

NAIROBI DISTRICT HOSPITAL

PREPARED BY

Professor Kumar Rajaram, UCLA Anderson School of Management

Sonia Benavides, Jessica Bonham, Carine Ireland, Nina Pelham & Mai Yaguchi
2010 UCLA Anderson MBA Students

*A case by the UCLA / Johnson & Johnson Management Development Institute
and the UCLA Anderson School of management*

We would like to thank Dr. Victor Tabbush for facilitating the development of this case through the UCLA / Johnson & Johnson Management Development Institute. We would also like to thank Mrs. Esther Papa Tata, Dr. A.J. Suleh, Dr. Mwagiru, Wisdom Gagakuma, Dr. Ernest Kenu and Gladys Damalin for providing the information and feedback to make this case possible. Finally, we would also like to thank CIBER, the Price Center and Johnson and Johnson at the UCLA Anderson School for providing travel support for the student field visits. Although the material in the case is based on an actual situation, the names and places have been changed to protect the anonymity of the people and program involved. It is intended to serve solely for the basis for class discussion and not as an illustration of effective or ineffective management. (copyright © 2010 by the Regents of the University of California)

Dr. Afla, Medical Director of Nairobi District Hospital, walked back to his office in the administration block after making his morning rounds to each of the hospital's 13 clinics. He is an alumnus of the UCLA Anderson School of Management and the Johnson & Johnson Management Development Institute (MDI), which has been conducting management development programs for hospital administrators in East and West Africa since 2006. He took pride in witnessing the many improvements that had been made to the services provided at the hospital in terms of patient access, quality of care and customer service. Despite the numerous, effective policies that had been implemented, he felt that there were several areas that still needed improvement – in particular regarding services for the Prevention of Mother-to-Child Transmission of HIV/AIDS, or PMTCT. These services were provided in both the Comprehensive Care Clinic (CCC) where HIV patients were treated and the Antenatal Clinic (ANC) and posed several operational challenges. Dr. Afla pondered how he could improve his hospital's PMTCT services while still working under heavily constrained resources, and how he could best deploy new resources when they became available.

HIV/AIDS AND PMTCT PROGRAMS

According to the WHO, there are 33.4 million people living with HIV with 2.7 million newly infected each year worldwide.¹ 67% of those living with HIV, 68% of new HIV infections among adults and 91% of new HIV infections among children are in sub-Saharan Africa, making this region the most heavily HIV affected region in the world. However in recent years, sub-Saharan Africa has succeeded in decreasing the number of newly infected cases due to improvements such as antiretroviral therapy (ART). There was a 17% decrease in number of newly infected adults and 15% decrease in the number of newly infected infants between 2001 and 2008.

The term PMTCT refers to medical services that aim to reduce the likelihood of transmission of the HIV virus from mother to child. The HIV virus can be transmitted from mother to child either during pregnancy, during birth or after birth via breastfeeding. To avoid transmission during these periods, PMTCT is generally broken up into four stages: Prenatal, Birth, Postnatal and Pediatric.² While the services provided vary greatly from facility to facility, the Kenyan Ministry of Health has established a protocol to describe what should take place at each of the four stages. This protocol, written in 2005, describes the core PMTCT services: HIV testing and counseling, antiretroviral (ARV) drugs for treatment and prophylaxis, safe delivery practices and education and support for safer infant feeding practices. The process begins with testing all pregnant women who seek Antenatal Care for HIV (or when an HIV+ woman identifies that she is pregnant). This procedure is highly encouraged as this is the first step in seeking treatment and preventing transmission. [Exhibit 1 shows an example of the typical signage posted at Kenyan hospitals to encourage HIV testing.] At this point, if the test is positive, she is counseled on HIV and PMTCT. In addition, her medical history is taken and she is physically examined and checked for symptoms of HIV and other diseases. She may or may not begin a regimen of ARV treatment (depending on her CD4 count), and she is counseled on pregnancy danger signs, childbirth, infant feeding methods and family planning. Women are encouraged to select a birth and infant feeding plan prior to birth that best fits their particular situation.

¹ WHO, "AIDS Epidemic Update 2009."

² The distinction between Postnatal and Pediatric is that postnatal care is directed toward the mother and pediatric care is directed toward the baby.

