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## Establishment of a General Medicine Residency Training Program in Rural West Africa

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*(Article begins on next page)*

FOCUS: GLOBAL HEALTH AND DEVELOPMENT

## Establishment of a General Medicine Residency Training Program in Rural West Africa

Frank W. Drislane, MD<sup>a\*</sup>, Albert Akpalu, MD<sup>b</sup>, and Harry H.J. Wegdam, MD<sup>c</sup>

*<sup>a</sup>Department of Neurology, Harvard Medical School and Comprehensive Epilepsy Center, Beth Israel Deaconess Medical Center, Boston, Massachusetts; <sup>b</sup>Department of Neurology, University of Ghana, Accra, Ghana; <sup>c</sup>former Surgeon-in-Chief, Holy Family Hospital, Techiman, Brong-Ahafo, Ghana, and tutor, Nijmeegs Institute of International Health, Radboud University Nijmegen, the Netherlands*

Ghana, a developing country in West Africa, has major medical burdens in taking care of a large population with limited resources. Its three medical schools produce more than 200 graduates per year, but most emigrate to developed lands after training. Ghana is working to educate and retain locally trained physicians, but it is difficult to get them to work in rural settings where the need is greatest. This article details the establishment of a General Medicine residency at a 150-bed hospital in rural Ghana. Early training comprises 6 months each in Medicine, Surgery, OB/GYN, and Pediatrics; the hospital in Techiman also has a Surgery residency. House officers choose the program for more hands-on experience than they can get in larger centers. They perform many tasks, including surgery, sooner and more independently than do residents in developed countries. The training program includes a morning report, clinical teaching rounds, and rotations on in-patient wards and in the Emergency Department and clinics. Teaching focuses on history, physical examination, good communication, and proper follow-up, with rigorous training in the OR and some clinical research projects pertinent to Ghana. Trainees work hard and learn from one another, from a dedicated faculty, and by evaluating and treating very sick patients. Ghana's rural residencies offer rigorous and attractive training, but it is too soon to tell whether this will help stem the "brain drain" of young physicians out of West Africa.

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\*To whom all correspondence should be addressed: Frank W. Drislane, KS 479, Department of Neurology, 330 Brookline Ave., Boston, MA 02215; Tel: 617-667-2395; Fax: 617-667-7919; Email: [fdrislan@bidmc.harvard.edu](mailto:fdrislan@bidmc.harvard.edu).

†Abbreviations: OB/GYN, obstetrics and gynecology; HIV, human immunodeficiency virus; OR, operating room; ER, emergency room; ICU, intensive care unit; RN, registered nurse; g/dL, grams per deciliter; HFH, Holy Family Hospital.

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Author contributions: Dr. Drislane wrote most of the paper based on visits to the University of Ghana and the General Medicine residency at Techiman, with the perspective of a residency program director in the United States. Dr. Akpalu is a neurologist and MD graduate of the University of Ghana and provided much of the information about recent Ghanaian physician graduates and medical practice at Korle Bu Teaching Hospital at the University of Ghana and the administrative structure of medical education and accreditation in Ghana. Dr. Wegdam is a Dutch trauma surgeon who worked in Ghana for more than 12 years, co-founded the residency in Techiman, and provided information about how it developed and functions.

Ghana, a developing country with a population of about 25 million, is well ahead of most African countries in the development of a system of medical care and medical education, but both are centered heavily in the two largest cities, Accra, the capital, and Kumasi, a large city in the center of the country. Ghana needs physicians and medical facilities in rural areas where most of the population lives, but as elsewhere, it is hard to retain physicians there. While international (primarily European) physicians directed most mid-sized hospitals in Ghana decades ago, Ghanaian and European authorities are now committed to shifting resources to local programs that can be sustained over a longer period by Ghanaians.

As part of the trend toward local training and self-sufficiency, the Ghana Postgraduate Medical College has begun the development of house officer training programs in rural areas where most Ghanaians live, but these programs are still young and it is not clear how they will fare.

This article describes some of the achievements and problems in the establishment and maintenance of a General Medicine residency training program in Techiman, a city of about 170,000 people, 150 km North of Kumasi, where the forest vegetation of the Southern coastal land gives way to the grasslands that stretch across most of West Africa.

