

A PARADIGM SHIFT IN GLOBAL SURGERY TRAINING: RWANDA'S HUMAN RESOURCES FOR HEALTH (HRH) PROGRAM

In November 2014, Dr. Georges Ntakiyiruta, Academic Head of the Department of Surgery for the University of Rwanda, was readying himself for the upcoming Physician Subcommittee meeting. The group met regularly to discuss and advance the innovative Human Resources for Health (HRH) Program launched in Rwanda in August 2012. It was an exciting time for Dr. Ntakiyiruta and his colleagues. They were part of leading a high-profile global consortium aimed at, in the words of Rwandan Minister of Health Agnes Binagwaho, creating “a critical mass of health professionals” and transforming Rwanda’s health care system.

HRH paired United States faculty from more than 20 institutions—including Dartmouth, University of Virginia, Duke, and Yeshiva—with Rwandan college faculty counterparts. A discipline-specific “twinning model” sought to provide a two-way learning experience that would help support and develop a sustainable health care system in Rwanda.

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The HRH Program held not only great promise for the country of Rwanda, but it also held personal promise for Dr. Ntakiyiruta's day-to-day life and work. Since joining the University of Rwanda in 2008, where Dr. Ntakiyiruta taught undergraduate as well as post-graduate courses in addition to maintaining a full clinical schedule at the University Teaching Hospital of Kigali (CHUK), there had never been more than four permanent university-employed faculty in the Department of Surgery. If the HRH program achieved its ambitious human resource growth targets, it was reasonable to conclude that the professional lives of devoted physicians like Dr. Ntakiyiruta would witness desired improvements with the opportunity to serve more patients and to educate the next generation of surgeons in Rwanda. It would also provide more time for published research and academic inquiry.

When the HRH program was launched a little more than two years earlier, news of the Rwandan effort was accompanied by great fanfare. "This is the boldest effort I've seen to make good on a central promise of global health," said Dr. Paul Farmer, the Kolokotronis University Professor at Harvard University and Chair of the Harvard Medical School Department of Global Health and Social Medicine. "The fruits of science serve everyone, especially those that bear the highest burden of disease," he also noted.¹

Medical professionals across the many Rwandan hospitals participating in the HRH program also expressed a feeling of great anticipation and optimism at the program's launch. One of the aspects that made HRH unique was that external funding acquired to support the program would not be funneled through nongovernment organizations (NGOs), as was the custom. Instead, Rwanda's Ministry of Health would have full ownership and oversight of the program, which was scheduled to run from 2012–2019. The project was largely funded by the US government at a level of US \$170 million.

The agenda for the upcoming Physician Subcommittee meeting that Dr. Ntakiyiruta was preparing to attend was written as follows: "HRH Program: Midcourse Review." Evaluation of a program of this sort was not uncommon after a 12- to 24-month period. This provided an opportunity to review the early success of the program and to make mid-course corrections,

¹ Jake Miller, "HMS Partners with Rwanda Ministry of Health," <http://hms.harvard.edu/news/hms-partners-rwanda-ministry-health-11-20-12>, November 20, 2012, accessed January 2015.



as necessary. Overall, the goal of the meeting was to align expectations among US and Rwandan participants in the program, while working towards achieving the program's aggressive human resource recruitment and educational goals in Rwanda.

Health Care Context in Rwanda: Towards a Sustainable Model

Rwanda is a landlocked country in sub-Saharan Africa with one of the densest populations of any country in the world. Since the 1994 genocide, Rwanda has made significant progress on several health and development indicators; however, the country remains an agrarian-based economy with approximately 60% of the population living below the poverty line. In order to understand 21st century Rwanda, it was critical to consider the nation's history. Dating back to the 11th century, Rwanda was a nation built on the shared history, values, and language of its people. Following the Berlin Conference of 1884, Rwanda was colonized first by Germany, then by Belgium during World War I. As described in Rwanda's national development plan, "The colonial power, based on an ideology of racial superiority and in collaboration with some religious organisations, exploited the subtle social differences and institutionalized discrimination. These actions distorted the harmonious social structure, creating a false ethnic division with disastrous consequences."²

The health of Rwanda's population suffered greatly after the genocide. Infrastructure was lost and the professional working class, including healthcare workers, was decimated.³ Post-genocide Rwanda witnessed the lowest life expectancy in the world.⁴ Foreign aid plummeted as aid communities lost hope in Rwanda's recovery. Operating under this harsh set of realities, the new leadership began to set the country on a new course.

² Rwanda Vision 2020, Ministry of Finance and Economic Planning.

³ Ibid.

⁴ Agnes Binagwaho, et al. "Rwanda 20 Years On: Investing in Life, *Lancet* 384, no. 9940 (July 2014): 371–75.



Vision 2020

In July 2000, a new national development plan was launched by the Rwandan Government. It set high expectations for what Rwanda could achieve in the coming decades.⁵ Formalized as Vision 2020, the plan outlined steps toward sustainable development for Rwanda by the year 2020. The ultimate goals of the program were to move Rwanda from a low-income country to a middle-income country, and to liberate the country from the need for foreign aid.⁶

A number of new approaches to health care in Rwanda proved effective in the first decade of implementation. The decentralization of health services, introduction of a broad-based health insurance program that increased financial accessibility, and a sector-wide approach to align interventions and resources, were among the innovations included in the Vision 2020 plan.⁷ These steps produced results, most notably in an increased vaccination coverage in Rwanda, and a decrease in child and maternal mortality rates. (See **Exhibits 1A, 1B, and 1C** for data.)

Vision 2020 also set clear, aggressive targets to improve health-care-provider to population ratios. The new targets, to be achieved by 2020, included 10 medical doctors, 20 nurses, and 5 lab assistants per 100,000. Accordingly, workforce capacity-building emerged as a major priority for the Ministry of Health, and strategies for achieving this complex endeavor rose to the forefront of strategic planning.⁸

HRH Program: Conception, Design, and Management

The Faculty of Medicine was institutionalized in 1963 at the National University of Rwanda (NUR). The only institution in Rwanda to train physicians, it later was reorganized as the University of Rwanda (UR). Education for general physicians in Rwanda required six years of

⁵ Ibid.

⁶ Rwanda Vision 2020, Ministry of Finance and Economic Planning.

⁷ HRH Presentation, "Rwanda Overview and Impact on the Health System," Dr. Uwaliraye Parfait, Director General of Planning & Health Information System, Ministry of Health, August 27, 2014.

⁸ Agnes Binagwaho, et al. The Human Resources for Health Program in Rwanda—A New Partnership, NEJM.



study, followed by one clinical internship year. The post-graduate training predating the HRH program included Internal Medicine, Pediatrics, Surgery, OB/GYN, Anesthesia, Family and Community Medicine (FAMCO), and Ear-Nose-Throat (ENT) Surgery.

