foundational course to a two-year Master's of Medical Science in Global Health Delivery at HMS. The 2016 cohort included 52 students representing 24 countries, and diverse professionals including clinicians and providers, managers, economists, and medical students.

RESEARCH

Among the tenets of the division's mission is to address inequalities in disease burden and treatment outcomes through research. Research activities range broadly, from HIV/AIDS and multi-drug-resistant TB, to cholera vaccines, surgery, cardiology, health-system benefits of community health workers, school-based community trials, and high-tech innovations in remote rural settings, all as they relate to poverty and health. The division has seen growth in cross-disciplinary, biosocial research on diseases of the poor; in FY16 total research expenditures were \$10M.

Tuberculosis

The division has an active TB research program focused on optimizing treatment outcomes in patients with multidrug-resistant tuberculosis. This ongoing work is a collaboration with PIH and the Department of Global Health and Social Medicine at HMS. Division faculty Drs. Salmaan Keshavjee, Mercedes Becerra, Carole Mitnick, Michael Rich, KJ Seung, Joia Mukherjee, Serena Koenig, Sonya Shin, Dylan Tierney, and Ed Nardell are conducting retrospective

studies that apply novel analytic methods to clinical data from Peru, Russia, and Haiti. This group has produced multiple peer-reviewed publications that provide evidence that patients with MDR-TB who receive at least five likely effective drugs have significantly lower risks of death and recurrence, and significantly speedier response to therapy, compared to patients who receive less than five likely effective drugs. This group of investigators is also engaged in translating these results into practice through active participation in numerous global technical, policy, and program advisory boards.

Dr. Megan Murray completed an NIH-supported project that links three different studies focused on drug-resistant tuberculosis and one on the epidemiology and transmission dynamics of MDR/XDR tuberculosis in Lima, Peru, in collaboration with Dr. KJ Seung. Division faculty, Socios En Salud, and the Harvard T.H. Chan School of Public Health (HSPH) embarked on this research project to evaluate the risk of infection in people exposed to different strains of TB in order to inform new strategies to reduce the spread of the disease.

This landmark study, which included over 4,500 patients and 14,000 of their household contacts, was completed in August 2014; results are forthcoming. While this study was underway, SES erected a state-of-the-art biosafety level-3 (BSL-3) laboratory, now certified both nationally and internationally. The BSL-3 laboratory supports research protocols, including the HiRIF study (a Trial of High-Dose Rifampin), the Center of Excellence for Translational Research (CETR) on the integrated discovery and development of innovative TB diagnostics, the Opti-Q study (Study Levofloxacin for the Treatment of MDR-TB), and the NIH-Fogarty-funded study seeking innovative interdisciplinary approaches for infection control and TB risk reduction in hospitals in Lima. In addition, Dr. Murray received two major NIH grants totaling more than \$45M for work in Lima. Dr. Murray is the sole principal investigator on a five-year grant based at the CETR at HMS, focused on developing TB diagnostic tools for MDR and childhood TB. A seven-year grant based in the Division of Rheumatology, Immunology, and Allergy with co-principal investigator Dr. Branch Moody is focused on lipidomic, immune, metabolic, and allelic determinants of TB risk.

In Russia, studies led by Dr. Keshavjee focus on treatment outcomes, risk factors for treatment failures, and community-based care-delivery models. Recent publications describe the role of alcohol use in patients with MDR-TB and hepatotoxicity related to treatment.

In South Africa, Dr. Nardell continues his work at the Airborne Infection Research (AIR) facility in Witbank studying innovative interdisciplinary approaches to sustainable airborne infection control, based upon a human-to-guinea pig transmission model. Dr. Nardell's current projects, supported by the National Institute for Occupational Safety and the NIH/Fogarty Center, focus heavily on germicidal ultraviolet air disinfection (GUV). Based upon earlier research, Dr. Nardell and colleagues will be pilot-testing an egg-crate ceiling with GUV in an actual clinical setting; they also have plans to test the first LED UV prototype GUV fixtures later in 2016. This is the first significant advance in GUV in almost 50 years. LED UV is capable of running off solar

or alternative power sources, thus holding great potential for use in low-resource, high-TB-burden settings. The fixtures will undergo testing in the HSPH exposure chamber in Boston before being sent to partners at the AIR facility and elsewhere for pilot implementation. Dr. Nardell recently purchased a real-time viable particle counter for use as a promising, innovative method to measure the impact of various interventions on airborne particles and infection risk. This device is being tested in laboratories and a hospital ward in Boston and will be sent to South Africa for use in the AIR facility, once its potential is better understood. Concurrent with these efforts, Dr. Nardell is spearheading the development of a sustainable model for GUV design, manufacture, implementation, and maintenance in low-resource settings. Current efforts focus on South Africa, India, Pakistan, Myanmar, and Ethiopia but will ideally be scalable and transferable to other settings.