Given that the greatest likelihood of transmission occurs during the birth itself,³ women are strongly encouraged to deliver in a hospital where doctors can monitor the duration of labor and act quickly if any complications arise. Whether or not delivery occurs in the hospital, both mother and child return to the hospital or clinic at certain intervals during which the baby is immunized, tested for HIV and put on ARV treatment if needed. The mother is encouraged to maintain her infant feeding plan, which should follow either exclusive breastfeeding or formula,⁴ and not a mix of the two.⁵ After 18 months if the baby has not tested positive for HIV, it is concluded that mother-to-child transmission has not occurred. [See Exhibit 2 for a diagram of the protocol for testing infants during the pediatric period.]

THE MINISTRY OF HEALTH AND THE KENYAN PMTCT OUTLOOK

While touring Nairobi District Hospital with Dr. Afla, fellow MDI alumnus, Mrs. Safiya from the Ministry of Health (MOH), also pondered how to improve the PMTCT services provided in her region. As the Provincial PMTCT Program Officer for the MOH, it was her responsibility to carry out policies and programming aimed at reducing the number of HIV-positive births at all facilities in the region. She spent a great deal of time traveling around the province to observe how PMTCT was provided and how guidelines were being adhered to at different facilities. She also sought to integrate comprehensive programming into PMTCT care, such as prevention of primary HIV infection, prevention of unintended pregnancies among HIV+ women and incorporation of families and the community into PMTCT care. A nurse by trade, Mrs. Safiya was passionate about emphasizing the human side of PMTCT in MOH programs. Specifically, she wanted to improve PMTCT care by making it more accessible and culturally acceptable to women throughout the country.

Mrs. Safiya was eager to work with Dr. Afla and his staff to improve the PMTCT process at Nairobi District Hospital. She, too, was proud of the strides that had been made, but wondered how they could tackle the remaining challenges. On one hand, the number of women accessing PMTCT services had increased as the social stigma associated with HIV/AIDS had fallen. Additionally, community awareness of mother-to-child transmission problems was growing.

³ Margaret Khoury and Andrea Kovacs, "Pediatric HIV Infection."

⁴ Formula is a feeding replacement for breast milk.

⁵ Studies have shown that mixed feeding causes gastrointestinal problems in infants, increasing the likelihood of HIV transmission above the risk of exclusive breastfeeding.

People were becoming more and more aware that (a) HIV could be transmitted from mother to child and (b) that transmission was preventable.

On the other hand, these achievements were expected to increase patient flow to the CCC by about 15% annually. Data on HIV/AIDS for expectant mothers was still a problem. The MOH had implemented a new registry system, but was still struggling to see that the registries were completed correctly and that data was returned to the MOH in a timely fashion in order to track patients. Other problems included erratic drug and test kit supply, staff shortages, a general lack of PMTCT data and difficulty in following up with exposed infants. Many of these problems occurred throughout all levels of facilities under the public system. In addition as described below, there were many social pressures associated with implementing the PMTCT program. All these aspects affected the choice of the scale and scope of PMTCT policies.

Mrs. Safiya wondered how she could work to overcome these challenges, while working within tight resource constraints in an environment in which there were strong and divergent views on the best deployment of scarce resources.

SOCIAL PRESSURES

Besides constrained physical resources, the success of PMTCT services was also affected by the stigma surrounding HIV/AIDS. HIV status disclosure to partners was still a tremendous obstacle in PMTCT, as many women feared abandonment by their partners after disclosing that they were HIV-positive. This lack of disclosure increased the likelihood for partners to be infected or to infect others. Low male involvement also complicated the pre- and post-natal PMTCT processes by making it more difficult for women to explain why they needed to give birth in a hospital and why they needed to stop breastfeeding after six months⁶.

Because women did not want their HIV-positive status publicly disclosed, they often ‘disappeared’ from the system, drastically increasing the likelihood of transmitting the virus to their baby. The stigma played out in several ways. First, most HIV-positive expectant mothers did not want to receive their prenatal care in the CCC, preferring to be seen in the ANC where other

⁶MOH PMTCT guidelines suggested six months of exclusive breastfeeding for HIV- babies born to HIV+ mothers. After this period the child was to be weaned to food.

women were seen. Second, fear of being singled out or shunned by their communities led women to adopt traditional or cultural birthing practices rather than delivering in a hospital. This posed a significant problem because the greatest chance of transmitting the virus was during the birthing process. Finally, following the birth, women who had not been properly counseled in PMTCT would try to mix breastfeeding (when in public) and formula (in private) in order to avoid any unnecessary attention. This mix was very dangerous as it further increased the likelihood of mother-to-child transmission due to intestinal problems that the baby could develop, making it easier for the virus to enter their system. Thus, PMTCT was most effective when women disclosed their status to their families and were able to attend regular check-ups and counseling without forcibly disclosing their HIV status to the public.

