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Introduction

Children’s health around the world is not what anyone would want it to be. Too many children are born too early. Too many children are born unwanted. There is not enough food for too many families and the wrong kind of food for so many others. Preventable infections still kill children in staggering numbers. Injuries, violence, substance abuse and other risky behaviors claim the lives or mar the chances of a huge percentage of children and adolescents. The picture is not a good one. And all this in a world where we have the know-how, the where-with-all and a fair amount of the desire to make things better.

So what is stopping us?

For decades, the major barriers in global child health were that: 1) there was no clear international plan for addressing what appeared to be intractable problems; 2) there were few models of successful interventions and 3) there were few pathways for individuals or groups to follow to make a difference in global child health.

But things have changed. Since the conception and implementation of the Millennial Development Goals (see p. 24), expert groups have drafted road maps to address maternal and infant health, infections, diarrhea, pneumonia and other child health problems. Clinicians and researchers have established interventions that work to improve child health. The current challenge is to take what is known and put it into action. We need to close the so-called “Know-Do” gap.

The Global Pediatrics Program began seven years ago as a response to the question “What role should the Department of Medicine at Boston Children’s Hospital play in the emerging global fight for children’s health and social equity?” Our answer has been to join an ever-increasing network of global child health providers, government agencies, community members and families who are committed to achieving better health for the world’s children. Together with our partners, we have built service, training, research and advocacy programs that increase capacity, improve quality and ensure positive health and developmental outcomes in the sites where we work. We also share our experience widely through participation in global forums, on-site and virtual educational programs, publications and presentations.

We are grateful to so many people at the Boston Children’s Hospital and beyond for their caring advice, backing and donations. We especially want to thank Dr. Gary Fleisher, the Chief of the Department of Medicine and Dr. Mark Schuster, the Chief of the Division of General Pediatrics and Dr. Michelle Niescierenko of the Boston Children’s Hospital Global Health Program and Dr. Jeffrey Burns, Ms. Cynthia Haines and Dr. Alan Retik from International Health Services for all their encouragement and support. And special thanks to our funders, especially Patti Satterthwaite and John Muresianu, who have believed in us from the very beginning.

Judith S. Palfrey, MD
Director, Global Pediatrics Program
Haiti is a Caribbean country located on the island of Hispaniola along with the Dominican Republic. Home to 10 million people, Haiti has experienced significant turmoil and societal upheaval throughout its history. Currently, the human development index of Haiti is 0.47, the lowest in the Western Hemisphere and 168th of 187 countries. The health and education systems are fragile at best and the country depends on significant foreign aid.

In 2010, a devastating earthquake struck Haiti and destroyed much of the capital city of Port Au Prince including hospitals, the national medical school and the national nursing school. This disaster caused over 230,000 deaths and left large numbers of people with injuries and disabilities. Many children were orphaned and left to live on the streets or be cared for by already overburdened relatives. At the time of the Haitian earthquake, the Boston Children’s Hospital sent over 100 staff members in response. Also, the hospital provided medicines and supplies to aid the disaster teams. Boston Children’s Hospital global health programs have continued to work in Haiti since that time. The Global Pediatrics Program has made a formal relationship with Partners In Health and Global Pediatric fellows and staff work in PIH programs in St. Marc and Mirebalais.

Where We Work

Haiti

INFANT MORTALITY RATE = 55
probability of dying by age 1 per 1000 live births

UNDER 5 MORTALITY RATE = 73
probability of dying by age 5 per 1000 live births

MATERNAL MORTALITY RATIO = 380
per 100,000 live births

NUMBER OF HOSPITALS = 0.2
per 100,000 population

POPULATION AGED < 15 = 35%
Liberia

INFANT MORTALITY RATE = 54
probability of dying by age 1 per 1000 live births

UNDER 5 MORTALITY RATE = 71
probability of dying by age 5 per 1000 live births

MATERNAL MORTALITY RATIO = 640 per 100,000 live births

NUMBER OF PHYSICIANS, NURSES, & MIDWIVES = 2.8 per 10,000 population

POPULATION AGED < 15 = 43%

The Liberian nation of 4.1 million people is now 10 years post-conflict in a health system re-building phase. Boston Children’s Hospital collaborates with the Liberian Post-Graduate residency training council, the Academic Collaborative to Support Medical Education in Liberia (ACSMEL), partner universities and the NGO, Health Education and Relief Through Teaching, to provide education for medical students, interns and residents in Monrovia, Liberia. Physicians from Boston Children’s provide bedside and didactic teaching critical to the training of the Liberian physician workforce. The multidisciplinary group also engages in direct clinical service with our Liberian physician colleagues. Additionally we partner with our local Liberian colleagues to implement quality improvement projects such as evidence based guidelines, new charting and mortality monitoring. Together, we work to implement innovative care delivery models including a primary care clinic for children with non-communicable diseases. We partner to address unique educational needs of the Liberian trainees such as the delivery of advanced pediatric and adult life support education. This partnership also hosts joint research efforts with projects including implementation of neonatal CPAP and an assessment of the burden of traumatic disease after national road traffic regulation changes. In 2013, a Boston Children’s global health service delivery fellow was present for 6 months teaching, providing clinical service and conducting research. When the Ebola outbreak devastated the country in 2014, GPP faculty member Dr. Michelle Niescierenko responded by partnering with the Academic Consortium Combating Ebola in Liberia (see p. 13).

Rwanda

INFANT MORTALITY RATE = 37
probability of dying by age 1 per 1000 live births

UNDER 5 MORTALITY RATE = 52
probability of dying by age 5 per 1000 live births

MATERNAL MORTALITY RATIO = 320 per 100,000 live births

NUMBER OF PHYSICIANS, NURSES, & MIDWIVES = 7.5 per 10,000 population

POPULATION AGED < 15 = 43%

Rwanda is located in central and east Africa, bordered by Uganda, Tanzania, Burundi and the Democratic Republic of the Congo. Three ethnic groups (the Hutu, Tutsi and Twa peoples) make up the population. From 1990 to 1994, the country was trapped in a devastating civil war, characterized by ethnic genocide that claimed the lives of as many as 1,000,000 people. Since the end of the war, Rwanda has witnessed a high level of social stability and an increase in economic growth.

The health of the Rwandan people was profoundly affected by the 4 years of civil war and the health indicators at the time were some of the worst in the world. With the reconstruction of the country and the economic recovery, the government of President Kagame has been committed to improving the health systems infrastructure to benefit the citizens and to improve the overall health status of the population. The Health Ministry has initiated a number of innovative programs to advance the state of health services. The Boston Children’s Hospital is actively involved with the USAID funded Human Resources for Health project (see p. 25). This program is directed at increasing the number of well-trained Rwandan health professionals. As of 2011, prior to the beginning of the HRH program, there were only 625 physicians, 8,000 nurses and 10 dentists for over 10 million people. Boston Children’s Hospital physicians participate in the HRH program providing training to residents in pediatrics, surgery and anesthesia. Rwanda, through a formal relationship with Partners In Health, is a longstanding field site for the Global Pediatric Fellowship Program. We have also developed observership opportunities for Rwandan physicians to visit and study at Boston Children’s Hospital.
**Chile**

Chile is a middle-income country that is experiencing strong economic growth. The GDP Annual Growth Rate in Chile has averaged 5.32% between 1987 and 2014, eventually reaching an all time high of 16.15% (Banco Central de Chile). Despite the strong economy, the benefits of the improvements have not accrued to everyone. Chile has the second highest financial inequity measure in South America. GPP faculty have been working in conjunction with the David Rockefeller Center at Harvard on two major projects - Un Buen Comienzo, an early childhood development project and Recupera Chile, an initiative to assist with community recovery after the 2010 8.8 earthquake.

**India**

With a population of over a billion people, India is the 2nd most populous country in the world. India has recently experienced very positive economic growth, but the country still has a low nominal GDP per capita and the average life expectancy is very low at 64 years for men and 68 years for women. The 2012 under 5 mortality rate was 56/1000 and the 2008-2012 stunting rate was 48%. GPP affiliated faculty member Vibha Krishnamurthy has developed a child development program in Mumbai that has a national outreach arm to train health and social care providers about children with developmental disabilities.

**Dominican Republic**

The Dominican Republic occupies the eastern half of the Caribbean island of Hispaniola. Its population is 9 million and its economy is increasingly growing with a current designation as an upper middle-income developing country. While the Dominican health care infrastructure is relatively well developed but health indices continue to reflect significant needs, especially among the poor. Under 5 mortality is 28/1000 live births and immunization completion is well below the recommended levels and stunting rates are high. GPP faculty partner with primary care and hospital programs in the DR to improve maternal and infant care issues and provide infectious disease prevention.