In Peru, Dr. Nardell leads a study on an intensified, refocused administrative approach to TB infection control, called FAST (Find cases Actively, Separate temporarily, begin effective Treatment). By identifying unsuspected TB and unsuspected drug-resistant TB cases and initiating effective treatment for inpatients at a large general hospital in Lima, Dr. Nardell's team, along with Peruvian partners Socios en Salud, will be evaluating the impact of FAST on TB transmission to healthcare workers.

The question of how to measure the actual impact of building design and use on airborne infection control continues to be a challenging one. Dr. Nardell oversaw a pilot study this past year in two South African hospitals using both personal and static CO₂ monitoring to measure "re-breathed" air as a proxy for airborne infection risk. The static monitors provided point-in-time and location CO₂ levels, while the personal monitors, together with healthcare worker diaries provided critical information about CO₂ levels at different locations within the hospital, based on building design and healthcare worker use of space. This approach will be further refined and tested at a third hospital site in South Africa in early 2017.

Human Immunodeficiency Virus

The division's HIV research agenda spans multiple countries and sites with a common theme of improving care to those with the least access and greatest need.

In Haiti, Dr. Louise Ivers is completing an NIH-funded study that assessed the impact of a pilot nutritional intervention on HIV-positive individuals, and Dr. Serena Koenig is the primary investigator for an NIH-funded randomized trial evaluating the effectiveness of same-day HIV testing and treatment, compared to standard care. Dr. Koenig is co-investigator for a proposal to improve the management of depression among HIV-infected patients. Dr. Koenig, along with division colleagues, has also demonstrated that HIV outcomes have improved over time, while treatment costs have significantly decreased. In addition, she has evaluated the impact

disease and improve their long-term antiretroviral drug adherence and well-being. Findings related to HIV outcomes are mixed, and the paper is currently under review. Qualitative findings regarding social support and stability as well as the validation of the HIV stigma scales for health professionals have recently been published.

Domestically, Dr. Bisola Ojikutu's research focuses on the challenges faced by at-risk women and immigrant populations. She recently completed a large cross-sectional study to determine barriers to HIV testing among black U.S.-born and non-U.S.-born individuals in Massachusetts. Internationally, she has worked extensively throughout sub-Saharan Africa developing programs to improve health systems and is the founder of the Umndeni "Family" Care Program, which promotes HIV testing and linkage to care in rural South Africa.

THE DIVISION IS COMMITTED TO STRENGTHENING HEALTHCARE DELIVERY, TRAINING AND RESEARCH; TO REDUCING DISPARITIES IN DISEASE BURDEN AND; AND TO IMPROVING TREATMENT OUTCOMES TO THE MOST NEEDY, BOTH DOMESTICALLY AND ABROAD.

of gender on HIV treatment outcomes, and evaluated the rates and risk factors of attrition at every step from HIV testing to antiretroviral-therapy initiation.

Dr. Shin and SES completed the Community-based Accompaniment with Supervised Antiretrovirals (CASA) project, which explored the use of the directly observed treatment short-course (DOTS) framework for HIV patients living in extreme poverty in the outlying communities of Lima. Also NIH-funded, this study followed 356 patients receiving directly observed therapy (DOT-HAART) through community-based accompaniment and support to gain independence of the management of their

Cholera

Cholera has presented a persistent humanitarian crisis in Haiti since October 2010, having infected more than 700,000 people and claiming the lives of nearly 10,000. PIH continues to provide urgent care, treatment, and prevention activities in response to the widespread cholera outbreak. Dr. Louise Ivers currently leads a team from PHS and HMS on several NIH-funded studies related to the epidemiology of cholera in Haiti and the use of oral cholera vaccine. These include a case-control study to evaluate the field effectiveness of oral cholera vaccine piloted in the Artibonite and expanded in the Central Plateau.

Dr. Ivers also is engaged in several studies on immune responses in vaccinated Haitians. Using results of her research work, Dr. Ivers is also involved in national and international advocacy efforts to draw continued attention to the cholera epidemic. She is part of the WHO's global task force for cholera control that works on updating WHO policy on cholera, and a member of the WHO's Strategic Advisory Group on Vaccines working group on oral cholera vaccines. In 2016, she was awarded a \$3M grant from the Bill and Melinda Gates Foundation to work on cholera control and prevention in Haiti.

Health-System Strengthening

Division faculty are implementing and evaluating health-system-strengthening programs in rural southeastern Rwanda. Co-led by Drs. Peter Drobac and Lisa Hirschhorn, this multi-year project, the Rwanda Population Health Implementation and Training Partnership, was established in 2009 with support from the Doris Duke Charitable Foundation's African Health Initiative. The partnership endeavors to improve the capacity and performance of the health system in two rural districts with targeted financial and technical investments focused on health centers, coupled with quality-improvement initiatives designed to improve service delivery and to strengthen monitoring and evaluation systems. Aspiring to create a replicable, evidence-based roadmap for district-level primary healthcare delivery, the partnership has developed an integrated model of implementation, operational research, and impact evaluation to facilitate refinement and rigorous evaluation of the intervention.