## THE HOSPITAL IN TECHIMAN

The Brong-Ahafo region, in the center of Ghana, just north and west of Kumasi, has about 2 million inhabitants. Its capital, Sunyani, has about 25 physicians and a large modern hospital building. Holy Family Hospital (HFH) in Techiman, 80 km from Sunyani, was founded in 1954 by the (European) Medical Mission Sisters, later taken over by the Catholic diocese of Sunyani, and has been staffed by physicians from Europe, particularly the Netherlands. It is now a 150-bed hospital, admitting about 15,000 patients a year. It occupies a compound covering about 1/2 km<sup>2</sup>, at the north end of Techiman, with six hospital buildings for wards, emergency room (ER†), and clin-

ics, and more than 20 housing units for staff physicians, house officers, nurses, visiting physicians and students, and administrative staff.

The Medicine ward has about 30 beds in a large open room, with 25 more in the ER for short term observation or backup from over-full wards (a phenomenon not unknown in the United States). This is augmented by 12 beds in a separate "isolation ward" for patients with active or suspected tuberculosis, many of whom also have HIV and diabetes. Here, physicians wear masks, but there are two to four patients to a room, and occasionally they can be seen strolling around the hospital grounds after rounds. Some are reported to venture into town, as well.

Inpatient accommodations are Spartan, to say the least. Beds are flat, unless propped up. Patients bring their own bedsheets. Except in the operating room and pharmacy, there is no air conditioning, and afternoon temperatures are usually in the high 30s (centigrade; 90s Fahrenheit). Few hospitals in Ghana provide meals for inpatients. Fortunately, families can be extensive, but no patient may be admitted to HFH without a family to provide food. Even at the university hospital at Korle Bu in Accra, the wards are large and open, with no air conditioning. Korle Bu does provide meals to the patients, but they are not always considered enjoyable (another problem not unique to Ghana).

The Surgery ward also has about 30 beds, with similar provisions for overflow. There is a large, well-equipped operating room. Much of the modern equipment in the OR was obtained in Holland by the surgeon-in-chief (author HW). The theater is air-conditioned when necessary; two smaller procedure rooms for urologic and lesser operations or procedures are not. About 1,370 major operations are performed in the OR each year, including those from a recent year listed in Table 1.

The well-trained expert core of OR nurses is all Ghanaian. A very busy, highly trained physical therapist helps facilitate recoveries. Abdominal and pelvic surgery are daily events in the training of house officers, but major thoracic surgery is performed at

**Table 1. Major operations at Holy Family Hospital, Techiman, Ghana.**

Operation	Number
Hernia repairs	209
Other abdominal surgery	169*
Hysterectomies	36
Cesarean sections	427
Internal fixation of fractures	84
External fixation of fractures	50
Amputations	54
Sequestrectomies (for osteomyelitis)	39

\*includes perforation repairs, 35; infection/abscess exploration and drainage, 39; appendectomies, 21

the large urban teaching hospitals only. There is no ICU at HFH. There are no patients on ventilators in Techiman (except intra- and postoperatively), and cardiopulmonary resuscitation is not attempted outside of the OR. At the request of the Diocesan Health Service, the surgeon-in-chief maintains an outreach program at four smaller regional hospitals to train their local doctors in surgical procedures.

The Maternity ward has 30 beds in a large open room, without dividers or curtains. Neither privacy nor modesty is an available luxury. The ward is always full but with the possibility of some expansion so that particularly sick patients need not be turned away. Patients often must sleep on mats on the floor when there are extra admissions. Few beds have mosquito netting. There is a delivery room adjacent to the maternity ward where midwives assist with most of the 3,000 deliveries each year. Cesarean sections are done in the OR.

All 21 beds in the Pediatrics ward are small; adolescents are admitted to the medical ward. A parent stays by the bedside 24 hours a day, usually sleeping on a mat. They are responsible for feeding the child and cleaning and other duties. Most admissions are for infections. Malaria and high fever, along with volume depletion and hemolysis, are the most common reasons for admission. Pediatrics, like other services, backs up into the ER, where there can be 40 or more patients waiting 24 hours or more for beds or for discharge.

Sickle cell crisis and other complications of the disease are common on the pediatric ward. The anemia it causes can lead to

a hemoglobin level of 1 g/dL. Many patients are anemic, but not all receive transfusions. A chronic anemia with a hemoglobin of 5 to 6 (hematocrit 15 to 18) is considered a non-urgent, outpatient evaluation. A newborn with a hemolytic anemia (hemoglobin, 5) due to Rh incompatibility with his mother, however, needs a transfusion.

Osteomyelitis is a very frequent complication of sickle cell disease, often leading to crippling bone deformities to the point where they are common to see in public. Many patients on the surgical ward require sequestrectomies (debridement of the infected bone) leading to months of antibiotics for open wounds and still sometimes to deformities.