**Indonesia**

Indonesia is an archipelago of hundreds of islands located between the South Pacific and Indian oceans. With a population of over 250 million, Indonesia is the world’s fourth most populous country. Indonesia’s economy has been improving over the past few decades and currently its HDI is in the medium range at 108th in the world. Indonesia is prone to volcanic eruptions and frequent earthquakes. The Tsunami of 2004 devastated Indonesia, causing an estimated 168,000 deaths, severe disruption and displacement for over 500,000 people. GPP faculty worked in the recovery efforts after the 2004 tsunami to help reestablish health care facilities and systems for maternal and child health. Currently, GPP members are involved in strengthening newborn care in Indonesia.

**Guatemala**

The Central American country of Guatemala has a population of 15 million, 40% of whom are under the age of 15. The country’s health statistics reflect significant health care insufficiencies with an under 5 mortality rate of 31/1000 live births and high rates of malnutrition and stunting, especially among the indigenous populations who live in isolated areas with high rates of poverty. GPP affiliated faculty member Peter Rohloff has been confronting the health care issues in several indigenous communities. He has developed clinical, nutritional and educational programming to meet the needs of the families and children.

**Laos**

Laos is a landlocked country in Southeast Asia with a population of 6.8 million. The Lao economy depends heavily on investment and trade with its neighbors, Thailand, Vietnam, and China. Continued government corruption has maintained its Human Development Index at 138th in the world. Laos has a poor human rights history particularly dealing with the nation’s acts of genocide being committed towards its Hmong population. Laos has an under-five mortality rate of 72/1000 live births and a maternal mortality ratio of 220 per 100,000 live births. The GPP faculty is interacting with the Lao Friends Hospital for Children, which is a NGO supported, new children’s hospital in Luang Prabang. The Lao Friends Hospital aims to improve medical education, standardize treatment guidelines, and develop drug reference guides.
Tanzania

Tanzania is an East African country with a population of 47.4 million people and a landmass of 365,756 square miles. Its major industries are textiles and agriculture. Mining yields its most valuable export, gold. While the under 5 mortality rate for 2012 was 52/1000 live births, this is a vast improvement since 2009 when the under 5 mortality rate was 167/1000 live births. Members of the GPP have worked in partnership with colleagues in Dar es Salaam at the Muhimbili University through training exchanges and quality improvement projects. Also, faculty of the GPP are engaged in research studies on nutrition and on the use of mHealth in collaboration with the Harvard T.H. Chan School of Public Health Global Health Program.

Nepal

Nepal is a mountainous South Asian country of 27 million people who are highly dispersed and often severely isolated. Nepal has a high rate of poverty at 25% in 2010/2011. The country’s health care status is marked by high rates of malnutrition and childhood stunting. Life expectancy is 65.8 years and under 5 mortality is 40 per 1000 live births. Affiliate GPP faculty member Duncan Maru participates with Possible (formerly Nyaya Health) to meet the challenges of rural health care. Possible works on management and health care coordination and has an advanced program involving community health workers. The 2015 earthquake added major challenges to health care delivery.

South Africa

With a population of 54 million, South Africa is the second largest country in sub-Saharan Africa. For nearly a century, the country suffered the consequences of the repressive and brutal apartheid system. Post-apartheid South Africa has seen emerging development of more equitable health and education systems, but the country’s poor initial response to the HIV epidemic has led to heavy burdens of illness. There is a continued need for innovative approaches to health and social care provision. GPP faculty partner with a number of South African universities and NGOs to develop health and public health responses to address the ongoing issues around HIV and other health problems for children.

Uganda

Uganda is a land locked country located in East Africa. Its 37.9 million inhabitants occupy 93,065 square miles. The country is known for its agriculture, beautiful landscapes, and robust production of coffee. The under 5 child mortality rate is 66/1000 live births. In conjunction with CURE International, Boston Children’s Hospital physicians have been working in Uganda at the CURE International Hospital, which was built to address the problem of hydrocephalus among children. Several other Children’s Hospital projects are taking place in Uganda focused on child development and on HIV treatment.

Country data: Derived from wikipedia.org as accessed Spring, 2015.
What We Do

The Global Pediatrics Program engages with our partners in health care systems to address pediatric health needs in low resource settings.

Our initiatives focus on at least one of the following three areas:

**Personnel**
Train healthcare professionals, with the hope of helping them become sustainable and self-sufficient in meeting the medical needs of their communities.

**Material**
Identify and provide the medical supplies and equipment that are necessary to meet the medical needs of a community, while also being location appropriate.

**Systems**
Address the systematic challenges that act as roadblocks to progress in sustainable health services.
Strategic Priorities

The global health work of Boston Children’s Hospital is focused on strengthening child health care delivery in low resource settings. Our partnerships address: Care Delivery, Research, Education and Advocacy.

In the following sections, we provide illustrative examples of the global projects and programming in these four key areas:
Care Delivery

Excellence and innovation in global health care delivery is central to the work of the Department of Medicine’s Global Pediatrics Program (GPP) at BCH. Here we present the current areas of clinical focus and some exemplary projects.

Maternal, Infant, & Child Care

With our global colleagues, faculty and fellows of the GPP strive to improve the perinatal and newborn care experience of children in our partner countries. GPP faculty and fellows become proficient in the Helping Babies Breathe curriculum and offer regular trainings at our partner sites. GPP faculty and fellows provide direct care in newborn nurseries, establish clinical guidelines, initiate and implement quality improvement protocols and provide on-going training and technical assistance with our partner pediatric and nursing colleagues. Together with the Department of Nursing, we work to assure that the neonatal staffs in our partner sites are equipped with appropriate materials and have access to ongoing consultation.

In Rwanda, the Ministry of Health (MOH) has put a high priority on improving neonatal survival. While the Rwandan neonatal mortality rate declined from 37/1000 in 2005 to 21/1000 in 2011, the MOH has set a goal of lowering the neonatal mortality even more substantially. BCH has collaborated closely with Partners In Health (PIH) to help lead this effort in Rwanda. Dr. Anne Hansen has provided essential technical guidance to Dr. Hema Magge and her team at PIH, and have worked closely with the MOH in Rwanda to create and implement standard clinical neonatal guidelines since 2012. A major innovation in the Rwandan neonatal care units is the introduction of bubble CPAP, which was implemented in the first rural hospitals through this collaboration. Furthermore, Dr. Magge’s team leads the All Babies Count Initiative with the MOH, a combined clinical mentorship and quality improvement approach at all health system levels. During the 18-month validation phase, neonatal mortality dropped 33% in the intervention area serving approximately 500,000 people. Dr. Hansen’s staff is currently also advising the newly established Neonatal Intensive Care Unit at University Hospital in Mirebalais, Haiti. In Southeast Asia, Dr. Grace Chan is promoting the wide-scale adoption of Kangaroo Mother Care as a life saving measure for premature and vulnerable infants.

In collaboration with dTree International and the Harvard School of Public Health, Dr. Kim Wilson and her team are working to improve care by up-dating Integrated Management of Childhood Illness (IMCI) protocols to include neo-natal and post-neonatal guidelines. These protocols are available on an mHealth platform that can be easily accessed on cell phones, allowing health care workers in the community sites to employ high quality systems of care. Our programs collaborate with the Every Newborn Action Plan, which has been accepted by Ministries of Health throughout the world. At each of our partner sites, GPP members serve as the health care staff in hospitals and clinics caring for children with a wide variety of common childhood conditions.
Infectious Diseases
At every care site, the staff and fellows of the GPP care for children with a wide range of common infectious diseases including pneumonia, diarrheal disease, sepsis, meningitis, HIV, TB, malaria, etc. GPP physicians treat conditions that are routinely prevented by immunizations in the United States – including measles, tetanus, and rotavirus. They also manage tropical illnesses such as dengue, cholera, and chikungunya. They follow the established national protocols and employ quality improvement methodologies to ensure accurate diagnosis as well as timely and appropriate treatment of the children and adolescents they care for. When there are staff and materials shortages, they do the best they can to manage the children with supportive care.

Boston Children's Hospital’s Division of Infectious Diseases has had a long-standing commitment to the prevention and treatment of HIV disease. Dr. Kenneth McIntosh has led global efforts to establish care for mothers and children with HIV. Most recently, he consulted to Human Resources for Health Program in Rwanda offering training and technical assistance to the doctors and nurses who care for patients with pediatric HIV. Dr. Lisa Butler is developing innovative behavioral interventions to improve compliance with HIV treatment in low resource settings. In Haiti, Dr. Sara Stulac supervises the care of children with HIV throughout the Partners In Health network of hospitals and clinics.