Dr. Sonya Shin was awarded support from the Patient Centered Research Outcomes Institute (PCORI) to evaluate the impact of the Community Outreach and Patient Empowerment (COPE) Program in Navajo Nation. COPE is engaged in ongoing qualitative interviews and compilation of content for data analysis as well as pilot- testing of online training tool for CHRs. The goal of this work is to understand the impact of COPE's standardized trainings on CHRs'

self-reported efficacy, clinical teams' coordination and cooperation, patients' ability to make informed healthcare decisions, and better control of their diabetes.

Dr. Duncan Maru was awarded a five-year "high-risk, high-reward" grant by the NIH to further develop Possible's implementation research program, the Healthcare Systems Design Group. Recently, the team published studies on the determinants of institutional birth, provider training in mental health, a community health worker mobile surveillance project, and implementation of a patient-navigation system.

Dr. Gene Bukhman is leading the Lancet Commission on Non-Communicable Diseases (NCDs) and Injuries of the Poorest Billion with the goal of shifting the global framework of NCDs for those living in extreme poverty. Between 2015 and 2017, the Commissioners are developing a critical report for publication in September 2017. Currently country leaders and disease experts will collaborate, and commentaries are anticipated in advance of the release of the report.

School-based Interventions for Child Health

Dr. Mary Catherine Arbour is committed to reducing disparities and interrupting intergenerational poverty transmission by designing, evaluating, and disseminating interventions that optimize the healthy development of young children in disadvantaged families. She directs the health component of a randomized controlled trial of a preschool-based child-development intervention in Chile, leading the integration of continuous quality improvement (CQI) methods in an expansion phase of the project to schools serving 10,000 children in two regions of the country. Investigators are examining the impact of intensified case management within schools on outcomes including asthma frequency and school absenteeism. In addition, Dr. Arbour was funded to evaluate the benefits of home visits on early childhood development in Santiago, Chile.

Dr. Arbour's research methodology is to integrate CQI and traditional research methods to improve the impact of interventions that, despite a strong evidence

base in small-scale experiments, often obtain only partial positive outcomes in children's health and development when applied at scale. In the U.S., Dr. Arbour leads the adaptation of quality-improvement methods for the first national quality-improvement collaborative in-home visiting (HV CoIIN).

Dr. Shin and SES researchers finished piloting a community-based strategy to screen children 6-24 months of age for developmental delay, and deliver early interventions to at-risk children and their parents.

Funded by Grand Challenges Canada, this study has involved collaboration with BCH, Boston University's SPARK Center, HMS, and the University of California in San Francisco. This cross-disciplinary team has worked closely with Peruvian colleagues to develop an intervention that is tailored to the local context. Preliminary findings suggest that the community-based intervention (termed "CASITA") improves child development and positive parenting behavior, compared with control families. A grant that seeks matched funding to scale-up this project across Carabayllo, Lima, Peru, was submitted in September 2015. They have also begun exploratory qualitative research to understand how community-based early interventions could be potentially adapted and deployed in other PIH sites, including Mexico and Rwanda.

Global Health Economics

In AY16, research in global health economics in the division mainly focused on (1) assessing the role of community-based financing approach in improving medical care utilization among under-five children and child stunting in rural Africa; (2) estimating prevalence of under-five children exposed to stunting or poverty in 141 developing countries and adulthood income loss due to the deficit in schooling associated with exposure to stunting or poverty during childhood; and (3) understanding funding sources for community health workers.

In collaboration with colleagues at PIH and the HMS Department of Global Health and Social Medicine,

Dr. Lu provided the first comprehensive quantitative analysis regarding the association between *Mutuelles* enrollment and the likelihood of being stunted for children in rural Rwanda. Undernutrition is a leading cause of child morbidity and mortality in low-income countries. Lack of sustainable financial support represents a major barrier to scaling-up nutritional interventions in resource-poor settings. Evidence suggests that the most-effective nutritional interventions are those with regular financial support via integration into existing local health systems. Community-based financing has been proposed as a method to promote the financial sustainability of nutrition and other health-related programs, as well as for promoting equitable access to nutrition care. However, there was no solid quantitative evidence on the effectiveness of this approach before this study.

Under the leadership of Dr. Barbara Bierer, the BWH Harvard University Multiregional Clinical Trial (MRCT) Center was fully integrated into the division in AY16. The mission of the MRCT Center is to improve the design, conduct, and oversight of multi-regional clinical trials, focusing on trials sited in or involving the developing world, simplifying research through the use of best practices, and fostering respect for research participants, efficacy, safety, and fairness in trans-national, trans-cultural, human-subject research. In AY16 the MRCT Center addressed a call for an increased level of data sharing including journal editors and other key stakeholders. The center focused its multi-stakeholder base on providing a forum for discussion of the rationales, barriers, and implications of this paradigm change and to formulate potential solutions. The MRCT Center, the Wellcome Trust, the Institute of Medicine (IOM), the Laura and John Arnold Foundation (LJAF), and Deloitte Consulting have spearheaded an initiative related to sharing of clinical trials data, to enable stakeholders to comply with guidelines on clinical trial data sharing: facilitating broad stakeholder clinical trials data sharing and sharing participant-level data with researchers.