In conception, the HRH program sought to expand the number of specialty areas covered in Rwanda to include Emergency Medicine, Radiology, Oncology, Pathology, and Psychiatry.⁹ Students interested in pursuing specialties beyond those offered through HRH would still require training outside of Rwanda.¹⁰ Historically, there was a notable dearth in specialization among the Rwandan healthcare workforce. As Minister of Health, Dr. Agnes Binagwaho, commented, “we created partnerships with US Institutions, higher learning institutions, to [bring into] Rwanda the necessary teachers to help us educate our students.”

Architects of the HRH program also sought to establish longer-term participation of US faculty—an expected improvement relative to shorter-term stints more customarily managed by physicians based in developed world nations such as the United States. Tej Nuthulaganti, the Clinton Health Access Initiative's (CHAI) Director for HRH at the time, explained:

I think the conventional model that we have all strived to move away from is this fly-in, fly-out model where you have two weeks of service or a month of service. I think [instead] it's pretty phenomenal to see a faculty member be able to invest in a long-term relationship, really get deep into projects, quality improvement work, research—really looking into how to improve medical education in a challenging setting where you might not have the same resources as back home.

An Innovative Program Model

The HRH operating model represented, in conception, a social innovation—“A new model for foreign aid.”¹¹ Traditionally, an international funder such as the US government placed financial support under the aegis of a well-situated NGO, which in turn allocated funding and

⁹ HRH Consortium Website, <http://www.hrhconsortium.moh.gov.rw/>, accessed January 2015.

¹⁰ HRH Strategic Plan 2011–2016, Ministry of Health (PDF).

¹¹ HRH Program Orientation Slide Deck, August 2014.



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managed the specific activities comprising a given program. In the case of the HRH program, however, US government funds were placed directly with the Rwandan Ministry of Health, which maintained full ownership and oversight of the program.

This funding approach held a number of potential advantages over the traditional NGO model. In particular, architects of the program touted strong coordination, low overhead costs, and high alignment to government goals and needs.¹² (See **Exhibit 2** for traditional versus new program model.)

This is not to say that the efforts were devoid of NGO involvement. In the first two years of operation the Clinton Health Access Initiative (CHAI) played a vital role in linking Rwandan faculty and government officials with faculty from US institutions. CHAI also assisted with program administration, including the development of comprehensive memoranda of understanding (MOU) that would be used to define program goals, expectations, and decision rights governing the alliance between Rwandan and US institutions. CHAI's Nuthulaganti commented:

One fateful day, there was a conversation with Dr. Paul Farmer, who sits on CHAI's board, about how do we get universities to participate in a program like this—to establish a model where universities would have low overhead and low administrative fees so more money would come to the developing country, to Rwanda. And Dr. Farmer said he thought he could get Harvard on board, which was already a gargantuan task. We had a partnership with Betsy Bradley at Yale University through our work in Ethiopia and other places. So we went to Yale and said, 'Look what Harvard's doing.' Then we went to Duke and said, 'Look what Harvard and Yale are doing.'

When the HRH program launched, in August 2012, it was characterized as an unprecedented collaboration in global health. At the start, 13 US academic institutions committed to providing their own faculty as mentors, trainers, and colleagues in Rwanda—promising knowledge transfer between and among US-trained specialists and Rwandan physicians,

¹² HRH Program Orientation Slide Deck, August 2014.



faculty, and physicians-in-training. This has since grown to over 20 institutions. (See **Exhibit 3** for mapping of Rwandan institutions and consortium of US institutions.) Minister of Health, Dr. Agnes Binagwaho described her vision for this “win-win” collaboration on her blog:

Rwanda is not the only country to benefit from this program, which breaks sharply from old models of foreign aid. This partnership is also a win-win for our American colleagues, who are learning more each day about what it takes to deliver care in resource-constrained settings. Such experiences are already enriching global health programs at universities throughout the United States and opening new doors for research collaboration between our two countries. Overall, this partnership—in both the clinical and research settings—will help the global health community better understand how we can collectively overcome health challenges in a more sustainable way.

She emphasized:

Interdependence in global health is not just an abstract idea. In an age in which a single airplane flight can turn a drug-resistant pathogen into an international public health emergency, better-trained health workers in the developing world will improve prevention by bolstering our first-line of defense against serious global public health threats.¹³

HRH Program Targets: Physicians, Nurses, Hospital Managers

The majority of Rwandan physicians were general practitioners, suggesting they did not complete a formal, post-graduate training program in a medical specialty. As of February 2011, Rwandan general practitioners numbered 367, versus only 70 specialists and 43 sub-specialists. Additionally 58 expatriate specialists were working in Rwanda.¹⁴ According to the

¹³ Agnes Binagwaho, “A Win-Win for Global Health,” <http://dr-agnes.blogspot.com/2013/11/a-win-win-for-global-health.html>, accessed December 2014.

¹⁴ HRH Strategic Plan 2011–2016, Ministry of Health (PDF).



HRH Strategic Plan prepared by the Ministry of Health, these figures needed to increase dramatically over the seven-year period of the HRH program (2012–2019), if the country was to close the “gap” between the current and desired number of physicians. (See **Table A.**) Part of expanding the medical workforce in Rwanda would involve the creation of “a new cadre of health workers” called Medical Assistants (MA), which “would function in a similar way as physician assistants (PAs) in the United States and would be allowed to see patients and provide care under strict guidelines and under the supervision of a physician.”¹⁵

TABLE A: Targets by physician type

Healthcare Provider	Current	Desired	Gap
Medical Assistant	0	500	(500)
General	367	215	152
Specialists	70	565	(495)
Sub-Specialists	43	175	(132)
TOTAL	480	1,455	(975)

Source: HRH Strategic Plan, Ministry of Health, March 2011.

The targets, to be achieved by 2019, reflected the desired number of physicians per health facility. The figures calculated by the Ministry of Health took into account “not only the number of physicians, but also the skill mix required between different specialties and at different levels of the health system.” Under these newly envisioned optimal staffing levels, referral and district hospitals were to have their staff augmented by specialists, reflecting the growing variety of clinical services offered at the district level.

¹⁵ HRH Strategic Plan 2011–2016, Ministry of Health (PDF) HRH Consortium Website (<http://www.hrhconsortium.moh.gov.rw/>), accessed January 2015.



According to estimates, approximately 300 specialists would be trained over the seven-year program by visiting faculty from US institutions. As this would not be sufficient to fill the gap, the need for additional specialists would be filled by sending physicians abroad for specialty training.

Nurses Historically, nurses working in Rwanda received three levels of training. A2-level nurses received training only to the secondary school level. A1-level nurses held an advanced certificate in nursing, which required three years of nursing school. AO-level nurses, the highest tier, held a bachelor's degree.