In Uganda, the GPP has been working with Dr. Benjamin Warf of the Neurosurgery Department to give general pediatric health care to children with post-infectious hydrocephalus. Dr. Warf and his colleagues are carrying out investigations to determine which bacterial agent is causing the high incidence of hydrocephalus among the Ugandan newborn population.

The tragic Ebola crisis of 2014-2015 has had a major impact on the health infrastructure of Liberia. Dr. Michelle Niescierenko is leading a collaborative effort in Liberia to train health care providers in safe Ebola care (see p. 13).

Nutrition
Recognizing that malnutrition is a contributing factor to childhood mortality in upwards of 40% of cases, the GPP teams emphasize the integration of nutritional interventions into health care delivery. In Haiti, Dr. Sara Stulac supervises the nutritional clinical services for infants and children throughout the PIH system. These programs provide high density, high calorie supplements for children who are chronically malnourished. The supplements are produced in Haiti through a local factory program that has begun to provide jobs and economic stability to some of the country’s poorest inhabitants.

At St. Nicholas Hospital in Haiti, Dr. Brittany Potts has upgraded the in-patient protocols used to treat severely malnourished children. Babies and young children are admitted to the unit with weights significantly below what would be expected for age. Dr. Potts is focusing on progressive increases in feeding as the children improve and can tolerate greater amounts of intake.

Dr. Christopher Duggan and other members of the BCH Faculty and the HSPH Nutrition Department have a long-standing collaboration with Muhimbili University in Dar es Salaam, Tanzania. They have established comprehensive interventions to ameliorate the acute and chronic effects of malnutrition on children with a wide variety of illnesses, including cholera and HIV.

In Guatemala, Dr. Peter Rohloff has introduced nutritional supplementation in indigenous communities. This has moderated the malnutrition that has caused widespread stunting among poor children. He is beginning a new project to integrate child development promotion with the nutritional supplementation.
The Ebola outbreak in Liberia began in the spring of 2014 and by June 2015 had claimed over 4800 lives. Tragically, many frontline health care workers (HCWs) were affected, with over 390 cases and 189 fatalities reported in Liberia. The Ebola outbreak severely strained Liberia’s healthcare system that was still developing out of recent post war conditions.

Beginning in the fall of 2014, Dr. Michelle Niescierenko, working with the Academic Consortium Combatting Ebola in Liberia (ACCEL) and the Liberian Post Graduate Medical Council (LPGMC) implemented an Infection Prevention and Control (IPC) training, mentorship and supply intervention. The program acquired Patient Protective Equipment (PPE) and disseminated the gear to health care workers in Liberian governmental hospitals. They also implemented elements of water/sanitation infrastructure improvement, community engagement and social mobilization. The project’s core intervention was the development of teams of Liberian physician and nurse trainers who worked with midwives, water/sanitation technicians and psychosocial support/social mobilization providers to educate health care workers. The teams used the Liberian Ministry of Health and Social Welfare endorsed “Keep Safe, Keep Serving” training package to provide education about Ebola safety techniques for health care workers and patients.

During Phase 1 of the program, the ACCEL teams delivered the “Keep Safe, Keep Serving” training to over 2200 health facility staff at 20 of Liberia’s 21 government hospitals. They 1) imparted training, 2) provided 3 months supply of PPE, and 3) conducted water and sanitation quality improvement projects. More than $221,000 in water and sanitation infrastructure improvements were completed. Training at each hospital addressed all roles in the hospital system from security, registration and laundry to physicians. In addition to IPC training, the water and sanitation technician assessed infrastructure and helped with any basic repairs. The social mobilization person educated the community on new hospital practices and what to expect from hospitals when seeking patient care.
Non-Communicable Diseases

In low resource settings, it is a challenge to mount services for children with non-communicable diseases such as cancer, congenital and acquired heart disease, sickle cell disease, neurodevelopmental disabilities and diabetes. The GPP is sponsoring a number of clinical programs aimed at filling the void in the care of children and adolescents with these chronic illnesses. Our faculty, fellows and partners are able to receive consultation and support from the wider sub-specialty programs at Boston Children’s Hospital and affiliated programs including the Dana Farber and the Joslin Clinic.

In Rwanda, in conjunction with Dr. Emmanuel Rusingiza Kamanzi, our faculty and fellows are working to establish clinical care guidelines and training protocols for children with congenital heart disease. These protocols are being prepared in conjunction with OPENPediatrics™ so that they can be available for wide scale virtual distribution. In addition, Dr. Rusingiza Kamanzi and GPP are exploring ways to up-date the care of children with rheumatic heart disease in Rwanda. Dr. Hema Magge and her team, with essential technical support from Dr. Kim Wilson, have developed an NCD program to provide early childhood development support to preterm and other vulnerable infants in Rwanda. Dr. Michelle Niescierenko and her colleagues have established a program for a large number of children with chronic illness and disability at the JFK Hospital in Liberia. These multidisciplinary programs focus on the whole child employing team based care that coordinates primary and specialty care, surgical and nursing services as well as developmental, behavioral and educational services. While this work was interrupted during the Ebola epidemic, it is a critical element of the Liberian health system going forward.

Although sickle cell disease is highly prevalent in African and Caribbean children, until recently, it has not been possible to screen infants for the disease, leaving children without proper identification and prophylactic protection. In Liberia, Dr. Venee Tubman is helping the Ministry of Health to establish a newborn sickle cell screening program. During the period of the Ebola epidemic, Dr. Tubman continued her work on establishing sickle cell screening in Tanzania. In Haiti, Dr. Natasha Archer is collaborating with colleagues at PIH to improve the detection and early treatment of children with sickle cell anemia.

In Nepal, Dr. Duncan Maru has established chronic disease protocols and referral mechanisms for poor isolated families and children. He has also engaged community health workers to assist chronically ill patients in obtaining surgical care.

Drs. Chris Carpenter and Julia von Oettingen have established an innovative chronic diseases center in Haiti. At Kay Mackenson, nurses provide 24 hour care and healthy nutrition to newly diagnosed diabetic children and adolescents (see p. 35).

CANCER CARE IN RWANDA

Around the world, pediatric cancer claims the lives of nearly 175,000 children per year. In high income countries, research and high quality clinical care have made it possible for 80% of children with cancer to survive. The picture is much bleaker in low income countries. In 2009, Dr. Sara Stulac and Dr. Leslie Lehmann, with the support of the Dana Faber Cancer Center, began a pediatric cancer care program in Rwanda in conjunction with Partners In Health and the Rwandan Ministry of Health. The Butaro Cancer Center of Excellence (BCCOE) located in northern Rwanda, at a government district hospital, offers basic imaging (x-ray and ultrasound), lab tests, pathology specimen processing, chemotherapy free of charge and social services.

Since the cancer program’s inception, the numbers of pediatric patients being treated in Rwanda continue to grow. In the past three years, pediatric cancer treated at the two PIH-supported hospitals offering chemotherapy has increased from 8.9% of the total cancer patients enrolled in 2012, to 19% in 2014 when 125 new children with cancer were enrolled. Wilms’ tumor remains the most commonly treated pediatric cancer (31%), followed by acute lymphoblastic leukemia (22%) and other solid tumors (18%).

In 2012, national pediatric cancer protocols were established to treat 5 priority pediatric cancers: Wilms’ Tumor, Hodgkin’s Disease, non-Hodgkin’s lymphoma, ALL and Burkitt’s lymphoma. In late February 2015 over 30 local and international experts gathered in Kigali, Rwanda to revise and expand the national pediatric protocols to include 4 additional cancers given the increased capacity of cancer care in Rwanda.

▲ Sara Stulac (right), consults with colleagues at the Rwinkwavu Hospital in Eastern Rwanda.
Child Development & Behavioral Health

Children's health and development are closely linked. The GPP is working to enhance the delivery of coordinated health and developmental services in low resource settings.

In India, our affiliated faculty member, Dr. Vibha Krishnamurthy runs the Ummeed program that provides both center and community based care for children with physical and developmental disabilities. Dr. Krishnamurthy has created a highly effective and accessible care model that engages community workers in the on-going support for families of children with developmental disabilities and autism.

In Rwanda, Dr. Hema Magge and Dr. Kim Wilson are conducting follow-up assessments of children who graduated from the neonatal intensive care unit. They refer the children to medical, nutritional, and social services. Finding such services for children with developmental disabilities in many of the rural settings is very challenging.