### *Outpatient Clinics*

General outpatient clinics see about 115,000 patients per year; about a quarter of those are new patients. There are often more than 250 patients seen each afternoon, usually with five doctors. The typical patient gets about 7 minutes for everything — a bit less for follow-up patients and a bit more for those with new symptoms needing evaluation. Doctors write outpatient notes of several lines. The very short visits compromise the role of doctor as teacher concerning the rationale for anti-hypertensives and the medical management of many other illnesses. There is typically one nurse for each ward, clinic section, or ER area, plus many assistants. Each exam room (and ward) has an X-ray view box. Facilities for hand washing are meager on most wards and outpatient clinics, and if there were a sink down the

hall, the required time between patients seen at 7-minute intervals would prolong the clinics unacceptably. Most ward rounds do not include hand washing, but for “dirty cases” (those involving potentially infected tissue) and wound inspection, disposable gloves are used regularly. Even once acclimatized, it is hard to work through the afternoon heat.

Infections are a primary reason for clinic visits — and for admissions. Malaria is rampant, and its burden is tremendous [1]. Usually, it is remarkably easy to treat, with a 3-day dose pack of a combination of antimalarial medications distributed by the national government [2,3]. Many people, however, get malaria repeatedly, and untreated, it can be fatal. A few years ago, the wife of a foreign missionary worker near Techiman declined treatment for malaria and died. Typhus infection is common, and intestinal perforation is not a rare complication, contributing unhappily to the surgical training.

The variety of presenting symptoms is great, as anywhere. Patients with fever, malaise, and headache will probably be treated for malaria, a presumptive diagnosis when there is nothing else worrisome. A more chronic cough, on the other hand, raises concern for tuberculosis. There are many aches and pains and other infections. Several patients with large goiters are seen each week in the ambulatory clinic. Most young women come to the clinic for gynecologic problems or for routine pregnancy checkups and counseling in a separate maternity clinic maintained by the hospital and supported by the government. Some come for complications of pregnancy. There are also clinics focusing on diabetes and hypertension and for children under 5. Each meets a few times a week, all covered by the house staff with faculty, also seeing patients, nearby. Patients are surprisingly compliant about taking medication as directed. Of course, this applies better to antibiotics for symptomatic infections than it does to anti-hypertensives for a symptomless illness; nutrition recommendations and glucose management are frequently carried out poorly.

### *Specialty Clinics*

Internal Medicine and General Surgery are considered specialties in Ghana, but subspecialists such as cardiologists and rheumatologists are generally not available in most of the country. An ophthalmologist comes to Techiman once every other week. The nearest dentist is in the regional capital, 80 km away.

The Surgical clinic is staffed by the surgeon-in-chief, with a Surgery resident and a house officer or two. It runs for several hours, twice a week, seeing 12 to 15 patients an hour, with many patients making final plans for operations and others having post-op checks. Patients are sent to the surgeon-in-chief by referral. Fees for elective surgery are collected in advance, but not for emergencies. Long delays in the presentation of inguinal hernias lead to an increased incidence of strangulation and bowel infarction. The surgeon-in-chief makes it a principle to “always examine the part that hurts.” Patients are relatively stoic, almost always polite, and usually grateful for anyone’s assistance.

An 8-year-old boy is seen for follow-up of a necrotic bowel resection and anastomosis following obstruction, adhesions, and earlier infectious illness, possibly typhus. Stool oozes through the ileostomy stoma of his right lower quadrant. A month or so after his hospitalization, his mother died from bacterial meningitis treated far too late. When encountered in Surgery clinic, he breaks out with a gigantic smile; when asked how he is doing, he says, in crisp African-style English, “I am fine, doctor.”<sup>1</sup>

### *The Emergency Department*

The Emergency Department sees a large volume of trauma, major and minor. There are many wounds requiring suturing, and infections are extremely common. Sudden onset or severe abdominal pain, poten-

<sup>1</sup>Discussion with Surgery patient in clinic at HFH, Techiman; author (FWD).

tially requiring surgery (an acute abdomen) is a nearly daily occurrence, as are strokes. Acute respiratory failure may come from infection or congestive failure, but there are limits to what can be done in such cases; there is no ICU to admit to or any ventilators. As elsewhere, domestic and other violence [4] and complications of alcohol abuse are common, as are snakebites in Techiman.

Trauma comes from the same sources as in other lands, including home- and work-related accidents and violence; there are typically two assault cases in the ER each week. Motor vehicle accidents, however, generate the large majority of severe trauma cases seen in Techiman [5].