The goals of the HRH program was to increase the number of highly trained nurses and improve the overall quality of care. In 2008, A2 nursing ended, deeming the skill set insufficient. A concerted effort was made to educate A2 nurses to meet the the A1-level skill level. Concurrently, a modest number of nurses were trained to the AO level in order to ensure a sufficient number of Rwandan nurse lecturers to aid in future education of nurses. The HRH program called for an aggregate increase in nursing personnel by 54% over a seven-year period. The Ministry of Health reported the baseline distribution of nurses, prior to implementation of HRH, as follows:

The overwhelming majority of nurses are A2. (See Table B.) Currently, A1 nurses represent less than 10% of the total pool of nurses. A2 nurses are relatively evenly spread throughout the country, though there are still disparities between districts, with a number of under-served districts in the South, West, and Northern Provinces. On average there is about 1 nurse for a population of 1,500.



TABLE B: Target by Nurse Type

Healthcare Provider	Current	Desired	Gap
Nurse A1	457	7,171	(6,714)
Nurse A2	6,152	3,000	3,152
TOTAL	6,609	10,171	(3,562)

Source: HRH Strategic Plan, Ministry of Health, March 2011.

Hospital Managers/Medical Directors There were 40 District Hospitals and 5 Referral Hospitals in Rwanda. As a rule, each hospital was headed by a Medical Director with both management and clinical responsibilities. In the vast majority of instances, Medical Directors were appointed based on seniority as clinicians, and they had received little to no training in hospital management.¹⁶

As part of the HRH initiative, Rwandan policymakers sought to “create a new cadre of hospital administrators” by bringing into the system professionally educated and trained managers. According to the new Ministry of Health vision, and as part of the HRH rollout, “Ideal candidates for Hospital Administrators should not be drawn from the pool of existing Medical Directors, who should focus on clinical issues. Hospital leadership would therefore be divided between clinical and management aspects, fostering efficient and effective healthcare delivery.”¹⁷

Specific targets for the ramp-up of physicians, nurses, and hospital managers were established by the Ministry of Health against a seven-year time table. (See **Exhibit 4** for Rwanda’s seven-year scale-up goals.) The comprehensiveness of this education model was unique. Nuthulaganti commented:

¹⁶ HRH Strategic Plan 2011–2016, Ministry of Health (PDF) HRH Consortium Website, <http://www.hrhconsortium.moh.gov.rw/>, accessed January 2015.

¹⁷ Ibid.

One interesting aspect of the Rwanda HRH program is the Minister of Health had a bold vision for not just prioritizing one or two areas, but doing everything at once. So there were all of these specialties in the physician cadre, as well as attention to nurses and midwives, to oral health professionals,¹⁸ as well as the health managers. And how all of that comes together for the strengthening of the larger health system is a really important message, I think, especially for surgery.

Minister of Health, Dr. Agnes Binagwaho, highlighted the importance of the program and that it shows how “meaningful country ownership and leadership of aid programs can be the most efficient and effective way to bring strong results.”¹⁹

Program Governance

As a large, global collaboration, the HRH program involved an extensive governance and management structure. At the top of the structure were Rwanda's Ministers of Health and Education. The Ministry of Health maintained responsibility for overall ownership of the program and provided strategic direction and oversight. Situated at the next level was the HRH Steering Committee, which, similar to a board of trustees, provided leadership and council for all HRH activities. Next in the hierarchy was the HRH Program Management Team. This group had responsibility for managing the day-to-day activities of the HRH program. Staffing for the program management team consisted largely of Ministry of Health staff as well as select CHAI counterparts. Key functional responsibilities of this group included (1) Financial Management; (2) Procurement Management; (3) Programmatic Management; and (4) Faculty Support.

Two key roles on the HRH Program Management Team included the HRH Coordinator and the Program Monitor. Together, these two roles provided day-to-day leadership and

¹⁸ Efforts to improve human resource capabilities were not active in years one or two of HRH, but were scheduled to become active in year three.

¹⁹ Agnes Binagwaho, “Welcome from the Minister of Health” <http://www.hrhconsortium.moh.gov.rw/about-hrh/welcome-from-the-minister-of-health/>, accessed March 24, 2015.



operational management, with both solid and dotted-line oversight for all of the major functions comprising the program. They also maintained a direct reporting relationship to the Minister of Health. (See **Exhibits 5A** and **5B** for organizational structure of the HRH Program Management Team.)

Faculty Subcommittees The respective faculty subcommittees each played an important role in advancing the work of HRH. Consisting of six to eight members, each subcommittee met regularly to discuss a range of issues touching on expectations, deliverables, US Institution faculty placement, and prioritizing future recruitment priorities. (See **Exhibit 6** for composition of Physician Subcommittee.)

HRH in Practice: The First Two Years, 2012–2014

Former US President Bill Clinton announced the launch of the HRH program in July 2012 from the Rwamagana School of Nursing and Midwifery in Rwanda. He was flanked by Rwandan President Paul Kagame, Dr. Paul Farmer, Dr. Agnes Binagwaho, Chelsea Clinton, and nursing students from the school. The news of the launch was met with great excitement and anticipation not only throughout the country of Rwanda, but throughout the global health community. Press releases were launched by the many US institutions participating in the work, with the event receiving wide coverage in the health and popular press. The Geisel School of Medicine at Dartmouth University described the overarching aims of the program just before the start of the 2012 academic year:

The Rwandan HRH program will help address the country's severe healthcare shortage by increasing the number of faculty available to train future physicians and health professionals. The program aims to build the health education infrastructure and health workforce necessary to create a sustainable healthcare system.²⁰

²⁰Dartmouth Geisel School of Medicine, "Rwanda, Geisel & Clinton: Bold Effort Transforming Health," <http://32hours.dartmouth.edu/featured/photo/0077/Clinton-Geisel-Rwanda>, accessed December 2014.



Minister of Health, Dr. Agnes Binagwaho, described the program's aspirations:

By 2018, Rwanda's specialist physician capacity will have more than tripled, and the proportion of the country's nurses with advanced training will have increased by more than 500%. An additional 550 physicians, 2,800 nurses and midwives, 300 oral health professionals, and 150 health managers will have been newly trained in Rwanda—all of whom will have signed contracts to work in the country for a certain number of years based on the degree they obtain. Thereafter, the Rwandan government plans to fully finance the health workforce and medical education system on its own.²¹

HRH distinguished itself along a number of dimensions—including the seven-year time frame, the broad partnership with US affiliates, the ambitious nature of its goals, and the country's commitment to moving away from foreign aid following the run of the program. Those familiar with the workings and ongoing commitment to improving health systems demonstrated by the Rwandan Government also pointed to the inherent strengths of Rwanda as an area ripe for change. Nuthulaganti commented: "Rwanda is fantastic for their leadership. It's fantastic for how their health sector is so organized, and they run their country like a business. I'd say a lot of other countries are further behind in terms of infrastructure and development."

Facilitating the Partnership

With a financial commitment in hand from the US government, and faculty commitments from US institutions, there was still much work to be done during the first year of the program to seed the ground for a successful partnership. Under ideal circumstances, some program administrators acknowledged, more time between securing financial commitments and implementing the program would have been useful, particularly as all participants

²¹Agnes Binagwaho. "A Win-Win for Global Health," <http://dr-agnes.blogspot.com/2013/11/a-win-win-for-global-health.html>, accessed December 2014.



actually played an active role in designing the program. Thus, much time during the first 12 months of the implementation was dedicated to the administrative mechanics such as developing a strong memorandum of understanding (MOU) to guide the partnerships, onboarding and orienting new faculty once in Rwanda, and even taking the time to introduce the diverse range of partners to each other for the purposes of setting the work in motion.