Dr. Judith Palfrey and Dr. MaryCatherine Arbour have been working for a number of years in South America (in Chile and Peru) on early childhood developmental interventions. They have partnered with the Ministries of Health and Education in Chile to establish Un Buen Comienzo, an early childhood project within the Chilean public school system that emphasizes 4 components (early language/literary, health, socio-emotional development and family engagement). In addition, since 2011, Dr. Palfrey and Dr. Lili Peacock have participated in Recupera Chile. This disaster recovery project takes place in the Bio Bio region of Chile which is the area of Chile that was devastated in 2010 by an 8.8 earthquake and subsequent tsunamis. Among other interventions, Recupera Chile has established school-based services and promoted opportunities for community rebuilding with a strong emphasis on caring for children’s mental health.

Dr. Lisa Butler’s projects in South Africa and Uganda strengthen health care delivery to children with illnesses such as HIV by incorporating evidence based child development and family engagement principles. Her team is also establishing maternal depression prevention through media rich mHealth interactive counseling protocols delivered by community health workers. These protocols guide depressed mothers to be more responsive to their young children.
Prevalence & Epidemiological Studies

Determining the prevalence of health conditions and their impact on diverse populations is a key component of any global health effort. It is critical for clinicians, program planners and policy makers to have accurate information about 1) what conditions are affecting what people 2) what is the severity of those conditions, and 3) what kinds of interventions are (or are not) in place to address the needs of the population. Using both local observational studies and large regional and national data sets, GPP team members assess the prevalence of common pediatric conditions.

With the opportunity to describe clinical conditions and their correlates in detail, GPP physicians have added to the understanding of many disease conditions in low resource settings. For example, in Bangladesh, Grace Chan has documented the rates of maternal and infant colonization that put babies at risk for sepsis (Chan GJ, J Perinatology, 2013). Natasha Archer and Venee Tubman (Tubman VN and Archer, NM Hematol, 2013) are doing basic epidemiology to call attention to the large number of children with sickle cell anemia in Haiti, Liberia and Tanzania. Because there is no current universal sickle cell screening in either of these countries, their data are demonstrating the need for increased identification and treatment of children with sickle cell disease. GPP faculty are detailing the nutritional status of children in low resource settings. For instance, in Rwanda the primary care group has studied the prevalence of iron deficiency anemia in their patient population (Magge H, PAS 2012). As another example, the GPP nutrition specialists have documented the prevalence of Vit D deficiency in HIV exposed children (Rwebemba, J. Trop. Peds., 2013). Chris Carpenter and his team are conducting one of the first community based studies of lead poisoning in Haiti.
Quality Improvement

Increasingly clinicians and researchers around the world are employing quality improvement methodology that allows them to introduce step-wise clinical and systems improvements. With QI tools, the clinicians and researchers can test the usefulness of changes -nearly in real-time. This allows the programs to decide if a suggested innovation should be adopted, modified and retried, or rejected.

In post-Tsunami Indonesia, for instance, GPP faculty affiliate, Grace Chan has shown how a “balanced score card” can help monitor the roll-out of primary care health stations in disaster recovery. Dr. Chan developed a series of benchmarks (use of thermometer for documentation of fever, proper handling and disposal of needles, etc.). Employing a red, yellow, green scoring system, she showed how feedback to the multiple stations about their progress spurred the providers on to achieving their improvement goals. This system is now incorporated into the fabric of 350 health facilities in Indonesia.

In Haiti, Global Pediatric fellow, Xinshu She is using quality improvement methodology as part of the pediatric ward’s renovation and redecoration. She is involving staff, parents and patients in the process of creating the art work for the pediatric ward as an environmental adjunct to medical care.

In Chile, affiliate faculty member MaryCatherine Arbour has been using QI methodology in preschool settings. Parents and teachers join the QI teams and set the agenda for the innovations that they want to test. These teams are having success in increasing hand washing, water consumption (as opposed to soda and juice) and are decreasing absenteeism in the schools. (Arbour, 2015 personal communication).

In Rwanda, Dr. Hema Magge and her evaluation team have shown how quality improvement methodology assists in the monitoring of the use of tools such as the Integrated Management of Childhood Illness (IMCI), the algorithmic symptomatic approach to pediatric visits that was designed by the World Health Organization (Magge, 2014 –see sidebar, p. 18).

CLINICAL MENTORSHIP TO IMPROVE PEDIATRIC QUALITY OF CARE IN RWANDA

Integrated Management of Childhood Illness (IMCI) is the leading clinical protocol designed to decrease under-five mortality globally. However, its impact is threatened by gaps in implementation and quality of care (QOC). In 2010, Partners In Health (PIH) and the Rwanda Ministry of Health (MOH) implemented a nurse mentorship intervention Mentoring and Enhanced Supervision at Health Centers (MESH) in two rural districts. MESH builds upon the foundation of standard IMCI training with: (1) regular visits by a clinical mentor for supportive supervision and (2) support for QI efforts to address systems gaps.

Health worker adherence to IMCI assessment, classification, counseling and treatment was assessed through indicators and summary indices extracted from validated instruments. The primary outcome was the IMCI Integrated Assessment Index - a validated index of key elements of IMCI patient care assessment used in the IMCI multi-country evaluation.

MESH led to improvement in quality of IMCI that maintained significance after adjusting for a number of confounders and limiting to IMCI-trained nurses. While younger patient age was associated with a slightly lower index, improvement was seen in both of the study age groups. Formal training has been the traditional approach to IMCI introduction, but is often followed by limited supervision. Training is typically expensive, and continuous staff turnover decreases the effectiveness and increases the cost. MESH could be an important complement to amplify and sustain the impact of initial training on quality of care delivered. This could be an important strategy to achieving the predicted impact from IMCI on child survival in similar settings, as well as improving quality of care in other protocol-driven areas including maternal health and HIV management.
**Interventions Implementation**

Much of the work of the GPP involves clinical implementation and innovation. Clinical research methodology associated with program implementation allows the adaptation, monitoring and evaluation of clinical interventions that have proved effective in highly resourced settings. Much of the research and evaluation work of the GPP is devoted to lessening the so-called ‘Know-Do’ gap. Methods of pediatric care are well established, but not practiced because of a host of barriers in low resource settings. Members of the GPP faculty have developed clinical methodologies to implement evidence based practices in low resource settings. For instance, in Rwanda GPP members are involved in a large-scale effort entitled All Babies Count. The team is evaluating the uptake and impact of clinical guidelines for newborn care tailored to the conditions and resources in Rwanda (Hanson, 2011; Magge, 2013). The neonatal team is establishing a similar evaluation in Haiti. As another example, GPP faculty at the Kay Mackenson Center in Haiti are investigating the best regimens of diabetes care for children and adolescents who have only restricted access to diabetes testing and medicines (von Oettingen, 2014, see figure below).

**Educational Research**

Several GPP members are conducting educational research to test a variety of approaches to the training of health care providers. The GPP has been evolving as an educational effort at the Boston Children’s Hospital and the Harvard Medical School since 2008-2009. Educational research has focused on the creation of partnerships in global education, the content of global health education delivery, the effectiveness of various educational methodologies and the dissemination of educational materials and instruction for the scaling up of training programs. For instance, in Liberia, Michelle Niescierenko and colleagues from several US university pediatric program have established a coalition approach to assist the Ministry of Health in re-creating a national program of pediatric residency training in the wake of the civil war (Niescierenko, PAS, 2014). Christiana Russ and her team have been analyzing the experience of countries that have recently initiated pediatric residency programs to deepen the child health work force (Ganapathi, PAS, 2012). Dr. Russ and many members of the GPP faculty have participated in the development and evaluation of curricular teaching tools (Dickerson, APPD, 2014). Together with OPENPediatrics™ at the Boston Children’s Hospital, GPP members are developing web-based teaching materials on global pediatrics topics including maternal and child health, nutrition and common cardiac problems. In collaboration with the American Academy of Pediatrics, GPP members participate actively in the scaling up one of the major global educational initiatives – Helping Babies Breathe. This program teaches a wide range of people how to provide life-saving simple intervention in the “golden minute” after birth and during the immediate post-delivery period. Dr. Grace Chan is studying the impact of HBB in Tanzania.