To advance this initiative, the MRCT Center convened stakeholders from the U.S., Europe, and international organizations who decided that a global, federated portal of all data-sharing sites from industry, academia, and government would most effectively promote and facilitate the sharing of clinical trials data. A unified data-sharing model emerged from 70 participants at an MRCT Center Data Transparency conference at the Harvard Faculty Club in March of 2015: an empowered multi-stakeholder nonprofit organization with authority and accountability to implement the data-sharing initiative, which will have a central user interface with robust search engine to obtain clinical trial data from around the world. The data-sharing platform will have the flexibility to host data, the ability to download data freely, and the ability to process data requests through independent review panels.

Ebola Virus Disease

Drs. Ivers and Murray provided direction and support to the Harvard Global Health Delivery Partnership Research Core's (Core) efforts on EVD research. The Core team contributed to the design of a data

management system for clinical EVD data, and the design of a study on Ebola survivors. Ultimately, the EVD epidemic was less devastating than had been anticipated, and clinical studies were not undertaken. Dr. Ivers also contributed to a forthcoming guideline on the management of EVD that is based on PIH's experience. The team has published several studies on different EVD point-of-care diagnostics.

Drs. Mukherjee and Stulac led the division's overall efforts to establish EVD treatment units in Sierra Leone and Liberia. Dr. Cancedda led the implementation of the PIH Ebola response in Sierra Leone by partnering with the Government of Sierra Leone and the Wellbody Alliance to set up and operate 16 EVD health facilities (including a large 100-bed EVD-treatment unit, 12 smaller community care centers, and three hospital-affiliated holding units) in four of the most-EVD-affected districts in the country, by launching community-outreach efforts and leveraging a network of 900 community health workers and 800 EVD survivors, and by developing a strategy that will allow PIH to pursue long-term health-system strengthening in the aftermath of the EVD epidemic.

Dr. Michelle Morse and division residents at health equity boot camp in Cange, Haiti.



Future Directions

The division will undertake the following new and expanded initiatives in the coming academic year:

- Dr. Paul Farmer is completing a book for publication on EVD reflecting his own fieldwork on Health Systems Strengthening Framework.
- COPE will continue to collaborate to improve the lives of Navajo people with additional research funding addressing nutrition as well as chronic diseases. COPE will also continue discussions to expand its successful model of training, education, and health-systems integration to other under-served tribal (and non-tribal communities) across the U.S.
- In Haiti, division faculty will continue to play a critical role in the planning and implementation of a long-term strategy for strengthening healthcare infrastructure, and provide healthcare and support services to those patients most in need. Focus will increase on collaboration with the government on health-system financing and on cost analysis within the ZL system. In the aftermath of Hurricane Matthew, division faculty including Drs. Ivers and Mukherjee will collaborate on national cholera response effort.
- As Hôpital Universitaire Mirebalais, the national teaching hospital in Haiti, becomes fully operational, faculty will work towards providing primary care services to a catchment area of 185,000 people in Mirebalais and two nearby communities serving 500-700 outpatients per day. The newest residency programs in obstetrics and gynecology, and emergency medicine, began in October 2014, providing specialty-training programs for Haitian clinicians in an environment that allows them to have the resources they need to provide the highest quality of care possible. In 2017 DOM faculty will continue an internal review of residency programs to help them prepare for ACGME accreditation.
- In Haiti, educational initiatives will continue to grow with each of the five residencies enrolling their next classes of students and the David Walton Administrative Fellowship and Exchange bringing a third cohort to the division to further build the pipeline of future administrative leaders.
- In Madagascar, PIVOT will continue to track progress closely with its monitoring and evaluation system generating information for dissemination on best practices. PIVOT plans to upgrade the district hospital, expand to more health centers, and launch a comprehensive malnutrition program working at all levels of the health system including with a network of trained community health workers.
- In Malawi, APZU plans the opening of new infrastructure projects, supporting the Ministry of Health in district strategic planning, integrating primary healthcare services, expanding the CHW program, and expanding programs in academic training and mentorship.
- The division will continue to collaborate on the implementation of human resources for the Health Rwanda Medical Education Initiative alongside the government of Rwanda, PIH, and HMS to dramatically increase the clinical training of Rwanda healthcare providers and specialists.
- In Rwanda, the UGHE flagship Master of Science in Global Health Delivery degree students will extend coursework. Over the coming years, UGHE will add programs in undergraduate medicine, nursing, and dentistry, and graduate programs in veterinary medicine and health management.