One Saturday evening, two overcrowded minibuses, carrying about 20 people each, sped through town where a large truck was parked on the side of the narrow, main road, not far from the hospital. In a tight passage, with an oncoming vehicle, the first bus hit the truck, and the second bus hit the first. Nine people died on the spot, and over 20 came to the ER, prompting a call for all available house officers and staff. One patient had repair of extensive liver lacerations but died overnight. In the morning, there were more fractures than patients on the surgical ward; many left large bones piercing the skin, awaiting surgical treatment. Many leg wounds were over 15 cm long and nearly as deep, often needing deep wound cleaning and repair. Extremely frustrating for the dedicated residents, most of the injured leave the hospital against medical advice the next day for their home town about 250 km away. They claim a desire to be at a facility nearer home, but many probably cannot afford any treatment — even near home. Some will

probably die from lack of wound treatment or infections, but the staff has no right to detain them.<sup>2</sup>

### *Nursing*

Most of the nurses are knowledgeable and dedicated, although the work routine is not always efficient. Nurses insert intravenous lines and take vital signs, but not always as instructed. One meeting with midwives to go over new malaria and infection treatment protocols begins about an hour late, the time taken to gather the participants. There are many excellent nurses, but the hospital is constantly looking for new ones as there is a major “brain drain,” not only of physicians but also of nurses from Ghana and other developing countries.

The chief nurse on one ward reports that a third to half of new RNs will move to the UK, largely for the much higher salaries — the portions of which they send to their families larger than their total income would have been in Ghana [6,7]. Occasionally, an entire cohort of a hospital’s nurses will be hired away at once. Nursing salaries are paid by the Ghana government and have improved recently, but they are 10 to 15 percent of what a nurse can earn in the UK. The desire to supervise the education of her own children keeps this senior nurse in Ghana, but the fees and expenses for secondary school can run to \$1,000 a year. Many nurses leave their children with relatives or send for them after years abroad, but she is not willing to turn over her children to others. The loss of nurses is far worse in Eastern and Southern Africa.<sup>3</sup>

### *Laboratories*

For a medium-sized hospital in the tropics, HFH has extensive laboratory testing available. Blood counts (and especially smears

<sup>2</sup>Report of faculty and house staff in Emergency Department, HFH, Techiman, to author (FWD).

<sup>3</sup>Report of HFH, Techiman head nurse to author (FWD).

for malaria parasites) are requested by the physicians in clinic. Patients walk to the laboratory, pay for and have the test, and bring the results back to the physician, often within an hour. The same system applies to X-rays and pharmacy explanation of medications such as inhalers and multi-pill drug packs. Electrolytes, renal and liver tests, hepatitis antigens, HIV testing, and urinalysis are readily available. Vitamin and drug levels are not. Some esoteric disease testing is possible at a nearby private laboratory, but it is unjustifiable in many cases when no treatment is available for those diseases (e.g., leukemia subtypes or many steroid-resistant autoimmune diseases). There is an expectation that the laboratory will perform all ordered tests, and house officers are not all in the habit of tracking down results (such as cerebrospinal fluid) in a timely fashion. Residents learn to read their own X-rays (mostly chest, abdominal, and bone studies); there is no hospital radiologist.

HFH has an ultrasound machine operated by the residents and made possible by a joint Ghana-Dutch government venture and Phillips Medical Services, as is much of the Radiology machinery. Unusual for a hospital of its size, HFH also has a C-arm X-ray machine for OR use, including major orthopedic surgery, in which the house officers acquire training. The ultrasound equipment is used to look for masses or untoward events in pregnancy and to assess the stage of fetal development or sources of bleeding, but not for fetal malformations.

### *Finances*

The Ghanaian government pays most of the hospital staff salaries at HFH, but the hospital must be self-sufficient otherwise. Most of the operating expenses depend on patients paying their bills. If they don't, the hospital could be in danger of closing, as the local diocese supports the hospital operations (and the Ghana government, the salaries) and they cannot cover a substantial deficit. At HFH, the emergency room fee is about \$5 (all figures listed in US dollar equivalents). Admissions typically run about \$100 and require a \$20 to \$80 deposit, depending on di-

agnosis and anticipated intensity. The charge for external fixation of fractures is about \$100, plus a \$100 deposit for the hardware (sometimes adjusted for hardship), and deposits must be collected from the family before surgery. There was one brief discussion about the possibility of delaying the signing of death certificates (required for families to claim the bodies of relatives) pending payment of the bill, but the medical staff is also genuinely concerned about the families and the signature was not delayed.