**Median Hemoglobin A1c Levels over Time**

- **HbA1c is a sensitive marker of diabetes control. At Kay Mackenson, the team has shown that the median HbA1c of the children can be brought down into the normal range through careful diabetes management and then maintained over time.**
Randomized Controlled Trials

To test scientific hypotheses about the biological and bio-psychosocial mechanisms that underlie and explain clinical phenomena, GPP members employ randomized controlled trials (RCTs). RCT results often lead to a deeper understanding of pathologic pathways and they also provide opportunities for testing promising interventions to develop the evidence base for clinical improvement. RCTs depend on significant funding, large sample sizes and investment of research time and effort, generally over multiple years. For example, Dr. Christopher Duggan and his team conduct randomized controlled trials to examine the benefits of various combinations of nutrients and micronutrients and the value of maternal vs. child supplementation. In a recent paper, his group showed that Vit B12 supplementation of mothers in India resulted in enhanced Vit B12 levels in their children at six weeks of age (Duggan, 2014). In another RCT study of multi-vitamin supplementation vs. placebo in children who have been exposed to HIV and whose mothers are also receiving supplementation, the group found no additional benefit of child micronutrient supplementation with regard to growth faltering (Kupka, 2013). However, the group has confirmed the value of maternal supplementation for women infected by HIV and showed an overall decrease in under 5 mortality as well as a specific decrease in pediatric diarrheal disease (Khavari, 2014).

In Chile, the Un Buen Comienzo team has employed a randomized cluster design evaluation of an early childhood educational intervention and demonstrated the value of enhancing the preschool curriculum with added emphasis on language/literacy, health, childhood behavior and parent involvement. The UBC group showed that training on these areas contributed significantly to improved classroom emotional climate (+.71 effect size), more productive classroom time use (.51 effect size and improved instructional quality (+.41 effect size) (Yoshikawa, 2013).

In South Africa, Lisa Butler and her team have used a RCT to show how quality improvement methodology can be adapted for implementation with community health workers who deliver HIV and maternal-child health education to pregnant women and mothers of young children. In a recently completed community-randomized controlled trial, the team has shown that providing support and ongoing mentoring for community health workers led to improved coverage of antenatal and postnatal home visits by community health workers, as well as improvements in mothers’ willingness to disclose HIV status, infant feeding practices, knowledge of key maternal and child health messages, and improved community health worker knowledge, self-efficacy, and quality of care. (Butler LM, Horwood C, Ngidi W, Grant M, Reddy J, Barker P, Rollins N. The effectiveness of a quality improvement intervention to supervise community health workers in South Africa/ Invited Speaker. International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Melbourne, Australia).
mHealth Interventions

A burgeoning new type of research with mHealth methodology allows the real-time capture of research data as part of the ongoing clinical or systems intervention. Kim Wilson and her team are piloting studies on the use of cell phones as clinical tools for the implementation of neonatal Integrated Management of Childhood Illness (IMCI) guidelines. The programmed cell phones guide the clinicians through the IMCI protocols and allow them to collect data as they are providing the care. These data are readily uploaded to other digital platforms for clinical documentation and research analysis.

In Nepal, Dr. Duncan Maru is testing the use of a mobile phone system to improve the productivity of community health workers as they conduct surveillance in low resource, isolated rural settings. Through this study, Dr. Maru has documented both technical and personnel challenges to implementation of such a systematic approach. His team found that “buy in” to the research and surveillance aspects of the project were not as successful as they had hoped, but that the mobile technology enhanced the coordination of care for patients.

Lisa Butler uses digital tablets to increase families’ awareness of the importance of compliance with HIV medications for their infected children and adolescents (Butler, WHO HIV Expert Meeting, 2012). The new methodologies of mHealth allow researchers to expand their reach and capture increased amounts and diversity of information (see sidebar).

COMMUNITY HEALTH WORKER ASSISTIVE TECHNOLOGIES

Lisa Butler and her team developed CHAT (Community Healthworker Assistive Technologies), an mHealth application to support the delivery of home-based services, health education, child health assessments and referrals by community health workers in 6 communities in KwaZulu-Natal Province, South Africa. The CHAT application supports comprehensive data collection regarding services delivered to households, child health assessments and decision supports to enable timely referrals to care, and health-related media (film/animation) to promote dialogue between community health workers and caregivers about HIV and child health. Her work has demonstrated the importance of a participatory approach to mHealth application development, implementation and evaluation, as well as the feasibility, acceptability and effectiveness of the approach in improving the quality of community health worker-caregiver communication and fidelity to care-delivery protocols.

▲ Top: Tablet computers offer compelling new forms of interaction providing mobile support for decision making, media-enhanced health education, and bi-directional communication with programs and clinics; Bottom: Rich educational media capture the attention of household members and promote productive dialogue.
Advocacy

As we endeavor to enhance services and strengthen health systems, the Global Pediatrics Program partners actively advocate at the local, regional, national and international level for necessary resources, training and systems changes that can improve the health and developmental chances for children and families. The Millennial Development Goals and the Sustainable Development Goals provide aspirational benchmarks for monitoring progress.

Advocating at a local level, we look to identify areas of practice that might benefit from new training, new protocols, new equipment and try to integrate changes into the day to day practices at our sites. Our advocacy is also directed at identifying the root causes of problems and filling in systems gaps. In Guatemala, for instance, Dr. Peter Rohloff has created the Mayan Health Alliance to empower the indigenous population. As part of his work on malnutrition, he is shining a spotlight on food deserts and the socio-political and economic sources of food insecurity. In Rwanda, the newborn follow-up program staff advocate to fill the community services gaps for children born prematurely. It is not enough for clinicians to diagnose the common medical problems associated with pre-term birth. That work must be reinforced with community level supports for the children and their families.

At the regional and national level, GPP members call on government agencies, NGOs, universities and philanthropic organizations to obtain funding and support for improved health training and health systems strengthening. In Liberia, for instance, Dr. Tubman is advocating to create a national program of sickle cell screening. In Rwanda, Dr. Emmanuel Rusingiza Kamanzi is asking the Ministry of Health for expanded capacity to treat children and young adults with rheumatic heart disease. In Haiti, PIH and the ZL program call on governmental agencies to scale up the newborn training and nutrition programs throughout the government clinic system. GPP team members also make the case for children’s rights. For instance, in India, faculty affiliate Dr. Krishnamurthy advocates for improved disability services and teaches parents family advocacy skills to keep up the drumbeat for the rights of their children.

On the international level, the GPP has been involved with organizations and networks that promote the spread of high quality interventions for children and families, including the Clinton Global Initiative, Helping Babies Breathe, MAMA, the International Pediatric Association and the American Academy of Pediatrics. GPP faculty promote the idea that advocacy needs to be an integral part of the global child health response through national and international lectures and through the book “Global Child Health Advocacy. On the Front Lines.” GPP faculty have joined with our child health colleagues around the world through the Consortium of Global Child Health Programmes in order to support the work toward achieving the Millennial Development Goals and the Sustainable Development Goals.
## Global Child Health Advocacy

<table>
<thead>
<tr>
<th>Millennial Development Goals</th>
<th>Sustainable Development Goals</th>
<th>Global Pediatrics Program Activities</th>
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<tbody>
<tr>
<td><strong>Eradicate Extreme Poverty and Hunger</strong></td>
<td><em>Ensure food security, good nutrition, and access to water</em></td>
<td><em>Nutritional programming; Promote economic opportunities</em></td>
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<tr>
<td><strong>Achieve Primary Education</strong></td>
<td><em>Provide quality education and lifelong learning opportunities for all</em></td>
<td><em>Early childhood programming; Support educational initiatives</em></td>
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<tr>
<td><strong>Promote Gender Equality and Empower Women</strong></td>
<td><em>Achieve gender equality and empower all women and girls</em></td>
<td><em>Strengthen opportunities for women and girls; Speak out against sexual violence</em></td>
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<tr>
<td><strong>Reduce Child Mortality</strong></td>
<td><em>Ensure health and mental health; Promote well-being for all</em></td>
<td><em>Infant, child and adolescent programs; Acute and chronic care</em></td>
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<tr>
<td><strong>Improve Maternal Health</strong></td>
<td><em>Ensure healthy lives</em></td>
<td><em>Maternal and infant health training and guidelines</em></td>
</tr>
<tr>
<td><strong>Combat HIV/AIDS, Malaria, and Other Diseases</strong></td>
<td><em>Ensure healthy lives</em></td>
<td><em>Infectious disease programs; Prevention and treatment</em></td>
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<tr>
<td><strong>Ensure Environmental Sustainability</strong></td>
<td><em>Ensure sustainable consumption and production patterns</em></td>
<td><em>Increase consciousness of environmental sustainability</em></td>
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<tr>
<td><strong>Global Partnership for Development</strong></td>
<td><em>Establish a global partnership for development</em></td>
<td><em>Advocate for appropriate financing, health equity and wellness for all</em></td>
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▲ Adapted from the Campaign for People’s Goals for Sustainable Development (http://peoplesgoals.org/category/general/)
Human Resources for Health in Rwanda