- Dr. Margaret Bourdeaux is engaging in groundbreaking efforts to prevent health-system disruption at times of fragility including in the aftermath of climate shocks, epidemics, and armed conflict. With the Harvard Global Health Institute and the Kennedy School of Government, she is developing a seminar and a course focusing on supporting health systems in conflict-affected states.
- Dr. Gene Bukhman, as chair of the Lancet Commission on Non-Communicable Diseases and Injuries of the Poorest Billion, will prepare his report for release in 2017.
- Three of Dr. Chunling Lu's studies will be published as part of the Lancet Early Child Development Series.
- Dr. Hema Magge joined the Institute for Healthcare Improvement as Ethiopia Country Director and will serve on a national maternal-newborn initiative on quality of care, which will build on division work in maternal-newborn health from Rwanda.
- Dr. Bisola Ojikutu will co-chair Massachusetts' Getting to Zero Campaign, which is a coordinated strategy by the state to drive rates of HIV transmission down to zero new infections. She will lead the HIV Care and Treatment Subcommittee with a report with recommendations will be released on World AIDS Day, December 1, 2016.
- Dr. Gene Richardson will begin research on his NIH/Harvard grant, *Social Epidemiology of Ebola*, which will continue through 2018. This project will focus on interdisciplinary, mixed-methods approaches to understand the structural determinants of disease outcomes as well as biosocial interventions for containment and prevention.
- Dr. Jason Beste joined the division and will work as Chief Medical Officer for PIH in Liberia where he will lead strategic planning and implementation of clinical programs in partnership with the Ministry of Health with the goal of rebuilding health systems in the southeast region.
- Dr. Ruma Rajbhandari joined the division and serves as associate faculty director for the Harvard Initiative on Global Health Quality at the Harvard Global Health Institute. She will lead efforts to promote global health quality, recognizing the increasing need to ensure safe, effective, and patient-centered care in parallel to increased access to care globally.
- Dr. Ryan Schwarz joined the division and will work as chief operating officer with Possible in Nepal where he will focus on delivering high-quality, low-cost healthcare working with the government's existing infrastructure. 

FACULTY ROSTER

Professor

David Bangsberg, M.D.*
 Barbara Bierer, M.D.
 Paul Farmer, M.D., Ph.D.
 Howard Hiatt, M.D.
 Megan Murray, M.D., Sc.D.
 Edward Nardell, M.D.

Associate Professor

Mercedes Becerra, Sc.D.*
 Heidi Behforouz, M.D.
 Lisa Hirschhorn, M.D.
 Louise Ivers, M.D., D.T.M.H.
 Salmaan Keshavjee, M.D., Ph.D.
 Carole Mitnick, Sc.D.*
 Joia Mukherjee, M.D.
 Joseph Rhatigan, M.D.
 Sonya Shin, M.D.
 Norma Ware, Ph.D.

Assistant Professor

Gene Bukhman, M.D., Ph.D.
 Lisa Cosimi, M.D.*
 Ashwin Dharmadhikari, M.D.*
 Andrew Ellner, M.D.
 Lisa Gruenberg, M.D.
 Serena Koenig, M.D.
 Chunling Lu, Ph.D.
 Bisola Ojikutu, M.D.
 Michael Rich, M.D.
 Katherine Semrau, Ph.D.
 Rebecca Weintraub, M.D.

Instructor

Mary Catherine Arbour, M.D.
 Margaret Bourdeaux, M.D.
 Corrado Cancedda, M.D., Ph.D.
 Avik Chatterjee, M.D.
 Chadi Cortas, M.D.
 Ranvir Dhillon, M.D.

Peter Drobac, M.D.
 Patrick Elliot, M.D., D.T.M.H.
 Hugo Flores Navarro, M.D.
 Neil Gupta, M.D.
 Lara Hall, M.D.
 Jonathan Iralu, M.D.*
 Louise King, M.D.
 Fernet Leandre, M.D.
 Rebecca Li, Ph.D.
 Hema Magge, M.D.
 Regan Marsh, M.D.*
 Duncan Maru, M.D., Ph.D.
 Alishya Mayfield, M.D.
 Marla McKnight, M.D., Ph.D.*
 Michelle Morse, M.D.
 Koji Nakashima, M.D.
 Daniel Palazuelos, M.D.
 Rajesh Panjabi, M.D.
 Paul Park, M.D.
 Jonathan Quick, M.D.*
 Peter Rohloff, M.D., Ph.D.
 Hind Satti, M.D.
 Andrew Sechler, M.D.
 Sara Selig, M.D.
 Kwonjune Justin Seung, M.D.
 Sara Stulac, M.D.
 Neo Tapela, M.D.
 Dylan Tierney, M.D.
 Andrew Van Wieren, M.D.
 David Walton, M.D.
 Emily Wroe, M.D.
 Courtney Yuen, Ph.D.

Lecturer

Kerry Dierberg, M.D.
 Eugene Richardson, M.D., Ph.D.