Money clearly affects the extent of medical care. Medications are a major expense [8]. A patient's family is responsible for buying them individually and brings them back to the ward for administration. Some antibiotics are affordable, others not. For poorer families without insurance, however, it is not rare to decide that a sick child appears so ill that it is not feasible to spend \$10 for a week's antibiotics (plus hospitalization) when the child appears likely to die anyway. Often, such a child could recover with hospital treatment. Still, it is remarkable how often the families find the money for antibiotics and other medical expenses.

One strong young man who dropped a heavy object on his neck, suffering a severe spinal cord injury and quadriplegia, was taken home for "alternative treatment," but sometimes this means being taken home for a final meal that will facilitate a peaceful death, rather than undergo long and costly treatment that might not restore his health or productive labor. Large extended families take care of disabled family members, but there are limits to the burdens they can carry.<sup>4</sup>

The health insurance program established by the Ghana national government (see previous article) is extremely helpful, paying for most outpatient visits and hospitalizations, basic laboratory testing and certain medications [9]. As noted earlier,

<sup>4</sup>Report from author (HW).

however, many expensive procedures such as hemodialysis and most plastic surgery are not covered. The insurance program has a premium of about \$10 a year, but ironically, the poorest and sickest people may be least likely to sign up [10].

The hospital staff themselves will pay the insurance premium from a “Sick Children Fund” for one adolescent boy who has weekly episodes of diabetic ketoacidosis and has resided on the medical ward for months because his family cannot afford insulin. With the insurance, he may be able to go home and back to school. Insurance will not be precluded by a “pre-existing condition.”<sup>5</sup>

## THE TRAINING PROGRAM

### *The Structure of Medical Education*

In Ghana, university medical studies last 5 years in an educational system similar to that of the United Kingdom, from which they were developed. Students have less hands-on clinical experience than in North American programs, but direct patient care responsibility comes with required assignments as primary community health clinicians (with supervision) in rural areas later in their training.

Ghana sends physicians practicing general medicine, along with basic general surgery, obstetrics, and gynecology. For all newly graduated physicians in Ghana, the first 2 years of training (“housemanship”) include supervised work for 6 months each in Medicine, Surgery, Pediatrics, and OB/GYN, somewhat akin to a Family Medicine residency in the United States. New physicians practice with a temporary license from the Medical and Dental Board of Ghana. After that, a trainee may obtain a full license and practice independently or begin residency (“specialist”) training, e.g., in Internal Medicine or General Surgery, usually

for 3 years, with gradually increasing responsibilities. (For this article, all trainees are described as house officers or residents, specifying the level as needed.)

General house officer training programs are accredited by the Ghana College of Physicians and Surgeons (GCPS; see previous article) [11]. The West African College of Physicians certifies the training of Internal Medicine specialists, and the West African College of Surgeons certifies surgeons. Beyond the 2 years of house officer-ship, HFH is accredited by the GCPS to offer residencies in Internal Medicine and General Surgery.

### *Founding of the Program*

In 2000, when Ghanaian and European authorities were beginning the attempt to decrease reliance on international physicians and trying to train more Ghanaian physicians, particularly those who would practice in rural areas, the Ghanaian Ministry of Health agreed to the founding of training programs outside university centers in “Regional and District” hospitals. At about the same time, the program at Holy Family Hospital in Techiman was planned by a Dutch trauma surgeon (author HW) with many years of experience working in Ghana. In 2002, the GCPS (founded in part with the assistance of the Dutch Ministry of Development Aid) agreed to the establishment of the program in Techiman — the first Ghanaian facility outside of a medical school or university setting to host training programs. After inspection of the facilities in 2002, the GCPS accredited the hospital for training house officers (the first 2 years) as well as residents (in later years) in Internal Medicine and in Surgery.

Cordaid, a Dutch non-governmental organization interested in supporting educational and health-related programs in developing lands, agreed to assist the program financially. This support was crucial in establishing the proper hospital laboratories and library facilities, the operating theater, and housing units required for accreditation.

<sup>5</sup>Report from HFH, Techiman faculty to author (FWD).



The Ghana government agreed to pay the salaries of the house officers and residents. HFH supplies housing on the hospital grounds for all physicians.

The program began operations in 2004 with the arrival of two house officers, recent medical graduates of Ghana's universities. By 2007 and subsequently, HFH in Techiman has hosted 10 to 12 general house officers in the first 2 years of training (five to six in each year) and a maximum of two residents undertaking additional training in General Surgery. Surgery residency is 3 years, following the 2 years of house officership — with plenty of surgery and obstetrics in those earlier years.

Continued accreditation is supervised by the GCPS and faculty members at the Komfo Anochye Hospital, the university medical center in Kumasi. They made an inspection visit to Techiman when the program began and require submission of progress reports on the program every other year.