THE KENYAN PUBLIC HOSPITAL SYSTEM

The Kenyan Public Health system categorized facilities into six distinct levels (see Exhibit 3). Each level participated in PMTCT in its own way. The levels ranged from district hospitals in the larger cities to dispensaries and community centers serving rural communities. The successful implementation of PMTCT services depended not only on the timely proliferation of correct guidelines by the Ministry of Health, but also on the fundraising efforts and funding contributions of international organizations and governments. The type of funding a facility received dictated whether or not that facility would have sufficient staff, medical supplies, CD4 Machines⁷ and other equipment needed for patient care.

NAIROBI DISTRICT HOSPITAL

Dr. Afla and Mrs. Safiya continued touring clinics at the Nairobi District Hospital, which was centrally located in Kenya's capital city of Nairobi. Eventually, they approached the hallway that led to the CCC. The hospital consisted of many buildings connected by outdoor hallways. [See Exhibit 4 for an external photograph of the Nairobi District Hospital.] As patients entered the hospital, they were guided by well-marked signs showing the location of each clinic, with most clinics contained within independent buildings throughout the facility. The compound had originally been designed and built for another purpose, but had been serving as a public hospital for many years. Unfortunately, the facility's layout did not allow for a free flow of patients from

⁷ Without this machine, patients were forced to travel between locations to get tested at one location and to another for medication and treatment.

one clinic to the next. Of particular concern to the implementation of PMTCT services was the physical separation between the CCC and the ANC. [See Exhibit 5 for a layout of the Nairobi District Hospital buildings.] Although they were only about 100 meters apart, this separation posed a significant challenge. Once a woman tested HIV-positive in the ANC, she was referred to the CCC for further care. Many of those patients elected not to go to the CCC, fearing that they might be seen in transit and have their HIV+ status publicly disclosed. By not seeking the necessary PMTCT care at the CCC, these women significantly increased their risk of transmitting the virus.

COMPREHENSIVE CARE CLINIC (CCC) SERVICES

Within the cluster of buildings housing the different clinics was the CCC, where all HIV-positive patients at the hospital were treated. Treatment included all facets of HIV/AIDS management as well as prenatal care for HIV-positive expectant mothers. Once a person tested HIV-positive in any other clinic of the hospital, they were referred to the CCC building for future treatment. Once a patient came to the CCC, the staff carefully kept track of each patient to ensure continuity of treatment. Patients who did not show up for appointments were called by social workers. While the calls resulted in many patients coming back initially, some did not continue to return. The reasons for lack of continuing treatment for those who were reached included hospitalization, transfer to another clinic or simple refusal.

In order to reduce variability in patient arrivals, the clinic had implemented an appointment system. Each day, 90 appointments were given to follow-up patients while an additional 20 openings were left for new patients. On a typical day, about half of the walk-ins were new patients and the rest of the patients seen were follow-up visitors. Additionally, the Clinic attempted to book appointments with similar patients on given days. On Mondays, preference was given to the “Mama Group,” which consisted of special classes and informational sessions for expectant mothers on topics such as breastfeeding. On Tuesdays, priority was given to new patients and to the distribution of ARV medications. Wednesdays were dedicated to pediatric care; and, Thursdays were dedicated to the treatment of opportunistic infections. On Fridays, there were multidisciplinary team meetings, where social workers, counselors, pharmacists, nutritionists, HIV specialists, clinicians and Dr. Afla discussed treatment options for those patients who were failing under their current treatment.

Among the medical staff at the CCC was Dr. Bashira. She oversaw the activities of the eight clinical officers and the CCC nurses. [See Exhibit 6 for the CCC organization chart.] Dr. Bashira was fervent about the success of the services rendered at the CCC, and had left a lucrative private practice to come to Nairobi District Hospital to help those who really needed her services. Much like Dr. Afla, she was concerned about issues such as patient retention, unreliable supply management and staffing needs. Additionally, she wondered what the hospital could do to further manage variability in patient arrivals. She was eager to work with the hospital's administration to make changes to improve the CCC's PMTCT services, and she joined Dr. Afla and Mrs. Safiya as they thought about the many challenges they faced.