*Connotes secondary appointment in the
 Division of Global Health Equity

SELECT MAJOR FACULTY ACCOMPLISHMENTS

Mary Catherine Arbour, M.D.

- Featured, in a report from the National Academies of Sciences, Engineering and Medicine that identifies universal, preventive and targeted strategies that have been effective for parents of young children and lead to healthy outcomes for children, *Parenting Matters*

Barbara Bierer, M.D.

- Awarded, 2015 Award for Excellence in Human Research Protection: Best Practice, for the MRCT Return of Results Guidance Document and the MRCT Return of Results Toolkit, Health Improvement Institute
- Presented, "Developing Global Norms for Data and Results Sharing During Public Health Emergencies," World Health Organization

Margaret Bourdeaux, M.D.

- Chaired, Panel on Understanding Opportunities and Contradictions Between Humanitarian Health Assistance Versus Health System Support in Conflict-affected States, World Health Summit
- Awarded, Burke Global Health Fellowship to study public, private, and aid financing in fragile state health systems, Harvard Global Health Institute

Gene Buhkman, M.D.

- Member, Global Coordination Mechanism on NCDs, WHO
- Co-chaired, Lancet Commission on Reframing NCDs and Injuries of the Poorest Billion

Corrado Cancedda, M.D., Ph.D.

- Served as Consortium Director for Clinton Health Access Initiative and HRH Rwanda and Liberia Served as Moderator and panelist, "Story of a True Partnership: Symposium on Rwanda Human Resources for Health Program," HMS

Chadi Cortas, M.D.

- Mentor, Marshall Wolf Haiti Medical Education Fellowship, BWH
- Principal investigator for a research project evaluating the impact of the GHDOonline community on global health medical and nursing education projects

Peter Drobac, M.D.

- Published, "Improving district facility readiness: a 12-month evaluation of a data-driven health systems strengthening intervention in rural Rwanda," *Global Health Action*
- Presented, "Reimagining Higher Education: Introducing the University of Global Health Equity," Unite for Sight Global Health and Innovation Conference

Andrew Ellner, M.D.

- Published, "Strong Patient-Provider Relationships Drive Healthier Outcomes," *Harvard Business Review*
- Published, "An Integrated Approach to Surgery and Primary Care Systems Strengthening in Low- and Middle-Income Countries: Building a Platform to Deliver Across the Spectrum of Disease," *Surgery*

Paul Farmer, M.D., Ph.D.

- Received, Bronislaw Malinowski Award
- Honorary Doctor of Science, Regis College
- Keynote speaker, "Academic Medicine and Global Health: Rethinking Institutional Accompaniment," 5th Anniversary Symposium, Harvard Global Health Institute
- Keynote speaker, "Reimagining Social Medicine," Social Medicine Consortium, University of Minnesota
- Published, "All health is global health, all medicine is social medicine: integrating the social sciences into the preclinical curriculum," *Academic Medicine*
- Published, "Closing the divide: the Harvard Global Equity Initiative-Lancet Commission on global access to pain control and palliative care," *The Lancet*

SELECT MAJOR FACULTY ACCOMPLISHMENTS (continued)

Lisa Gruenberg, M.D.

- Advisor, “Bridges” Program, Health Care Without Walls
- Published, “Introducing clinically relevant gynecology, women’s health and sexuality into the first year curriculum at HMS,” *HMS Medical Education Day Book of Abstracts*

Lisa Hirschhorn, M.D.

- Published, “Learning before leaping: integration of an adaptive study design process prior to initiation of BetterBirth, a large-scale randomized controlled trial in Uttar Pradesh, India,” *Implementation Science*
- Published, “Implementation Science for Global Oncology: The Imperative to Evaluate the Safety and Efficacy of Cancer Care Delivery,” *Journal of Clinical Oncology*

Louise Ivers, M.D., D.T.M.H.

- Presented, “Updates on use of oral cholera vaccine in rural Haiti,” WHO Global Task Force on Cholera Control, Oral Cholera Vaccine Working Group
- Published, “Safe water, sanitation, hygiene, and a cholera vaccine,” *Lancet*
- Published, “Immunogenicity of the bivalent oral cholera vaccine Shanchol in Haitian adults with HIV infection,” *Journal of Infectious Diseases*

Salmaan Keshavjee, M.D, Ph.D.

- Presented, “Multidrug-resistant Tuberculosis: Data, Dogma, and the Making of Global Health Policies,” Eva Neer Memorial Lecture, HMS
- Presented, “Blind Spot: How Neoliberalism Infiltrated Global Health,” Fletcher Society for Russian Eurasian And East European Studies and the Fletcher Global Health Group, Fletcher School of Law and Diplomacy, Tufts University

Serena Koenig, M.D.

- Presented, “Same-Day HIV Testing and ART Initiation is Associated with Improved Outcomes,” International AIDS Conference
- Published, “Treating tuberculosis in Haiti in the aftermath of the 2010 Earthquake,” *Bulletin of the World Health Organization*
- Published, “Stemming the Tide: Can New Approaches to HIV Treatment Reverse the Trend of Rising Drug Prices in the United States?,” *Clinical Infectious Diseases*

Rebecca Li, Ph.D.