Said Nuthulaganti:

There was a lot of engagement where Rwanda brought all the US institutions to Kigali to establish the framework, get participation to inform the design of the program, and move towards early implementation. We also helped bring the Minister of Health and Dean of the School of Medicine to the US. We brought all the participating schools together, as well, to focus on strategy and design of the program. I'd say early on there was a lot of engagement in facilitating a partnership because Rwanda and the US institutions were thought partners in designing everything.

As the program unfolded in the early months, it became clear that assimilation of US faculty often simply took time for adjustment and orientation to a new working environment. This was one advantage of the one-year time commitment made by most participants (specialists were only required to commit for three months). To aid in the transition, HRH staff provided a comprehensive orientation program that included practical insights and recommendations on ways to acculturate oneself in Rwanda. (See **Exhibit 7** for Cultural Adjustment in Rwanda.)

Progressive Steps: Twinning Comes to Life

According to HRH orientation materials, "The twinning model is the vehicle by which the goals of the HRH program are achieved, and by which skills and knowledge are transferred to Rwandans."²² The basic premise of the twinning model was that US institution faculty were matched with Rwandan College faculty counterparts based on shared interests, skills, and

²² HRH Program Orientation Slide Deck, August 2014.

knowledge. A number of progressive steps were taken during the first two years of HRH to make good on the promise of this model. The core values of the twinning model included:

- Experiential learning
- Reciprocal benefits
- Results-oriented
- Capacity transfer
- Bedside teaching
- Education management
- Hospital systems improvement
- Expertise

In principle, each twinning relationship held the possibility for realizing the educational imperatives laid out on paper, and a number of highly fruitful US-Rwandan relationships evolved. Rwandan plastic surgeon Dr. Furaha began working with his US twin in July 2013. He commented:

We really like working together. We were seeing patients in consultation. I would get his opinion, he would get my opinion, and we would discuss alternate treatments. And in terms of teaching, he would come up to me with his suggestions or his way of teaching a resident, and I would come up with my way of teaching. We found out that we got along very easily: It's very enjoyable to work together.

Dean Patrick, Dean of the School of Medicine and Pharmacy, described some of the early advances realized through HRH:

In partnering with more than 20 US institutions, the program is building both institutional and personal networks, which would not otherwise have happened. We're exposing our students to trainers that have come from systems where certain things are done better than we do here, and we are encouraging the contextualization of that so that we remain real to what can work here and acknowledge what other people and systems out there are doing. . . . This [understanding] provides information useful to our mission and ambitions as we build the health sector.



He also noted the following adjustments made during the initial 24 months: advancements in curriculum; the opening of new questions to drive future research; and improved educational resources for residents, including new learning materials and computers. Medical Director at CHUK, Dr. Martin Nyundo, spoke to what he saw as the “double and potent contribution” of HRH:

The first mission is to teach and train Rwandan people to get more skills and to get more specialized doctors, but of course by giving this they also give good care. For example, we are now having a very good Department of Emergency because of having an emergency physician. So we are giving good quality of care to the patient, while also training people to become emergency physicians. So this is a double and potent contribution of HRH.

Recognizing Challenges

Notwithstanding the major accomplishment the HRH program model represented and the initial progress made in the first two years, those involved with the program as of August 2014 understood that there were, of course, challenges to overcome. Dr. Binagwaho reflected on the challenges and successes of the program, explaining, “it’s a discovery [process] when you go in with an idea that nobody has done; you don’t have a recipe how to do it, so of course you try and you learn as you go.” In particular, when comparing the program objectives with reality on the ground, both resident and faculty recruitment emerged as “gaps” that would require further attention moving forward. In addition, the team wanted to assess how they could further support the twinning model and also augment collaborative research opportunities.

Attracting Rwandan Post-Graduates to Surgery

In the area of surgery, Dr. Ntakiyiruta indicated that while there was an increase for the first time in the number of post-graduates in the first year of the program (19, nearly reaching the target of 20), year two saw a marked decrease to only 9. This was an especially frustrating outcome, given “the political will to increase the number of surgical applicants,” a condition



revealed in, among other ways, the approval of new surgical programs in neurosurgery orthopedics, and urology.

Some associated the notable dearth of medical trainees entering surgery with a lack of “sensitization” or exposure during their medical school training. This was thought to be problematic even during the internship year, which most students spent gaining experience in district hospitals, where complex surgical procedures were not performed. Some believed that medical students tended to choose fields in which they had developed a strong confidence level. This was easier to achieve early on in such areas as OB/GYN, internal medicine, and pediatrics, and much less so in the area of surgery. “When the time comes to apply for post-graduate study, you just go where you feel comfortable,” said Dr. Ntakiyiruta. “You don’t apply for a discipline where you feel like it’s going to be some new thing because you have not practiced any of these during your time.”

Many residents expressed apprehension about entering the field of surgery. They often pointed to a heavy workload, fewer colleagues, and a lack of interaction with role models and surgical faculty before residency. A widely held concern also included a lack of financial incentive for entering a field requiring longer hours than colleagues in other medical disciplines but not offering higher pay than other non-surgical physicians. In addition, as one US faculty member explained, “other specialties have the capacity to work in private clinics after hours, and so while they all receive the same base pay, they can supplement their incomes with private clinic work. And you don’t have that option in surgery. So surgeons would work more hours at a place like CHUK without actually getting paid more.”

Recruiting US Faculty

A second notable “gap” appearing in the first two years was related to the number of US faculty joining HRH through participation in the twinning model in Rwanda. For a number of subspecialties, such as cardiothoracic surgery, there were currently no surgeons in the country trained for the field. For others, such as plastic surgery, there was only one or two with their entire time spent outside the university teaching hospitals (the visiting plastic



surgeon who was twinned with a Rwandan plastic surgeon voluntarily performed additional surgeries at the public hospitals during his stay).

The CHUK Medical Director, Dr. Martin Nyundo, identified this as a top priority for the coming year: to recruit more subspecialists and also to work on extending the US subspecialist time in Rwanda. In his view, much time was spent during the first two years on such things as testing the structure of the program and focusing on improving cultural awareness between and among participants. More attention would now need to go into improving the recruitment of US specialists to avoid “having a resident who is interested in neurosurgery, for instance, or in cardiothoracic, and then is trained by a general or orthopedist because we don't have an alternative.” (See **Exhibit 8** for the desired number of US faculty by specialty.)