The Rwanda Human Resources for Health (HRH) Program is a novel and potentially transformative healthcare workforce capacity building initiative developed by the Government of Rwanda and funded by the U.S. Government. The overarching aim of the HRH Program is to build a comprehensive, high quality, and sustainable healthcare system in Rwanda. It will do so by strengthening the health workforce education system and by promoting the education and career development of the country’s health workforce over an eight-year time frame. To achieve this goal, the Government of Rwanda has convened a consortium of 23 U.S. partner academic institutions (including Harvard Medical School, Brigham and Women’s Hospital, Massachusetts General Hospital, Beth Israel Deaconess Medical Center, and Boston Children’s Hospital) engaged in the areas of medicine, nursing and midwifery, dentistry, and public health. Each of the participating U.S.-based institutions in this academic consortium will be asked to recruit and deploy clinical faculty according to the school’s identified specialty and subspecialty areas of interest. The Rwanda HRH Program proposes a structured plan for the complete transition of health workforce education from the academic consortium to Rwandan faculty and healthcare personnel within eight years as a result of the projected increase in the number of health care professionals and a projected increase in government health sector spending.

Faculty Projects

Dr. Shubhada Hooli is the Rwanda study site coordinator for a multi-country prevalence assessment of neurologic disorders in developing countries (PANGEA-DC). This study is designed to derive estimates of the number of children with neurologic disorders in order to enhance prevention and treatment of these conditions. The other African countries participating in the collaborative are Tanzania, Botswana, Uganda, Ghana and Kenya.

Dr. Samantha Rosman has been developing a Pediatric Early Warning Scoring System (PEWS) for Low Resource Health Systems. In the United States, the PEWS has been used successfully to equip hospital staff to document and analyze vital signs so that they can act early in acutely changing pediatric situations, often averting serious deterioration. In Rwanda, Dr. Rosman is adapting the PEWS for use in the pediatric hospitalized population.

Dr. Diane Stafford collaborates with the HRH faculty on a diabetic ketoacidosis protocol for use in Rwanda. They are basing the protocol on the International Society for Pediatric and Adolescent Diabetes (ISPAD) guidelines. The plan is to implement the guideline at the CHUK (University Hospital, Kigali) and then, after testing and refinement, to goal disseminate the guideline nationally.

In addition to providing direct clinical care for patients in collaboration with Rwandan colleagues and trainees, Dr. Daphne Remy, has led many educational initiatives including resident and medical student didactic lectures, neonatal resuscitation courses, developing an instructional CPAP video, as well as developing and implementing a multidisciplinary simulation project. She also served as a consultant to the Ministry of Health of Rwanda to update the Essential Newborn Care (ENC) guidelines and training materials.

▲ Top: Members of the HRH faculty team (from left to right): Samantha Rosman, Daphne Remy, Emmanuel Kamanzi Rusingiza, Kim Wilson and Diane Stafford. Bottom: President Bill Clinton shares a moment with HRH physician, Mark Corden.
Education

Education is a core activity of the General Pediatrics Program. The goal of the educational programs is to provide clinical, health care and advocacy skills to a wide variety of learners who in turn will improve health care delivery in low resource settings. The learners include US medical students, residents, fellows and attending and partner site medical students, residents, fellows, staff and other child health professionals.

Pediatric Residency Training at Partner Sites
A core element of many of the GPP programs is residency training in the partner sites. In conjunction with the Ministries of Health, in Haiti, Rwanda and Liberia, GPP is a key player in efforts to increase the number of pediatrically trained and certified doctors. In each of these countries, there are currently not enough child health physicians to meet the needs of the hospitals and clinics. Residency training is an organized, structured approach that ensures a new generation of highly qualified child health providers and leaders. The educational methods include bedside teaching, lectures and conferences, telemedicine, journal clubs and curriculum development.

Mentoring in Research and Quality Improvement
At the partner sites, GPP faculty and fellows join partner faculty and trainees on research and quality improvement projects. These activities include significant educational components as together the teams learn research and quality improvement techniques. Much of the positive impact of the GPP programs has come from the development and implementation of clinical protocols followed by rigorous quality improvement monitoring of the roll-out of the new pediatric care procedures.

Helping Babies Breathe
The GPP has linked with the American Academy of Pediatrics and other global child health groups in the dissemination of the Helping Babies Breathe curriculum. Faculty and fellows present HBB at the partner sites both as direct teaching and as train-the-trainers methodology. The elegantly simple, curricular materials aid health workers at both the community and the clinical level to appreciate the importance of pre-delivery planning and the critical nature of life’s first “Golden Minute.” The simple HBB icons direct learners through every step of the newborn process.

OPENPediatrics™
OPENPediatrics is a groundbreaking initiative with the aim of being “an online community of clinicians sharing best practices from all resource settings around the world through innovative collaboration and digital learning technologies.” The GPP is connecting with OPENPediatrics to develop internet modules that focus on common pediatric problems, such as maternal and infant care, diarrhea and malnutrition as well as modules on non-communicable disease issues that are emerging in the global child health context. Modules are under development on topics such as the approach to congenital heart disease in low resource settings.
Educational Opportunities

In conjunction with the Boston Children’s Hospital Global Health Program, we offer courses, seminars, and travel opportunities that complement the GPP programmatic work. These offerings emphasize the skills, tools, and attitudes that equip child health care providers to address health care needs in low resource settings.

Courses

**Helping Babies Breathe**
Simulation-based course on neonatal resuscitation designed for those who will be responsible to train other birth attendants in low-resource settings.

**Clinical Topics in Global Health**
Didactic course for pediatric clinicians with an overview of key topics in preparation for clinical work in resource limited and tropical settings. Topics include: parasites, malnutrition, TB, newborn care, malaria, IMCI, and HIV.

**Ultrasound Course**
This interactive didactic and hands-on course exposes participants to a range of point-of-care ultrasound applications including FAST, cardiac, lung, vascular access, and a variety of others.

**Trauma, Emergencies, & Sedation**
Simulation-based course to discuss response to trauma and emergencies and how to do sedation safely in resource limited settings.

**Nursing, Pharmacy, & Lab Skills**
Hands-on course on useful skills for clinical work in resource limited settings. Topics include: administration of IV medications and fluids, skin and wound care, lines and tubes, skin & wound care, a review of basic laboratory procedures.

Seminars & Workshops

**Global Health Seminar Series**
A monthly seminar series in which faculty & trainees come together to share their experiences and learn about current global health issues and strategies.

**Global Health Research Day**
The Global Health Research Day is a day devoted to helping fellows and junior faculty gain skills and knowledge necessary to conduct global health research and improve monitoring and evaluation plans. The day will feature workshops on IRB writing and procedures, data management systems, building partnerships, and grant writing.

**Ethics in Global Health**
Preparation for common ethical challenges encountered when working abroad, through small-group discussion and case-based simulation.

**Communication & Advocacy**
Written and oral communication skills in the context of advocacy for specific global health issues.

**Medical Education**
Clinicians learn curriculum design and evaluation as well as innovative teaching techniques.
Residents

The Boston Combined Residency Program (BCRP) currently offers global health opportunities of varying depth depending upon residents’ interests.

Tier 1

All residents in the BCRP are training to be outstanding clinicians. In this era of globalization where our patients are frequently immigrants or travelers, pediatricians need to know the basics about pediatric care of common illnesses encountered around the globe. Global Health topics are included in the BCRP noon conference series. The goal is that all of our graduates will develop a basic understanding of child health from a global perspective.

Tier 2

Many residents seek global health experiences – working in different cultures with different or limited material resources, and encountering pathologies seen in other places. Our goal is that all residents interested in global health will receive preparation and support to facilitate their participation in elective rotations in resource limited settings that are educational, safe, and responsive to their host communities.

Tier 3

Residents in the Urban Health and Advocacy Track, who are planning a career in global health research, may apply for a 4-year global health track that will impart proficiency in clinical pediatrics, public health and applied research aimed at improving policy and outcomes in areas of significant child health disparity.