THE PATIENT EXPERIENCE

The vast majority of pregnant women in Kenya sought medical care and advice at least one time during their pregnancy. Most visited an antenatal clinic (ANC) during their second trimester in order to receive information and advice on their pregnancy. The ANC at Nairobi District Hospital encouraged appointments, but did accept walk-ins. During an appointment, every expectant mother was encouraged to sign a consent form in order to be tested for HIV. Nairobi District Hospital utilized an opt-out policy so all women were tested unless they refused to sign the form. Although it occasionally occurred, it was rare for a patient to refuse the test.

The test performed was a "Rapid Test" that yielded results in 20 minutes or less. When an expectant mother tested positive for HIV, she was immediately referred to see a counselor at the CCC. [See Exhibit 7 for a floor plan of the CCC.] This clinic is open to patients from 8 a.m. until 5 p.m. daily and is open on all days except on Sunday. A medical assistant typically escorted the expectant mother to the CCC to ensure she did not get "lost" in the transition. The ANC was the primary method of referral of pregnant women to the CCC; however, they could also be referred from the maternity ward if they tested HIV-positive during childbirth.

THE INITIAL CCC APPOINTMENT

Newly identified HIV-positive expectant mothers checked in at registration with a clerk at the CCC and were moved to the front of the queue in order to reduce the waiting time of the mother to see a counselor. Before she could see a counselor, however, the registration clerk had to transfer her information from the ANC patient log into the CCC patient log by hand, as records at the

hospital were not automated. This step typically took 12 minutes and there were 2 clerks at registration. Next, the patient was taken to see one of the six counselors who were on duty at any given time at the CCC. Counseling sessions ranged from 20 to 35 minutes with the average session lasting 30 minutes. During the session, the counselor provided information and advice including the recommendation that the patient's spouse and other family members be tested. After her counseling session, the expectant mother would see a technician who drew blood for a CD4 test. Drawing the lab for the CD4 took an average of 10 minutes, but could take up to 15 minutes if there was difficulty drawing blood; results were typically available in 3 to 7 days and were given during the follow-up appointment. After the CD4 lab was drawn, the expectant mother would visit the clinic's pharmacy, staffed by three nurses, in order to receive drugs that could be administered at home in case she could not return for childbirth. Dispensing the drugs took between 10 and 30 minutes with an average of 20 minutes. [See Exhibit 8 for the percentage of patients requiring a resource or service for initial and follow-up appointments.] Finally, the expectant mother checked out and scheduled a follow-up appointment with a clerk to return in approximately one week. At the same time, the mother was also scheduled for a variety of "mama" training classes, designed to instruct expectant mothers in issues pertaining to motherhood including breastfeeding, support groups and administering medication for her and her baby throughout her pregnancy and beyond. Checking out and appointment scheduling typically took 10 minutes, although it could take up to 15 minutes. There were two clerks on duty for scheduling appointments and for patient check-out.

THE FOLLOW-UP CCC APPOINTMENT

Only about 78% of expectant mothers actually return 1 week later for their follow-up appointments. The CCC has noticed that some of the counselors seem to have a disproportionately large number of patients that never return after the first visit. Dr. Afla suspects that this could be due to inconsistency in the information that is being communicated to patients during the initial visit. Follow-up appointments were typically much longer than initial appointments due to a number of additional steps and services. [See Exhibit 9 for the average time spent in the clinic by appointment type.] No-shows could be attributed to a number of factors as described earlier. In addition, many mothers came from low socioeconomic statuses and faced many difficulties with transportation from their homes to the hospital.

However when the expectant mother did return for a follow-up appointment, she was checked in by a clerk and asked to complete registration paperwork. The check-in and registration process took an average of 15 minutes, though it varied from 10 to 25 minutes depending on whether or not the patient had her medical card in hand and whether or not she had been to that clinic before. After being checked in, the expectant mother waited in the lobby to be called by a nurse. [See Exhibits 10 and 11 for average process times and average wait times for each type of service.] Although the CCC had a high percentage of no-shows, wait times were still typically very long. Eventually, the expectant mother was called by one of the six nurses on duty who escorted her to one of five available beds and performed a brief consultation, observation and triage. This process was fairly consistent and nurses spent between 30 and 40 minutes (35 minutes on average) on this step.