While there was every expectation the recruitment of US specialists had room for improvement, it was also the case that it had proved more difficult for specialists to arrange to leave their home institutions, in comparison to generalists. Dean Patrick explained his hope that Rwandan residents would be more attracted to surgical specialties if there was an expectation of receiving high-quality training from successful, mid-career US surgeons. However, others feared that attracting a sufficient number of mid-career specialists would be challenging; one US faculty member expressed her concerns:

I mean you're essentially wanting somebody in the middle of their career to stop what they're doing for at least a year and take time off to go to Rwanda to live and work . . . the people that we have found are either at the beginning of their career or the end of their career, [and they are] not necessarily the best option. So either you have to be a little bit more considerate and be willing to take somebody at the beginning or end of their career, or you're going to have to make some concessions and understand that you're not going to get all of your positions.



Supporting the Twinning Approach

The twinning approach, at the center of the HRH model, experienced varying levels of success during the first two years of the program. Related to the challenge of filling the US faculty positions, it was sometimes difficult for the program to create the most mutually beneficial matches for Rwandan and US twins.

Several US Institution faculty members commented on their twinning experiences and observations:

- I started basically spending almost all my time with my twin . . . now it only works if you have a twin but I had one. . . . In year one for example, we had thoracic surgeons twinned with orthopedists; there were some problems with that. We also had people who were twinned but then their twin never met with them. So there were problems.
- The twinning concept—I've never really felt that it's worked the way it's intended, so I think it's a very misleading term, because very few people twinned in surgery. I think technically on paper there is somebody who is my twin, but I've never had anybody who has truly felt like a twin. I have many colleagues who I work with on certain issues but I would never describe them as a twin.
- I am twinned with two people. So there is my one twin, the one whom I work with the most, we actually get along really well and our relationship has gotten better throughout the year as we have gotten to know each other more. We were kind of forced at the beginning of the year to make plans, but we have actually worked toward the goals so it's been kind of neat. My other twin has been completely absent, like I don't even see him in the hospital. We have no relationship whatsoever.

Dr. Robert Riviello, trauma surgeon and HRH's Specialty Liaison for Surgery, reflected on some of the "wonderful relationships" born out of the HRH program, while also citing "lots of fragmentation" between the USI faculty and Rwandan College of Surgeons faculty. He believed that much of the fragmentation and mismanaged expectations stemmed from a lack of faculty support for both USUSI and Rwandan faculty. He explained that "requests have



been made for more administrative and human resources support, but those have been denied by the funders.”

Building a Culture of Research

During the first two years of the program, emphasis had been placed on establishing the program structure and practices. Now some discussions of joint US-Rwandan research emerged as another opportunity for collaboration that could help to augment research capacity within Rwanda. This built upon Rwanda's previous efforts to incentivize more research, and included expectations to increase co-authorship among medical twins during the third year.

Some were optimistic about the possibility of original, provocative research emerging from the twinning experience: “Faculty from US institutions are better able to ask some of the questions that we have not been asking here—partly because of coming from a different setting. So they find things that have been teasing their minds and they question the process; and that drives research.”

Others noted the inherent challenges to academic research sometimes present in low-resource settings. Rwandan reconstructive surgeon Dr. Faustin explained:

It is not yet a culture of research. People are busy in everything else and struggling in life. If I have free time, what do I do? Not sit in front of my computer and design research. I would rather find something where I can make 200–300 RWF. We cannot try to figure out what will come in 20–30 years when everyday life is not comfortable. If you don't keep people happy and calm, they can't sit down and think. . . . There is no single space in this hospital where a surgeon can sit and design something, plan an intervention.

Strengthening HRH

As leaders of the HRH program looked towards the remaining five years, it was clear that a deeper collaboration would be needed to help bring about the ambitious recruitment and



educational targets put in place by the Ministry of Health. During the first year of the program, a total of \$33 million (19%) of the program's 7-year budget (\$170 million) was spent. It was unclear at this stage that the program would reach its quantitative targets, and program staff and faculty alike were looking for new ways to modify and enrich the international collaboration that clearly held a great deal of promise—not only for Rwanda, but also for other countries that may one day look to emulate the program in their own regions.

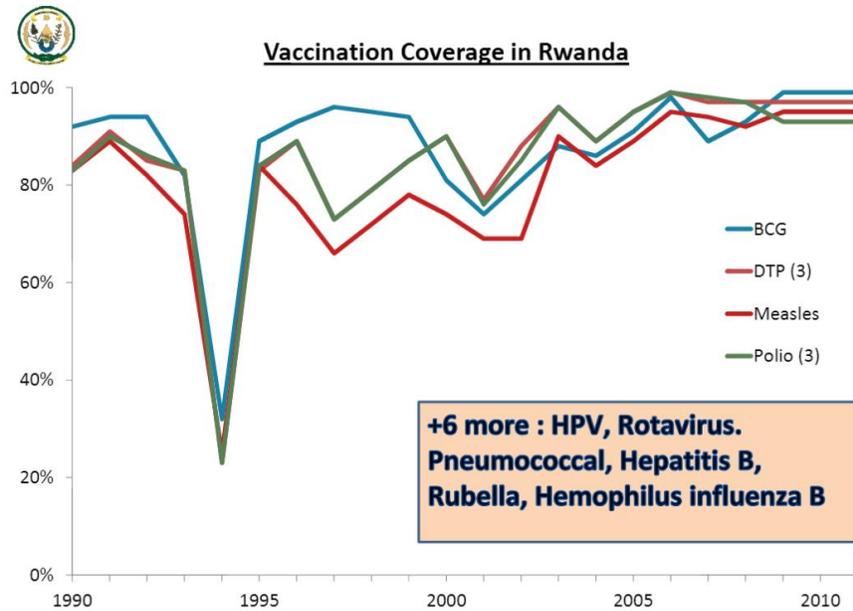
As Dr. Ntakiyiruta considered the administrative levers at his disposal, he looked to gain insight from both program administrators and surgical faculty as to how to bring about improved program performance resulting in sustainable achievement of the HRH programmatic goals for surgery.

Given the high-profile, innovative nature of the HRH program, Dr. Ntakiyiruta also considered whether, and to what extent, HRH in its current conception represented an apt model for health leaders in other resource-limited regions of the world to follow. Dean Patrick believed the model could be replicated, with some modification: “We are having a seven-year program. We've run only two years and already we know what can easily be transferred; we know what may not easily be transferred. So in my mind we shouldn't be thinking that this is only possible in Rwanda.” Dr. Binagwaho was also optimistic about the possibility of replicating HRH elsewhere. She recommended that those interested in HRH should assess their setting and adapt [the program] to them, their culture, the way to do business, the way to do administration, because [HRH] has to be embedded in your health sector and embedded in your education sector very well.” She continued, “the program is a fantastic program, there is no reason it's not replicable any place . . . you just need to adapt it to your culture, to your health sector, [to] your education sector.”