Examples of Funded Resident Projects

- Developing Protocols for Fever in Patients with Sickle Cell Disease in West Africa (Ghana)
- Teaching Neonatal Resuscitation (Indonesia)
- Developing an OPENPediatrics Cardiology Module for Residents (Rwanda)
- Evaluation of Clinical Outcomes and Predictors of Mortality in an Acute Care Unit (Tanzania)
- Research on Neonatal Care in the Community (Indonesia)
- Diarrhea Illness Management and Research (Bangladesh)

ADDRESSING CHILD MENTAL HEALTH IN DISASTER RECOVERY

During her medical residency in the BCRP, Dr. Lili Peacock joined Recupera Chile, a multidisciplinary Harvard and Chile team that was responding to the 2010 earthquake. In the Bio Bio region, the earthquake was accompanied by three tsunami waves that devastated many of the seaside towns leaving families in temporary shelters for up to three and a half year. Dr. Peacock had the opportunity to become deeply imbedded in the Dichato, Chile community through the multiple visits she made to the town. She continued her work into fellowship after graduating from the BCRP. She collected much of the Recupera Chile qualitative data on the impact of the earthquake and tsunami and helped the Recupera Chile team craft appropriate responses based on the needs she uncovered through her visits to the temporary shelters, the schools, health centers and day care centers. Dr. Peacock became so well known on the streets of Dichato, that community members often would call out to her to find out how her 3 year old daughter was doing, since Cecelia had accompanied her on two of her trips.

With the Chilean community care manager as well as colleagues from the University of Concepcion, Dr. Peacock helped design mental health interventions for the children and families. Through the work, she learned how teams form, how programs are created, implemented and evaluated. She learned how global work can be sustained through iterative visits and routine team communication between visits. She learned how communities and families can engage with universities and elementary school partnerships to strengthen child health and education services for a vulnerable population during long-term natural disaster recovery.

▲ Recupera Chile has hosted Summer School Sessions for children in Dichato for three years as a stress relieving support to families. The children learn yoga, music, Mandala drawing, soccer, kayaking and other activities related to the sea.
Global Pediatric Fellowship

The Global Pediatric Fellowship Program at Boston Children’s Hospital aims to train future leaders in global child health as well as support the development of essential child health services in regions of the world with limited access to child health providers. Our goal is to train a cadre of pediatricians who have the necessary skills and long term commitment to make an impact in improving child health in some of the world’s neediest settings.

PROGRAM STRUCTURE
The fellowship is a two year training program in which Fellows rotate in 6 month blocks between a field placement in Haiti, Rwanda, or Liberia, and a clinical placement in Boston, Massachusetts. The focus of the fellowship is on skills in global health service delivery, including skills in clinical care, medical education, program development, management, evaluation, quality improvement, and in implementation focused research.

Boston
During their clinical placement in Boston, fellows combine service in general pediatrics with an extensive global health curriculum that strengthens their core clinical, public health, quality improvement, and teaching skills relevant to global health. Fellows attend the Global Health Delivery Summer Intensive Program at the Harvard School of Public Health, in addition to courses in clinical skills, ultrasound, research, and QI.

Field Sites
During their field placement, fellows work in collaboration with Partners In Health (Haiti/Rwanda) or ACSME (Liberia) to provide direct clinical care and to study, teach and learn alongside site-based colleagues and students. Together with local clinicians, they strive to strengthen existing child health programs, and expand access to pediatric health care. Prior to departing to their field site, fellows attend a 1-week ‘bootcamp’ orientation to fieldwork in Haiti through PIH.

HOW TO APPLY
Requirements
Applicants must have board certification/eligibility in pediatrics or medicine-pediatrics. International applicants must submit: (1) USMLE Scores: Steps 1–3, (2) ECFMG certificate & Green Card. The application can be found on our website: childrenshospital.org/globalpediatrics

Timeline (for July 2016 start)

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<th>Event</th>
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<td>July 2015</td>
<td>Application available on website</td>
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<tr>
<td>September 30, 2015</td>
<td>Application deadline</td>
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<tr>
<td>October 2015</td>
<td>Interviews</td>
</tr>
<tr>
<td>November 2015</td>
<td>Decision notification</td>
</tr>
<tr>
<td>July 1, 2016</td>
<td>Fellowship training begins</td>
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</table>

In their field placements, the Global Pediatric fellows work in partnership hospital settings. Ophelia Adipa (left), Theresa Strong (right) care for children with a wide range of acute and chronic health conditions.
Graduates

Molly Moore, MD  2010-12
During fellowship, Dr. Moore served as a district clinical advisor in pediatrics in rural Rwanda. She worked on national pediatric oncology protocols, supported a pilot program to prevent mother-to-child transmission of HIV, and ran an HIV education program for nurses. She currently holds an academic appointment at the University of Vermont College of Medicine, where she is involved with global health medical education.

Vanessa Wolfman, MD  2010-12
During fellowship, Dr. Wolfman worked as a district clinical advisor in pediatrics in rural Rwanda. Her activities included clinical mentorship and health systems strengthening. She is currently the Emergency Medical Director of the International Medical Corps in Sierra Leone.

Chris Carpenter, MD, MPH  2011-13
During his fellowship, Dr. Carpenter worked in Haiti where he improved pediatric care by training local doctors and nurses at St. Marc’s district hospital. At the end of his fellowship, he co-founded the Kay Mackenson clinic for children with chronic diseases in Pierre Payen. He is now a faculty member at the University of California at San Francisco and serves as a consultant to the Boston Children’s Hospital Global Pediatrics Program in Haiti.

Sara Gonzalez, DO  2011-13
During her fellowship, Dr. Gonzalez worked at St. Marc’s Hospital in rural Haiti providing inpatient clinical services. She carried out several projects on neonatal nursing education with an emphasis on breast feeding promotion. She is currently an attending physician at the St. Luke’s Hospital (New Bedford, MA) with continued work in Haiti.

Jill Veselik, MD  2012-14
During her fellowship, Dr. Veselik worked in rural Rwanda where she provided pediatric care and participated on the teams that wrote the protocols for the newly established Pediatric Development Clinic. She is currently an attending physician at St. Luke’s Hospital in New Bedford, MA.

Brittany Potts, MD  2013-15
Dr. Potts spent her fellowship serving as a pediatrician St. Nicholas Hospital in St. Marc, Haiti. She focused on acute care delivery and on improving the delivery of nutritional support to severely malnourished children. She also assisted colleagues at the St. Damien Hospital in Port Au Prince with their programming around children with severe chronic health conditions, and collaborated with the Haitian Pediatric Society on initiatives pertaining to pediatric residency training. Dr. Potts is currently the Associate Director of Pediatric Global Health at Akron Children’s Hospital.

Theresa Strong, MD  2013-15
Dr. Theresa Strong spent part of her fellowship in Liberia, working at the JFK Hospital in Monrovia on the partnership medical residency training program. As a result of the Ebola outbreak she was redeployed to Indonesia where she worked on decision support tool implementation and to Laos where she supported the opening of a pediatric hospital. Dr. Strong is currently an attending physician at South Shore Hospital (Weymouth, MA) and is pursuing a masters in public health.

Leana May, DO, MPH  2013-15
During her fellowship, Dr. May worked as a district clinical advisor in pediatrics in rural Rwanda. Her work centered around capacity building through clinical care, and pediatric oncology programmatic work. Dr. May is currently a member of the Faculty of the Children’s Hospital of Denver at the University of Colorado Medical School.

▲ (left to right) Leana May, Theresa Strong and Brittany Potts
Accompaniment: a Powerful Combination

Leana May, DO, MPH
Global Pediatric Fellow, 2013–2015

As a college student reading the book about Dr. Paul Farmer entitled “Mountains Beyond Mountains,” I was struck by the accompaniment model that serves as a tenant of the care that Partners In Health delivers. The past decade of my training has taken me to work clinically, or conduct research, in nine different low- and middle-income countries. Over the past two years, during my Boston Children’s Global Health Service Delivery Fellowship, in partnership with Partners In Health Rwanda (Inshuti Mu Buzima), I am finally living and carrying out the accompaniment model I read about so many years ago.

I have had the honor of accompanying Dr. Cyprien Shyirambere, a Rwandan-trained pediatrician who has been task shifted into the role of a pediatric oncologist at the Butaro Cancer Center of Excellence (BCCOE) in a rural Rwandan district hospital. For me, as a U.S-trained pediatrician there were many challenges and lessons to be learned to provide locally appropriate care. From previous experiences focusing on pediatric cancer patients I knew that Dr. Cyprien would be my trusted guide. We hear too often tales of the American doctor working against the local doctors, fostering a disjointed work environment. In order for us to best serve the Rwandan children we need to accompany each other.