Other than in Sunyani, the regional capital, the Techiman training program is the only one in the region to offer house officer and residency training in both General Medicine and Surgery. It concentrates on Medicine and Surgery, with about 6 months full-time duty in each for the beginning house officers. Although house officers also cover the Pediatrics and Maternity wards at HFH, the primary training in those fields takes place at another regional hospital 100 km away in Berekum, where there are faculty specialists in those disciplines.

### *The House Officers*

Most of the house officers were students at the two major teaching hospitals in the large cities; a few come from neighboring countries. HFH in Techiman and its partner hospital in Berekum are popular choices for training among new graduates of Ghana's universities, in significant part because the young physicians have more independence and hands-on clinical responsibility than they could in the large urban centers. They apply by letter, with recommendations from the university faculty, and are interviewed by the

faculty at Techiman and Berekum. There are more applicants than positions. The faculty selects house officers individually, after review of the applications. There is no match process, and no one is assigned to HFH involuntarily. Candidates for the Surgery residency also apply, although most are chosen from the ranks of those who were more junior house officers at the same hospital.

### *Faculty*

The founding faculty members of the program were Dr. Wegdam and Benjamin Boateng, MD, an internist educated in Ghana and trained in Internal Medicine in the United States. The teaching and supervising faculty also includes one or two visiting physicians from the Netherlands on tours of 1 to 3 years, essentially as fellows in Tropical Medicine; several very senior OR nurses; a very experienced (more than 20 years) physical therapist; and the two residents in Surgery, who, while still in training, have become excellent teachers as well. The physician- and surgeon-in-chief (the founders) also do the administrative work for the program. There is also a separate hospital administrator, with frequent interaction on financial and other practical matters.

Supervision from the faculty is always available, but house officers have substantial autonomy and many are carrying out surgical procedures and making major medical decisions alone only a few months after university. The learning curve is very steep, and most house officers appear serious about learning to practice good medicine and not make mistakes with their patients.

### *Conferences*

The training routine in Techiman is similar to that around the world. The day begins at 7:30 with Morning Meeting for all physicians and two physician's associates, who share the night call. House officers covering all the different wards and services attend the meeting, where all topics and fields are discussed. It lasts about 75 minutes and takes place in the library (holding 200 medical texts, as well as periodicals donated by the faculty). It is run by the physician- and sur-

geon-in-chief. Residents present new cases, focusing first on ER activity overnight, admissions, and crises arising on the wards.

The physician-in-chief is authoritative, evidently idealistic yet realistic, avuncular, and displays a uniquely Ghanaian and infectious sense of humor — which appears essential when trying to practice competent and modern medicine in difficult circumstances. Raised and educated in Ghana, he gave up a medical practice after several years in the U.S. to return to Ghana, in part to join the house officer teaching program. It appears clear that his motivation could not possibly be monetary but reflects a sincere dedication to the improvement of medical care in his country. He is concerned with the well-being of the house officers. After they are up all night, he tries to be sure that they get relief or some sleep. Several residents were drawn to the program in Techiman by his dedication to teaching — and to them. Personal attention counts in training programs — everywhere.

The surgeon-in-chief is the director of Postgraduate Training Programme for “housemen” and the Surgery residency. He ran a smaller hospital in Ghana early in his training, then returning to the Netherlands to complete a surgical residency. After decades of a successful Trauma Surgery practice and raising a family, he and his wife returned to Ghana and have worked in Techiman for 10 years, in large part to develop the training program, but also for a fondness for Ghanaian society and clinical activities less impeded by European medical paperwork. His fundraising and work with charitable foundations in the Netherlands has

provided several of the buildings and other facilities on the compound.<sup>6</sup>

Much of the conference focuses on good clinical habits. Better medical care follows a complete history (although clinic visits are very brief). Detailing a reasonably complete physical examination is stressed, in part for the benefit of those who see the patient later in the hospital or outside. Communication in patient sign-out is a frequent theme. Correction of terminology in presentations, and also of management decisions, is direct and firm but without recrimination and often with humor. Even when clinical decisions are unacceptable, it remains clear that the senior staff is benevolent and dedicated to better residency training, not blame assignment.

The faculty knows the house officers very well, working side by side with them every day on the wards and in the clinics, as well as in the ER and OR. Teaching and feedback are individual and timely, whether in Morning Conference, on teaching rounds, or in the OR. Letters of recommendation are important and form the final evaluation. Forms and record keeping are minimal — recalling that the program directors returned to Ghana at least in some measure to escape the paperwork burden of Europe or North America.