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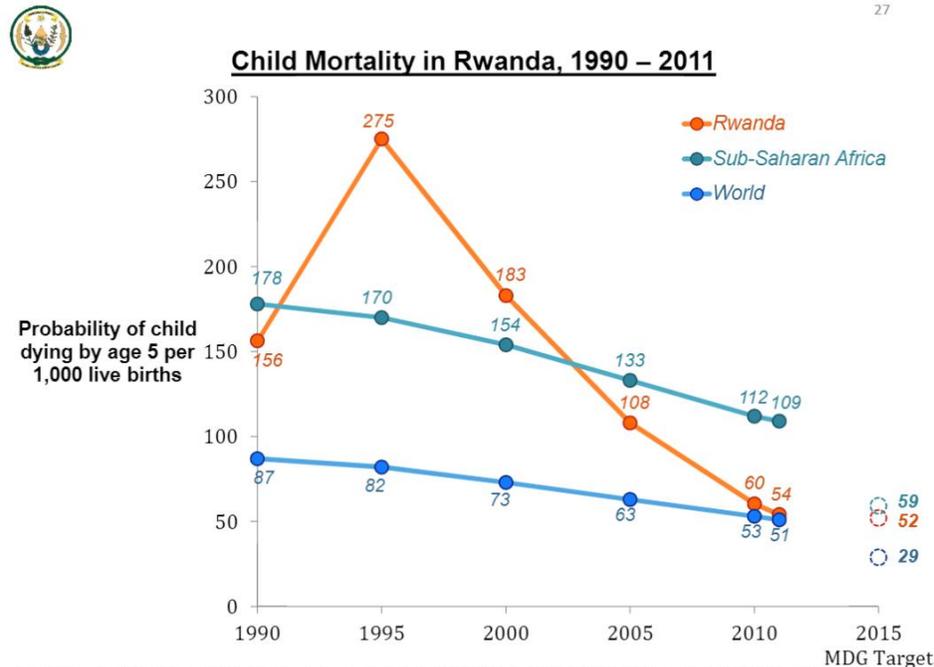
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EXHIBIT 1A: Vaccination History



Adapted from: World Health Organization. (2012). WHO-UNICEF vaccination coverage estimates time series for Rwanda.

EXHIBIT 1B: Child Mortality History



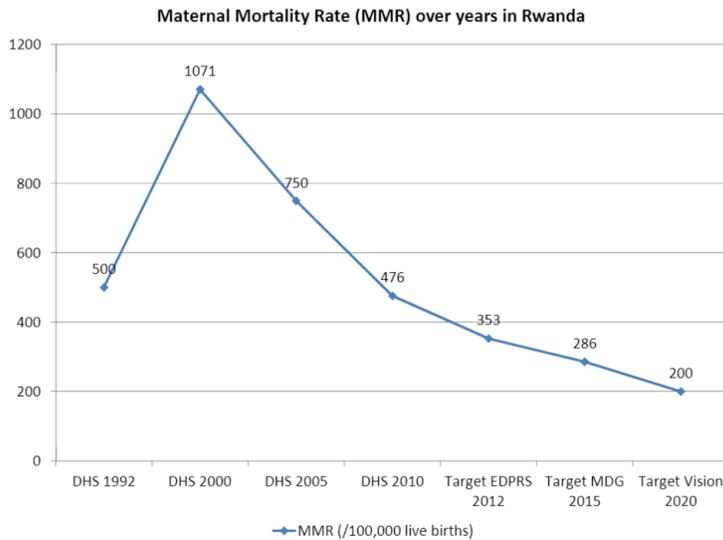
Farmer PE, Nutt CT, Wagner CM, Sekabaraga C, Nuthulaganti T, et al. (2013). "Reduced Premature Mortality in Rwanda: Lessons from Success." *British Medical Journal* 346(f65): [e-pub ahead of print].

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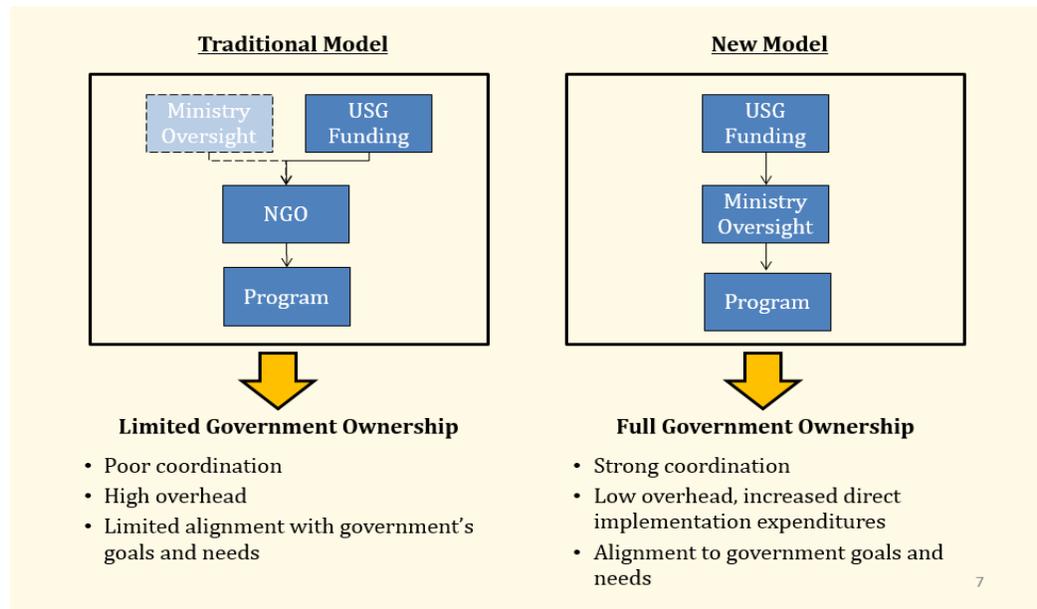
EXHIBIT 1C: Maternal Mortality History

MMR (DHS 2010)



Source: HRH Program Presentation, "Rwanda Overview and Impact on the Health System," August 27, 2014.