The majority of patients were triaged to see the next available clinical officer. During the examination, the expectant mother was given her CD4 results and she was provided with instructions for managing her disease based on these results. There were eight clinical officers available at the CCC. A typical patient examination with a clinical officer took 30 minutes although they could be as short as 15 or as long as 45 minutes depending on patient condition, questions and needs. Approximately three percent of patients were triaged as needing special medical attention and were seen by the CCC doctor, who examined the patient in his office, which had an additional bed. These examinations took 60 minutes on average, but in some circumstances lasted up to 2 hours if the patient's condition was particularly complex.

Dr. Bashira noted that the hospital struggled to manage the variability in the types of patient cases and the subsequent medical attention required. While the average proportion of patients that required special attention was about 3%, it could range from 0 to over 20%, depending on the day. This made it increasingly difficult to manage staffing needs and effectively utilize her time. Furthermore, the number of patients arriving throughout the day varied, and the processing times for each service varied by time of day. For example, the busiest times of days were often just before midday or later in the day, and this was when process times were longer as well. Exhibits 12 and 13 illustrate the variability in arrival rates and patient process times throughout the day.

If the clinical officer or doctor felt it was necessary, the mother would also see a nutritionist or family planning counselor during her visit. Approximately 25% of women were referred for a

consultation with the CCC nutritionist, which took an average of 20 minutes. Around 15% of women were referred for family planning counseling, which took an average of 25 minutes, but could last up to 40. All women saw one of the 6 counselors at the conclusion of their visit, which took between 17 and 46 minutes. Although there was great variability based on patient needs, most counseling appointments lasted about 30 minutes. Patients were usually allocated to the counselors they saw during their initial appointment. While this led to greater continuity and patients felt more comfortable, this sometimes created long wait times for the patients and uneven utilization of the counselors.

Once the expectant mother had seen all service providers and counselors, she received the prescribed medications from a nurse at the pharmacy. This step took 15 minutes, ranging from 10 to 20 minutes depending on the complexity of the medicine to be dispensed. There were three people who worked independently at the pharmacy. At the end of the visit, expectant mothers always saw one of the two clerks at appointment scheduling to schedule follow-up appointments. If her CD4 count was below 350, she was scheduled for monthly follow-up appointments and would receive all her antenatal care through the CCC until the time of delivery. Women with counts above 350 were considered at low risk for transmission and received antenatal care at the ANC. Women were rarely no-shows for future appointments after successfully attending the first appointment. Appointment scheduling typically took about ten minutes per patient.

DELIVERY

All HIV+ women were encouraged to deliver at a hospital. This significantly reduced the likelihood of prolonged birth, which increases transmission risk, and also allowed for the administration of necessary drugs during delivery and HIV tests for the child post-delivery. HIV tests at birth, commonly known as early infant diagnosis, were conducted via dried blood spot testing. Early diagnosis increases the chance of survival for positive infants who can immediately begin treatment with ARV's. In addition, providing mothers with early information that they have delivered a negative baby encourages them to adhere to PMTCT recommended feeding and drug regimens in order to keep the baby negative.

Despite the benefits of hospital delivery, 70% of patients delivered at home or at other non-medical facilities. These women may or may not have participated in prenatal care at Nairobi District Hospital. Women who were able to deliver at the hospital delivered in the maternity

ward. This caused a tremendous amount of apprehension as the women had to see and disclose their status to a new doctor. In addition, many women had complained that the doctors and staff in the maternity ward lacked compassion for them and their situation. Also, the unpredictable nature of childbirth made it very difficult to control the flow of patients into the maternity ward. Consequently, although on average there were 30 patients per day, this varied from 20 to 50 patients on any given day. On one day, the ward could be overwhelmed with women in labor, while the beds could lay completely empty the next. There were 15 beds available and women stayed an average of 3 nights; and, this ward was open every day of the week. In addition, Nairobi District Hospital has received reports of patient neglect and poor customer service in the Maternity Ward. There are some doctors and nurses that refuse to work with HIV+ patients because they fear they will also contract the virus.