Weekly seminars include brief presentations on basic pathophysiology and therapeutics by residents, e.g., fluid and electrolyte management in Pediatrics, and protocols for treatment of certain infections. One conference centers on procedures attendant to blood transfusions. Even with a hemoglobin of 5 or so, transfusions are avoided whenever possible. Lumbar punctures are emphasized as necessary in patients with suspected meningitis. Presentations cover some published studies of surgical technique. The house staff discusses a resident-designed protocol to determine which snakebite patients warrant treatment with anti-venom.

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<sup>6</sup>Observations from Morning Conference, HFH, Techiman by author (FWD).

Residents work hard to base their practice of medicine on published clinical studies and texts, rather than anecdote, but also on individual patient physiology rather than reliance on protocols. Clinical trials are scrutinized for “evidence,” but evidence gathered in other lands must apply to the local population in order to be of use. There is no hospital computer system, but increasingly, house officers have their own computers and can access online sources of medical information, supplementing tremendously the limited library resources.

One Morning Meeting, similar to a Morbidity and Mortality conference, includes discussion on how to improve after a maternal death from post-partum hemorrhage (for which there are also formal meetings; and the government monitors maternal mortality). Discussion focuses on decision making and supervision, which is readily available around the clock. All physicians, including senior staff, live on the hospital grounds. Sometimes, junior physicians need to be reminded to call for help before it is too late.

There are discussions about whether patients can be sent to the ER in preparation for admission or admitted directly to the wards and who should do the work without dumping it on others. An unpopular rotation at an affiliated hospital leads to vigorous complaints from the house officers and requests to redesign the training program. As elsewhere, residents who speak the best appear the most competent at first, but it becomes clear before long who is most competent in taking care of patients.

The intersection of finances and pharmacology is a frequent topic. In a country where even inpatients must go to the pharmacy and purchase medications individually, there is extensive and repeated debate about the cost/benefit impact of generic medications and which brand name drugs have anything to offer. The hospital does not have laboratory facilities for culture and antibiotic sensitivity, so antibiotic choices are based on clinical studies, textbooks, and general principles. There is an admonition against overuse of antibiotics in order to lessen expense and avoid selection for resistant organisms.

Combined meetings with the pharmacist are collegial and helpful. Physician handwriting on prescriptions and nurses’ transcribing on the wards and in clinics can be problems. There is no hospital dictation or computer system. There are frequent conferences with other services such as nursing and pharmacy to try to be sure that they are available when patients need them. Sometimes, support service coverage (e.g., for transportation of patients, medications, or basic hospital supplies) is spotty or even completely absent, especially on weekends.

### *Clinical Research Projects*

Clinical research projects are encouraged by the faculty, although without funding support. The surgeon-in-chief serves as research director for house officers and the Dutch medical students who visit for 3 months. They collect, analyze, and write up clinical data, e.g., on complications and outcomes of a particular operation.

### *Hospital Rounds*

Hospital rounds begin on the wards immediately after the Morning Meeting. Bedside rounds are truly by the bedside — the large open ward has no hallway in which to talk. In Medicine, there is a familiar tension between the interests of the residents in completing rounds so more work can get done, while the attending physician expounds (seemingly forever) on each case. Still, the house officers acknowledge readily that they need to learn more pathophysiology, e.g., about glomerular anatomy and physiology for patients with renal failure. They often need to be reminded to expand a list of diagnostic possibilities and discuss the certainty of diagnoses before rushing on to treatment. Not all overwhelming pulmonary disease is tuberculosis, and not all fevers are caused by malaria. Surgical rounds are much faster, to-the-point, and focused on selecting the appropriate OR cases for the day, in addition to wound inspection and other post-op checks.

As elsewhere in the tropics, where there are more open fires

and cooking is more of a communal activity, epilepsy is a common cause of burns [12]. In many lands, it is called “the burn disease.” One 17-year-old boy remains on the surgical ward for months, having lost most of the skin and subcutaneous tissue on his left leg after a generalized convulsion and fall into a fire. He will probably need some reconstructive surgery after extensive debridement and infection treatment of the open muscles and tendons.<sup>7</sup>

Rounds are conducted in English, which is spoken by perhaps one-third of the patients. Ghana is a country of hundreds of languages; no one is spoken in all regions. The surgeon-in-chief and some visiting residents, students, and nurses are Dutch. All African physicians speak Twi (sometimes called Ashanti by foreigners), the local language in the Ashanti and Brong-Ahafo regions and becoming close to a national language for Ghana. The house staff also speaks several local languages, although occasionally family members must translate for patients from remote villages with languages spoken by a few hundred people. Official rounds and conferences are in English; jokes and gossip are in Twi. Without loss of seriousness or compassion, there is much more laughter in West African than in Western hospitals.