EXHIBIT 2: HRH Innovative Program Model

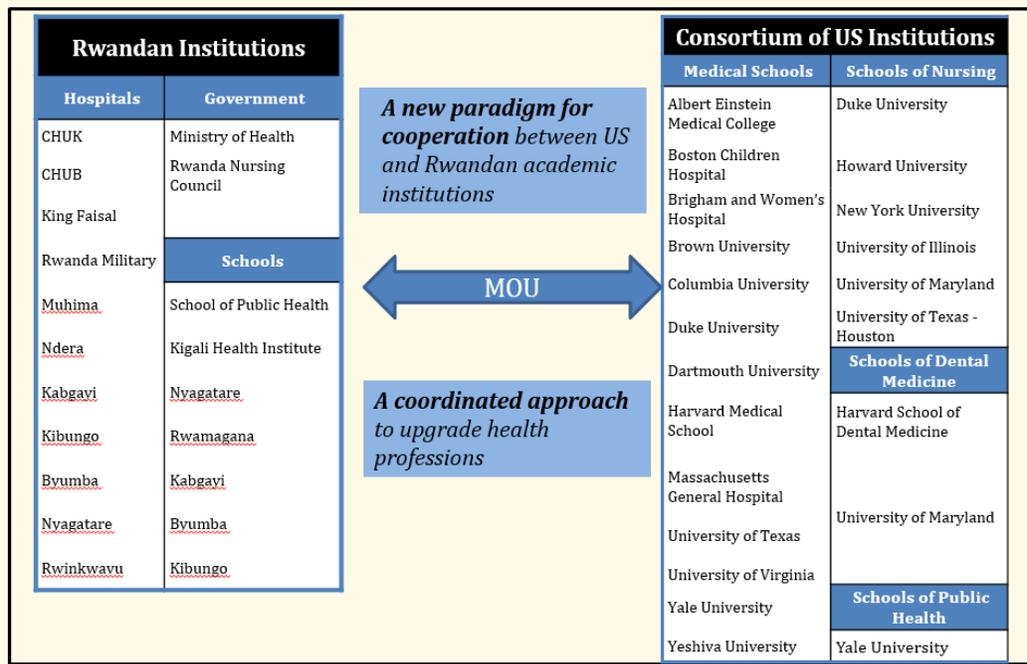


Source: HRH Program Orientation Slide Deck, August 2014.

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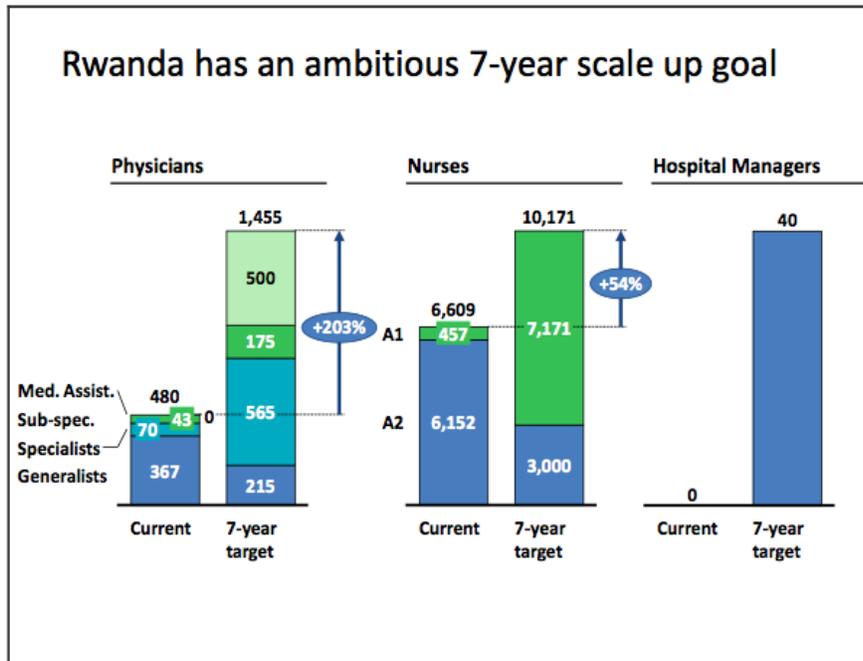
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EXHIBIT 3: Mapping of Rwandan and US Institutions



Source: HRH Program Orientation Slide Deck, August 2014.

EXHIBIT 4: Rwanda's Seven-Year Scale-Up Goals

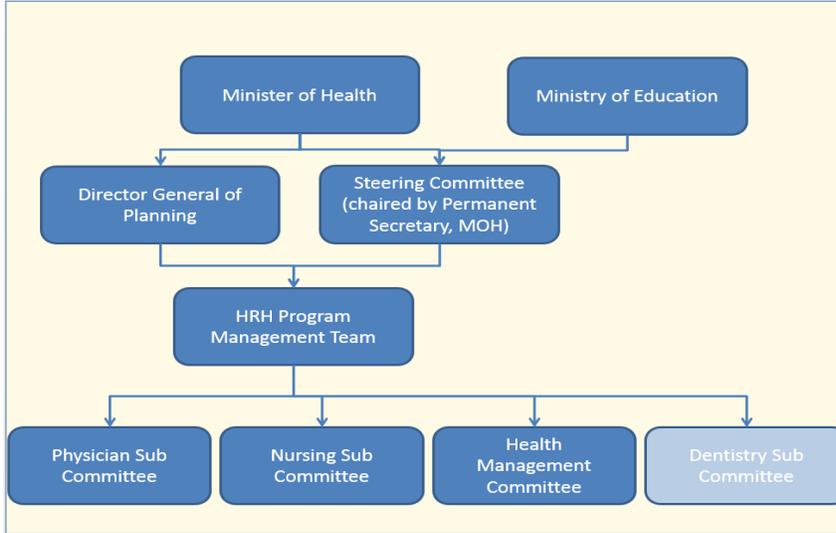


Source: HRH Strategic Plan.

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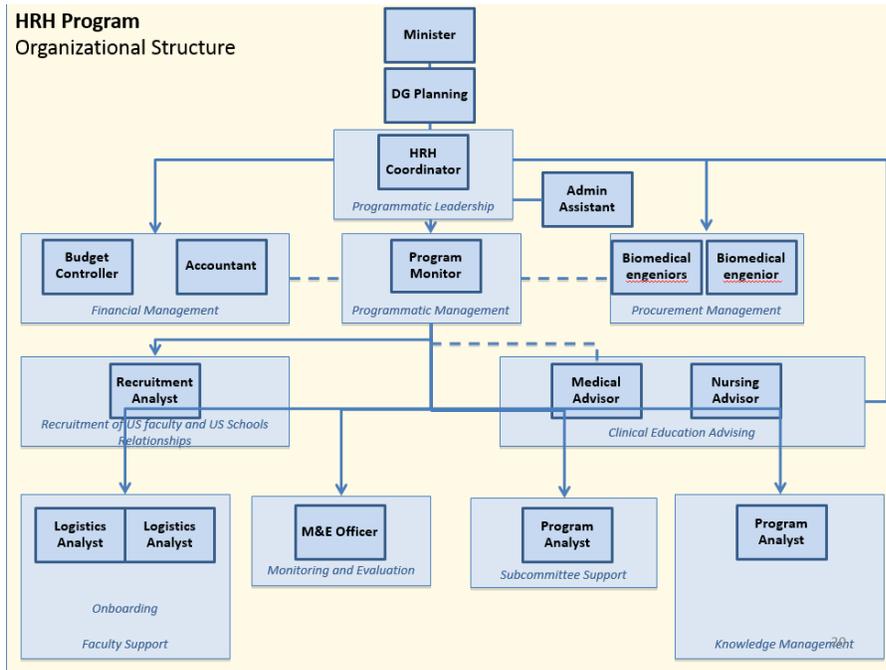
EXHIBIT 5A: High-Level HRH Organizational Structure



Note: The dentistry sub-committee was not functional in years one and two.

Source: HRH Program Orientation Slide Deck, August 2014.