- Published, “A Global, Neutral Platform for Sharing Trial Data,” *New England Journal of Medicine*
- Published, “Incorporating Ethical Principles into Clinical Research Protocols: A Tool for Protocol Writers and Ethics Committees,” *Journal of Medical Ethics*
- Co-facilitated discussions, Global Simultaneous Drug Development Workshop, Beijing Biometrics Association and Beijing Biometrics Forum, Beijing, China

Chunling Lu, Ph.D.

- Published, “Strengthening Primary Health Care through Community Health Workers: Investment Case and Financing Recommendations,” *U.N. Secretary General’s Special Envoy for Health MDGs Financing and Malaria*
- Presented, “Assessing effects of survey design on measuring household catastrophic health spending: a case study for surveys in Rwanda,” Workshop on Monitoring Health Service Utilization and Financial Protection, World Health Organization, Beijing, China
- Honorary Senior Lecturer, University of Witwatersrand, Johannesburg, South Africa

SELECT MAJOR FACULTY ACCOMPLISHMENTS (continued)

Hema Magge, M.D.

- Presented, "The All Babies Count Initiative: A Comprehensive and Integrated Strategy to Improve Neonatal Care and Eliminate Preventable Newborn," World Health Organization Technical Meeting on Implementation Guidance to Improve Maternal and Newborn Quality of Care
- Presented, "Every Newborn Action Plan Metrics Design Workshop for Facility-Based Testing for Coverage Metrics," Every Newborn Action Plan Metrics Group, Co-chaired by World Health Organization and London School of Hygiene & Tropical Medicine

Duncan Maru, M.D., Ph.D.

- Named, Schwab Social Entrepreneur Fellow, Annual Meeting of the New Champions, World Economic Forum
- Panelist, "Innovation in Humanitarian Response," World Economic Forum Annual Meeting of the New Champions, Tianjin, China
- Awarded, Skoll Foundation: Integrating Facilities and Frontline Healthcare Worker Surveillance Systems via an Electronic Medical Record

Michelle Morse, M.D.

- Presented, The Marshall Wolf Haiti Medical Education Fellowship: An Innovative Faculty Development Opportunity, Consortium of Universities for Global Health
- Awarded, Radcliffe Institute Exploratory Seminar grant: Principles and Practice of Global Health and Social Medicine, Development of a Case-based Learning Tool for the Next Generation

Joia Mukherjee, M.D.

- Speaker, HIV TB co-infection, the PIH experience. 5th Eastern Europe and Central Asia AIDS Conference.

- Awarded, Honorary Doctor of Science, Mount Holyoke College
- In publication, "The Next WHO Director-General's Highest Priority: A Global Treaty on the Human Right to Health," *Lancet*

Megan Murray, M.D., Sc.D.

- Published, "ReEBOV Antigen Rapid Test kit for point-of-care and laboratory-based testing for Ebola virus disease: a field validation study," *Lancet*
- Published, "Management and control of multidrug-resistant tuberculosis (MDR-TB): Addressing policy needs for India," *Journal of Public Health Policy*
- Presented, "TB Genome Database," Meeting of the International Union Against TB and Lung Disease, Cape Town, South Africa

Edward Nardell, M.D.

- Promoted to Professor of Medicine, HMS
- Faculty, Architectural and Engineering Approaches to Infection Control, University of Pretoria
- Published, "Infection Control for Drug-Resistant Tuberculosis: Early Diagnosis and Treatment is the Key," *Clinical Infectious Diseases*

Bisola Ojikutu, M.D.

- Presented, "Care and Treatment Challenges Among African Immigrants Living with HIV," National AIDS Education and Training Center Webinar
- Keynote Speaker, 2016 National Women and Girls' Day, Massachusetts Department of Public Health
- Co-chair, Getting to Zero, Massachusetts Statewide Campaign to End HIV
- Awarded, Harvard Catalyst Disparities Research Award, HMS

SELECT MAJOR FACULTY ACCOMPLISHMENTS (continued)

- Poster presentation, “HIV Prevention Trials Network Community cultural beliefs and disclosure to primary sexual partners among women living with HIV in Brazil, Thailand and Zambia,” International AIDS Society, Vancouver, Canada

Daniel Palazuelos, M.D.

- Named, Senior Health and Policy Advisor for Community Health Systems, PIH
- Moderator, Balancing Global Health Careers and Family, Harvard Global Health Institute
- Published, “Community health worker programmes after the 2013–2016 Ebola outbreak,” Bulletin of the World Health Organization
- Co-author, “Strengthening Primary Healthcare Through Community Health Workers: Investment Case and Financing Recommendations,” UN Special Envoy Office for Financing the Health MDGs and Malaria Report

Rajesh Panjabi, M.D.