Prior to joining Partners In Health, Dr. Cyprien was the director of medical education and a pediatric lecturer at one of the Rwandan teaching hospitals. In ongoing efforts to better understand the burden of disease treated at BCCOE and the outcomes of our patients, the oncology team participates in ongoing research. Dr. Cyprien and I were among the core team looking into the outcomes of Wilms’ tumor, the most commonly treated cancer at BCCOE. In his early days at Butaro, after long days of rounds, Dr. Cyprien and I would review cancer protocols and compare BCCOE’s outcomes to those in other low resource settings.

For Dr. Cyprien, writing his first abstract was a labor of love. This time, he turned to me for support. The process was frustrating and slow, but I promised him that the foundation he was building would serve him well as his career advanced. Little did we know, our Wilms’ poster, “Preliminary Treatment Outcomes Utilizing SIOP Guidelines in a Novel Oncological Care Model for Wilms’ Tumor in Rwanda” would go on to win the best poster prize at the International Pediatric Oncology meeting (SIOP) this past fall in Toronto, Canada.

Shortly after arriving back to Butaro, after my six months in Boston, I listened to Dr. Cyprien give a lecture to all of the hospital nurses and doctors. He paced around the front of the room with such ease and grace as he imparted knowledge to his colleagues. I thought back to his first days at BCCOE, when he was unsure of himself in this new specialized area of medicine he was practicing. I sat there smiling from ear to ear, so proud to witness his growth and transformation into a task shifted Rwandan pediatric oncologist.

Within the first hour of my return to the neonatal unit, I had a very complex medical social issue and I was so grateful to have Dr. Cyprien’s input to know how to handle it appropriately. He shared his thoughts and helped me think through the multiple levels of the problem. Soon after, he asked if I would be available after dinner to help him with a few quality improvement projects he was working on. Here was the accompaniment I had read about, a synergistic relationship allowing us to provide high quality locally adapted care to the patients we serve - together.
Each day in Rwinkwavu, I wake up in my small house and have a simple breakfast. Often it is raining. Some mornings I have tried to wait out the heavy down-pours, but eventually I just have to get going to the hospital no matter what. One day, when I arrived at the hospital looking like a nearly drowned water-rat, my Rwandan physician colleagues laughed and laughed in unison. The Senior Medical officer pulled up short and said, “Eh...are you rounding in the nursery? You can’t drip in my new neonatal unit.” We all started laughing again. That day, my life seemed comical even to me and I decided it was time to invest in better rain-gear and an umbrella. No dripping in the neonatal unit for sure. This is a new and valuable program for the district hospital. Few African hospitals of the size and type of the Rwinkwavu Hospital have neonatal units that can provide intensive care. Rwanda has put an emphasis on improving the health of babies in the first 28 days of life and the country is investing in the development of greater neonatal capacity. I usually round with the doctors in the morning and review the new and difficult on-going cases in the afternoon. On the day of my ignominious, rain soaked entrance, there were a number of very sick babies: one with multiple, serious congenital anomalies, a child with a large intra abdominal mass and respiratory distress, and a full-term infant with meconium aspiration and respiratory compromise.

Unfortunately, on the unit, there are only two Continuous Positive Airway Pressure (CPAP) machines that can support babies who aren’t breathing well and one was already in use. This day we had to make the difficult decision about who would get the CPAP. What to do? Do you withhold respiratory care from the baby with congenital malformations because you think he’s likely to have a poor outcome? What are his chances of surviving? What are the term baby’s? This is the daily reality of life with limited resources. It’s not fair; it’s not ethical; it’s not possible to make a good decision – because inherently whatever you choose you are devaluing one baby’s life over the others - and what if they both end up dying? But this is reality for most of the world. Ultimately we gave the CPAP to the full term baby. Grace of God they both looked good when I left at 5pm.

That night, after work, I went over to the PIH Training Center, just above the Hospital. One of the American PIH nurses, Melody, was projecting a Harry Potter film for the village kids. The children cheered and clapped and gasped as Harry went through his adventures. After the movie, the whole gang of 20 children walked me back to my house. All the while they cut up, talked like Golum (from the Lord of the Rings), asked me about Harry Potter, sang songs and shouted goodnight as one by one they peeled off to their houses.

That night in my room, I still heard the rain pattering on the tin roof. As I drifted off to sleep I thought, “This is my day here – beautiful, difficult, dirty, hilarious, sad, silly and real. This is a day of fighting for better futures while recognizing the beauty in the present.”
The first time I met R, I thought he was dying. His body was on fire, his mouth foaming, his abdomen tense like a rock. I was puzzled at first. Is he in having a seizure? Why is he in so much pain yet so conscious? Is there a perforated bowel?

My Haitian colleague walked in, took one look at the kid, and said calmly—"oh, it’s tetanus". Tetanus – a disease I have never seen in person. Sure, we read about it in medical school—one of the vaccine-preventable diseases. In fact, it is so preventable, that it is rarely seen in an American Pediatrician’s career. Here, in Haiti, it is quite common due to poor vaccine coverage, to the point that each year 1-2 children will die from it at our hospital.

Luckily for the nine-year-old R, he survived, but not without a lengthy struggle. Every day I walk in fearing that he had not made it through the night. I would find him moaning in bed, extremities tensing and body shaking in intense pain. These spastic episodes initially occurred 5-6 times per hour. The worst was when he yelled “Help me! Help me!” I have never felt so helpless myself. Nothing seemed to be enough for relieving his suffering. We gave anti-toxin, Diazepam, Penicillin and Metronidazole, but there wasn’t any Morphine. Toradol and Tylenol were just not enough to ease the pain. Many days I stood at the bedside, wiping away his tears and holding his hand, trying to stay calm and comfort him and his family by offering an overall optimistic prognostic.

Eventually, he turned the corner. The day he started walking, I felt like a different person too. That little distorted body that couldn’t even stretch in bed is now slowly strolling down the hallway. He curiously picked up my stethoscope, and offered his finger for an oxygen saturation check. It had become our ritual, I realized. On the days where no medicine seemed to help, my coming in, laying my hand on his, making sure that he was not in respiratory failure, and giving him an amateur massage, had bonded us. His family now smiled every time they saw me. They said, our son wants to be a doctor.
Changing and Sustaining

Chris Carpenter, MD, MPH
Global Pediatric Fellow, 2011–2013

After completing residency, I began a two-year volunteer medical mission in the developing world. I loved all the new experiences, unfamiliar obstacles and unexpected successes that I encountered in Goma, Democratic Republic of the Congo, East Timor, and Liberia. But, I continually felt something was missing. When I realized I did not have the knowledge or training to make lasting change, I decided to join the Boston Children’s Pediatric Global Health Fellowship.

During my two years in Haiti with the Global Pediatric Fellowship, I learned that global health practice involves integration into a local health infrastructure and partnership with national providers as well as careful systems’ evaluation that identifies both strengths and weaknesses. This allows the creation of effective and sustainable projects and the development of teams that can unify under a common goal.

Near the end of my fellowship, I recognized an opportunity to make a large impact. During the daily work in the hospital and clinic, I realized that there was inadequate infrastructure to support the ongoing care of children with chronic illnesses such as diabetes. In 2012 with Dr. Rick Bonnell, and Dr. Julia von Oettingen, and a Haitian team of physician medical director, two nurses, a program manager, two cooks/dieticians, a cleaner and three security guards, we founded the Kay Mackenson Clinic in Pierre Payen, Haiti.

Kay Mackenson now serves as a chronic disease referral center for patients from the Artibonite, Central Plateau and the Northern Departments. The patients stay at the clinic to recover from the acute phase of their disease and then learn long-term disease management. At discharge, KM provides them with the necessary supplies and medications to treat their disease. The clinic staff then follows-up with each patient by phone and the patients return for regularly scheduled clinic visits.

The Kay Mackenson Clinic currently delivers 24 hour a day, all encompassing care for children with a variety of diseases. We have over 50 patients with type 1 diabetes, more than 10 children with heart disease and a variety of children with nephrotic syndrome, juvenile idiopathic arthritis, chronic osteomyelitis, lymphatic malformations and bony diseases. We have rejoiced with parents, the community and all of our staff as we have had the opportunity to manage some of the sickest children in the area and help them regain strength and function.

KM’s partners are Partners In Health/Zanmi Lasante, the International Diabetes Federation(IDF), the FHADIMAC (the major Haitian Diabetes Association and the Ministry of Health. The IDF Life for a Child program provides free testing and treatment supplies for diabetic children, adolescents and young adults. The FHADIMAC, and the Ministry of Health ensure that our work fits national guidelines and integrates in the national treatment and training plan for diabetes and other non-communicable diseases.
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