POST NATAL

Women and children were scheduled for a follow-up appointment at the CCC six weeks after delivery in order for the baby to receive immunizations and to receive the results of the baby's HIV test. Because immunization records are required to register a child in school, nearly 90% of women returned for this appointment. In addition, Dr. Bashira noted that the importance to the child of this particular appointment made the mothers arrive very early for their appointments making it even more difficult to manage the queues that formed in the waiting room.

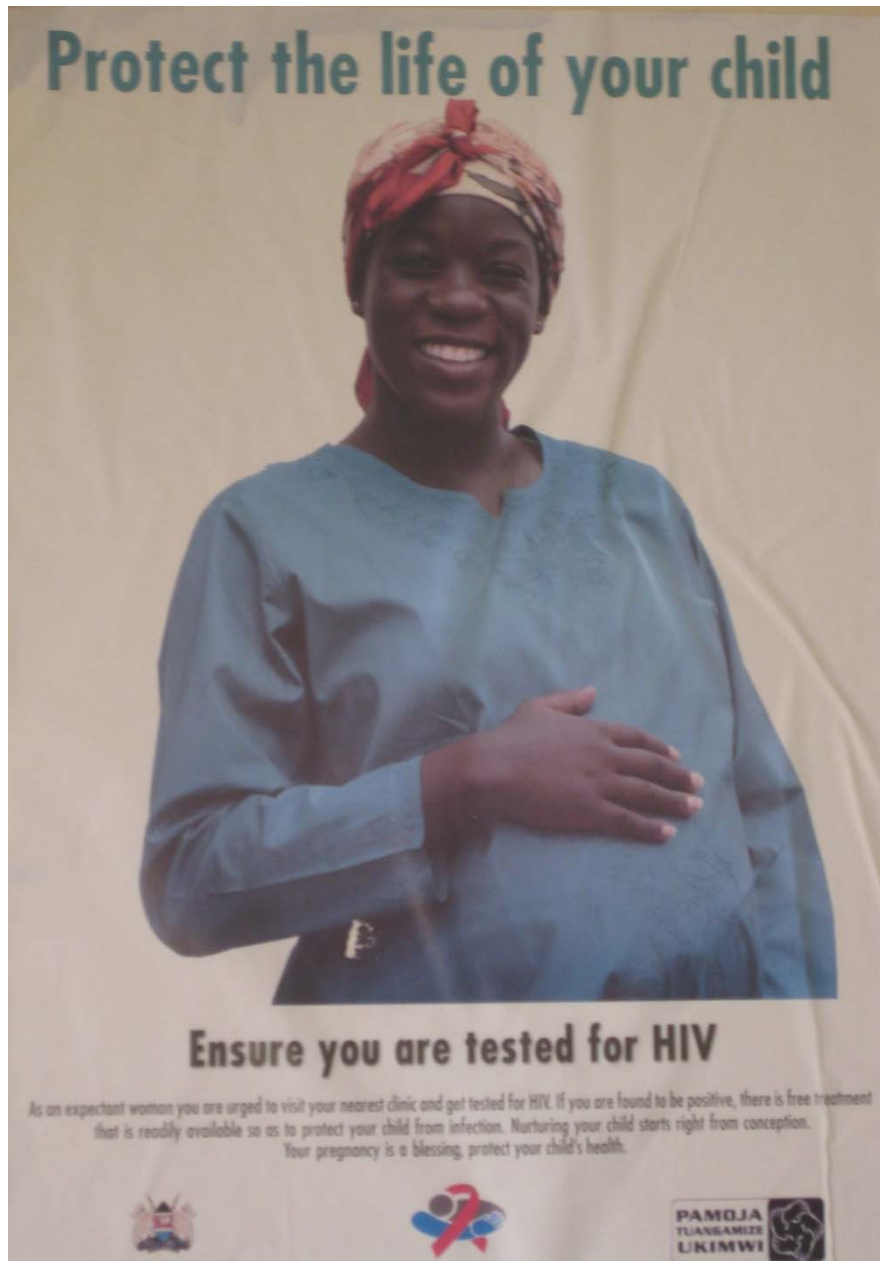
PROBLEMS AND PLANS

As Dr. Afla, Dr. Bashira and Mrs. Safiya discussed all the issues they were facing with PMTCT services, they tried to figure out the best way to use the current resources in order to continue the implementation and improve the efficiency of PMTCT services. There were many changes they thought could be made, but they needed to find out which combination of changes would make the best use of the human and economic resources they possessed. In particular, they wanted to know where to reallocate existing resources, how much to reallocate, and the best places to expand the clinic to ensure it could accommodate the 15% annual increase in demand, while improving customer service as defined by reducing patient wait times and maintaining the hospital's hard earned reputation for quality.