- Keynote Speaker, Princeton-Fung Forum, Woodrow Wilson School of Public Affairs, Princeton University
- Speaker, Forbes 400 Philanthropy Summit
- Recognized as one of TIME’s 100 Most Influential People, *Time Magazine*
- Published, “Remoteness and maternal and child health utilization in rural Liberia: A population-based survey,” *Journal of Global Health*

Paul Park, M.D.

- Panelist, “Africa’s fight against cancer,” World Economic Forum, Africa
- Published, “Access to Essential Medicines for Noncommunicable Diseases in Poor Countries: The Forgotten Challenge of the Twenty-First Century,” *Health Affairs*

Joseph Rhatigan, M.D.

- Published, “Closing the delivery gaps in pediatric HIV care in Togo, West Africa: using the care delivery value chain framework to direct quality improvement,” *AIDS Care*

Michael Rich, M.D.

- Published, “Presumptive treatment of multidrug-resistant tuberculosis in household contacts,” *International Journal of Tuberculosis and Lung Disease*
- Facilitated, National discussions of the endTB project: Kazakhstan, Nepal, Peru

Gene Richardson, M.D. Ph.D.

- Facilitated, “Ebola: Drivers of transmission, vaccines, clinical sequelae, and asymptomatic infection,” Annual Meeting, American Society of Tropical Medicine & Hygiene
- Published, “Biosocial Approaches to the 2013-16 Ebola Pandemic,” *Health and Human Rights*

Peter Rohloff, M.D., Ph.D.

- Presented, “Food deserts and gastro-politics in a rural Guatemalan village,” American Anthropological Association
- Featured, “Big data meets modern medicine in a lifesaving equation,” [television broadcast]. PBS News Hour Program
- Published, “Field report: Early child development in rural Guatemala,” *Perspectives in Infant Mental Health*

Sara Selig, M.D.

- Awarded Masters in Public Health, HSPH
- Awarded PCORI Engagement Award, Engaging Stakeholders to Improve Cancer Care in Navajo Nation

SELECT MAJOR FACULTY ACCOMPLISHMENTS (continued)

Katherine Semrau, Ph.D.

- Published, "Learning before leaping: integration of an adaptive study design process prior to initiation of BetterBirth, a large-scale randomized controlled trial in Uttar Pradesh, India," *Implementation Science*
- Awarded, BetterBirth: The World Health Organization Safe Childbirth Checklist Trial, Bill and Melinda Gates Foundation

Sonya Shin, M.D.

- Awarded, Inaugural Richard and Hinda Rosenthal Award, American College of Physicians
- Presented, "Community Health Workers and Patient Navigators: Bridging the Gap Between Health Systems and Patients to Improve Care," Inaugural PCORI Annual Meeting
- Published, "Collaborative Group for Meta-Analysis of Individual Patient Data in MDR-TB. Surgery as an Adjunctive Treatment for Multidrug-Resistant Tuberculosis: An Individual Patient Data Meta-analysis," *Clinical Infectious Diseases*

Sara Stulac, M.D.

- Published, "Initiating Childhood Cancer Treatment in Rural Rwanda: A Partnership-Based Approach," *Pediatric Blood and Cancer*

Neo Tapela, M.D.

- Presented, "Health for All — Public Health and Health Care in Rwanda," the Madeleine Korbel Albright Institute for Global Affairs Symposium, Wellesley College
- Published, "Capacity building for oncology programs in sub-Saharan Africa: the Rwanda experience," *Lancet Oncology*

Dylan Tierney, M.D.

- Speaker, New England TB Clinicians Conference, National TB Controllers Association

Norma Ware, Ph.D.

- Awarded, Delivery Optimization for Antiretroviral Therapy, Bill and Melinda Gates Foundation
- Published, "SMS reminders plus real-time adherence monitoring improve adherence to antiretroviral therapy in rural Uganda," *AIDS*

Rebecca Weintraub, M.D.

- Published, "Design thinking can help improve care for the elderly," *Harvard Business Review*
- Funded, A Global Health Delivery Teaching Case Featuring Project ECHO, GE Foundation
- Funded, Supporting U.S. Providers of Vulnerable Populations through Virtual Exchange, Education, and Collaboration, RX Foundation

Emily Wroe, M.D.

- Presented, "Nutrition in Neno: a comprehensive approach," Nutrition Technical Working Group, Ministry of Health, Lilongwe, Malawi
- Presented, "Addressing HIV care in vulnerable populations: barriers and accessibility to care for truck drivers and commercial sex workers in rural Malawi," Abstract and poster at International AIDS Society

Courtney Yuen, Ph.D.

- Presented, A systematic review of national policies on tuberculosis contact investigations," 47th Union World Conference on Lung Health
- Presented, "Turning off the tap: stopping tuberculosis transmission through active case-finding and prompt effective treatment," Harvard Center for Global Health Delivery, Dubai
- Published, "Two methods for setting child-focused tuberculosis care targets," *Public Health Action*