Residents learn physical diagnosis and clinically applicable pathophysiology on rounds. With the lesser availability of technology, they, of necessity, appear to become proficient much earlier in abdominal and pelvic examinations. Hepatomegaly is common on the medical ward, prompting a lengthy discussion of possible causes. Complete blood counts are available, but residents learn to recognize anemia from the pallor — especially in the conjunctivae, given the darker pigmentation of skin in West Africa.

On pediatric ward rounds, the team sees a 5-year-old child who suffered a shattering of the left parietal skull in a motor vehicle accident (seemingly without penetrating brain injuries), requiring extensive debridement of glass and other foreign material and a removal of non-vital bone fragments, leaving most of the left side of the brain covered by dressings alone. The surgical debridement was carried out by a second-year house officer and a senior surgical resident. The child would need a skin flap later to close the wound and probably some cranioplasty, but first must recover on the general pediatrics ward where fever and infection, potentially fatal, are the greatest concerns. He survived.<sup>8</sup>

After rounds, most residents go to clinics for the afternoon, or to the ER. Some are more likely to head off to a more interesting activity and leave work for others. Those on surgical duty head to the OR.

### *Surgery Training*

All house officers learn to do laparotomies and Cesarean sections, with supervision, even in the first weeks after medical school. A few months later, supervision occurs primarily upon request, but the house officers know to request it when the procedures are more complicated. The house staff group performs an average of almost two Cesarean sections a day. Senior Surgery residents receive supervision primarily for the most complicated cases only or whenever they request it. House officers do their own radiologic and ultrasound testing and occasionally even do (partial, individual organ) post-mortem examinations.

From the beginnings of the program, high priority has been given to instruction in proper surgical technique, including sterile technique and sterilization of equipment, as taught by the surgeon-in-chief to all house

<sup>7</sup>Observation on surgical ward, HFH, Techiman, by author (FWD).

<sup>8</sup>Observation on Pediatrics ward, HFH, Techiman, by author (FWD).

officers, OR nurses, anesthetists and aides. The instruction was shown to be successful in a prospective study of postoperative infection rates in the HFH Techiman OR even in the first years of the program — no different from those in Holland [13].

### *Nights and Weekends*

On call, the trainees cover the entire hospital and ER, working in pairs of a junior (first year) and senior (second year) house officer. Call is about every fifth night and every fifth weekend, with weekend call running from Friday evening until Monday morning (plus the daytime shifts on either end), but house officers usually make it home to their quarters on the hospital compound for sleep intermittently. Surgery residents and faculty are on call for backup. With large traffic accidents, almost the entire compound can be called upon to assist. Those on call expect to present all admissions and all serious problems at Morning Meeting. As everywhere, much of their learning is from one another. They are not shy about disagreeing on clinical management, but disagreements rarely take on a personal tone and rather constitute a mutual reinforcement of education and proper training for better patient care.

### **CONCLUSION AND OUTLOOK**

Is it possible to develop and sustain a residency training program in the West African countryside, and will this induce more Ghanaian physicians to stay in Ghana and practice in remote areas? Practicing medicine in rural, poor West Africa is difficult and often frustrating, and the pay, while similar to that in the cities, is not enough to overcome the preference for the amenities of large cities, including better schools for children. At this point, it is unclear whether the adversities will frustrate the efforts of the Ghana College of Physicians and Surgeons and starve smaller towns of the personnel needed for the extension of modern medicine to rural areas. Many medical graduates acquire their education and early house officer training in Ghana and then leave and

never practice there for many reasons. It is not so different from other lands where highly educated people must have some incentive to leave the cities. General economic development may improve life in smaller communities to the point where they become more attractive.

Meanwhile, the training program in Techiman has grown over 10 years, combining difficult logistics with a rich clinical experience. There is no shortage of sick patients to treat and learn from, and the basic clinical lessons of Medicine and Surgery appear universal. There are many talented, dedicated physicians, nurses, and others working on the initiative to improve training and medical care in rural Ghana. House officers come (voluntarily) to Techiman for the excellent clinical exposure, the autonomy in developing their clinical skills, and for the personal assistance and guidance of a dedicated staff. Clinical Medicine requires reading, study, practical experience with patients, and taking advantage of the opportunity to learn from and teach one another. The same knowledge, personal values, dedication, and work habits, as well as the patients, teachers, and colleagues, that make a good doctor anywhere are certainly available in Ghana.

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