EXHIBIT 5B: Detailed HRH Organizational Structure



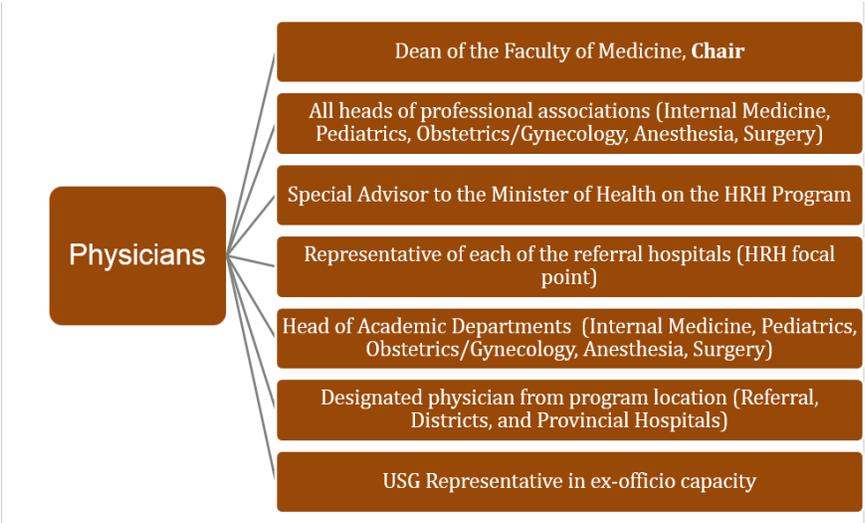
Source: HRH Program Orientation Slide Deck, August 2014.



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EXHIBIT 6: Composition of Physician Sub-Committee



Source: HRH Program Orientation Slide Deck, August 2014.

EXHIBIT 7: Handout for US Faculty: Cultural Adjustment in Rwanda

Do:

Here are some tips that will help you interact more effectively with Rwandan counterparts:

- Simplify communication by using less complex sentence structure and vocabulary.
- Suspend judgment – try to understand the background before judging.
- Be patient.
- Adapt your communication style to that of your counterpart, if he/she likes to communicate via cell phone just adapt to it
- Explain what you mean in greater detail.
- Communicate important messages many times and through several media to ensure that they are received the way you intended.
- If you have a feeling that the telephone call is not understood, use an SMS
- Get to know people outside of work and personally
- Be careful asking people about their background and experience during the genocide

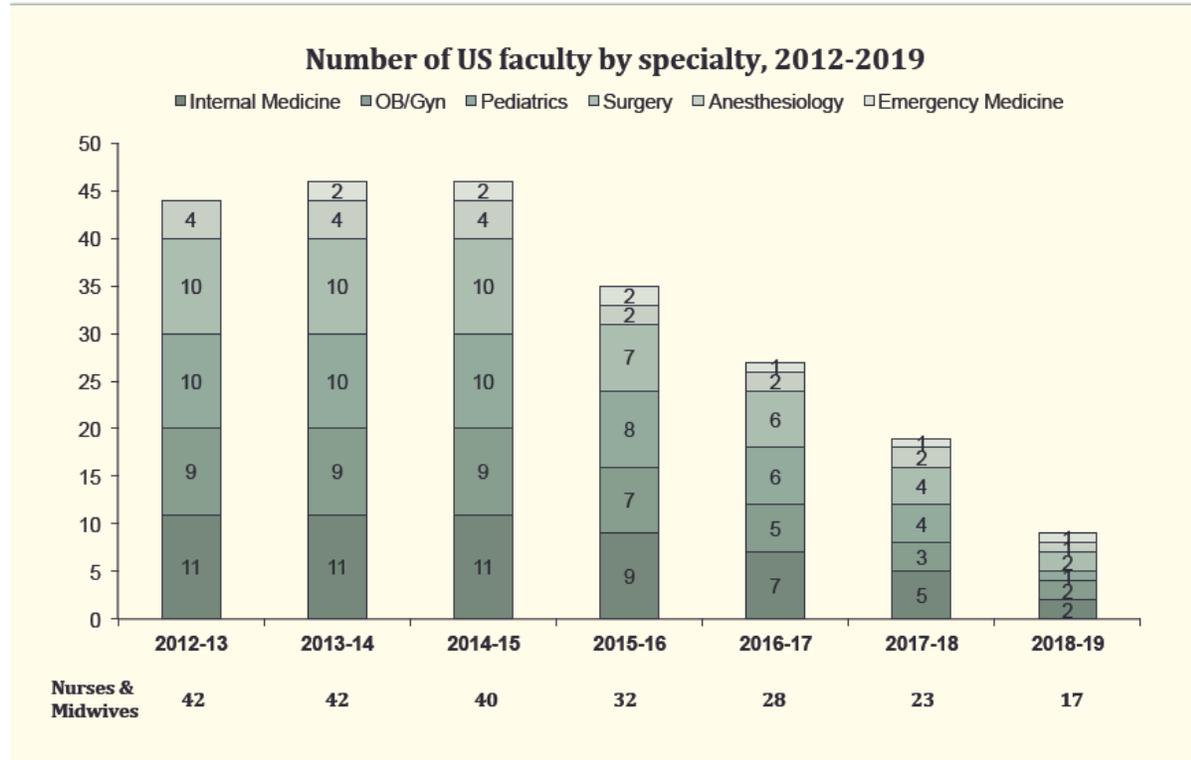
Don't:

- Don't beckon/call people with your hands (rude!) except children
- Don't take motorcycles after dark. A good strategy is to ask one of your local colleagues to recommend a honest motorcycle driver. They know very well who is honest or not. Then you keep the number of the person with you and call him any time to want to use the motorcycle.
- Don't keep ideas just to yourself – share them with your teammates and keep them informed
- Don't eat in public unless you can share – there is an expectation of communalism in Rwanda
- Don't give money or food - next time the whole crowd will follow you
- Don't give strangers your phone number
- Don't bring non-biodegradable bags. Plastic bags are banned!
- Don't give in to the barrage of "give me money" or "Agacupa"(water bottle) this mainly comes from the kids. If you give to one then 2 things will happen. Everyone else will want the same and fights will break out.
- Don't yell to people in public. Control your anger in public: Public displays of anger are rare. Rwandans, generally, remain calm and talk extensively when in disagreement (i.e. staff meetings tend to be long when controversial topics are discussed). Raising your voice or showing anger may make people not feel comfortable to approach you for your entire time in Rwanda because no matter how you want to help them, they will interpret that as disrespect.
- Never shout to be understood

Source: HRH Program Handout: Cultural Adjustment in Rwanda.

EXHIBIT 8: Desired number of US Faculty by Specialty

Scale-Up and Scale-Down Plan for HRH Program



Source: Robert Riviello. "A Report on a Novel Approach to Strengthening Surgical Training: The Rwanda Human Resources for Health Program." For the full conference presentation, see http://cugh.conferencespot.org/CS05_Riviello/~PdfSource/o. Used with permission.