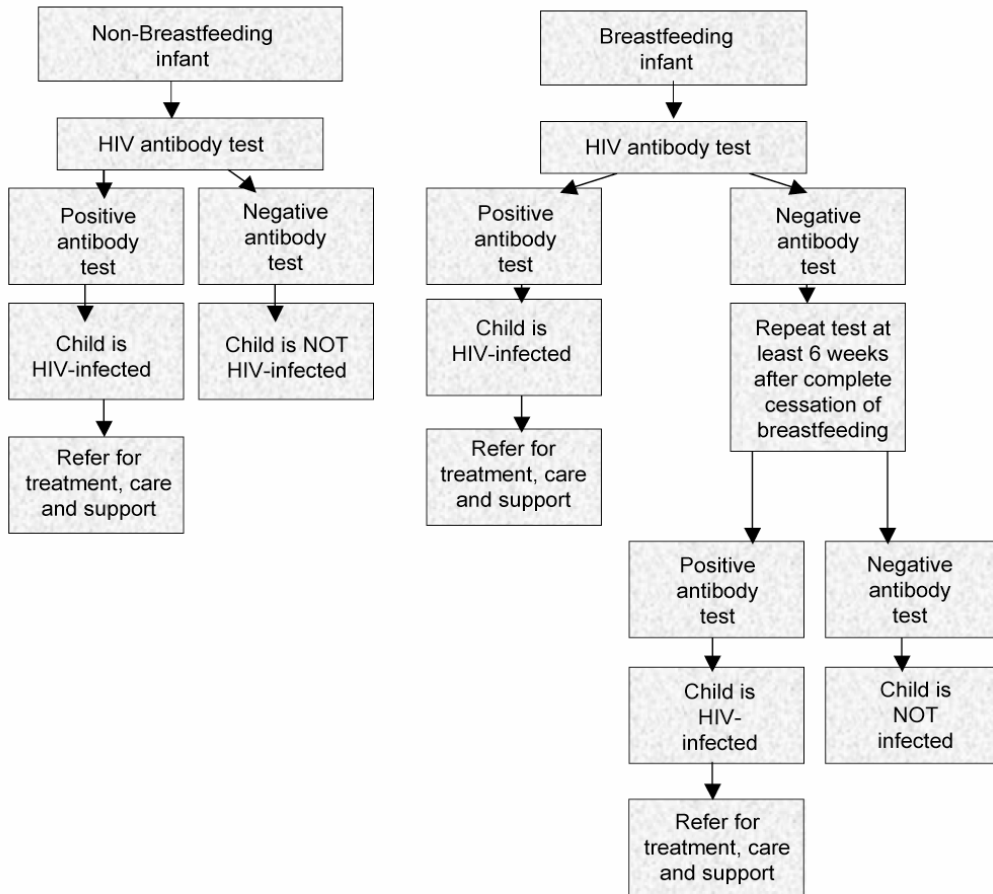
SUGGESTED OPERATIONS QUESTIONS

1. Draw process flow diagrams to describe the workflow when the patient arrives for the initial and follow up appointments.
2. Calculate the capacity and utilization for each of the resources listed in Exhibit 8 and identify the bottleneck of the process.
3. Should this stage be the bottleneck if this is a well-designed process? If not, what stage should be the bottleneck and why?
4. Calculate the average number of patients that will be present at the clinic at any given time during the day.
5. Where should Dr. Afla add capacity to accommodate the expected 15% increase in annual patient visits?
6. Calculate the capacity of the delivery (birthing) stage. Is this capacity sufficient to cope with the 15% increase in demand? How would you increase the capacity of this stage if needed?
7. How does variability in patient arrivals and clinic procedures affect lead times?
8. Produce a detailed list of recommendations to reduce patient lead times.
9. In addition to operational refinement, what other measures could Dr. Afla take to reduce the number of patients who default and to increase patient retention?

[EXHIBIT 1] PRO-HIV TESTING SIGNAGE IN HOSPITAL



[EXHIBIT 2] 2005 KENYAN NATIONAL PMTCT PROTOCOL FOR TESTING HIV-RISK INFANTS AT 18 MONTHS



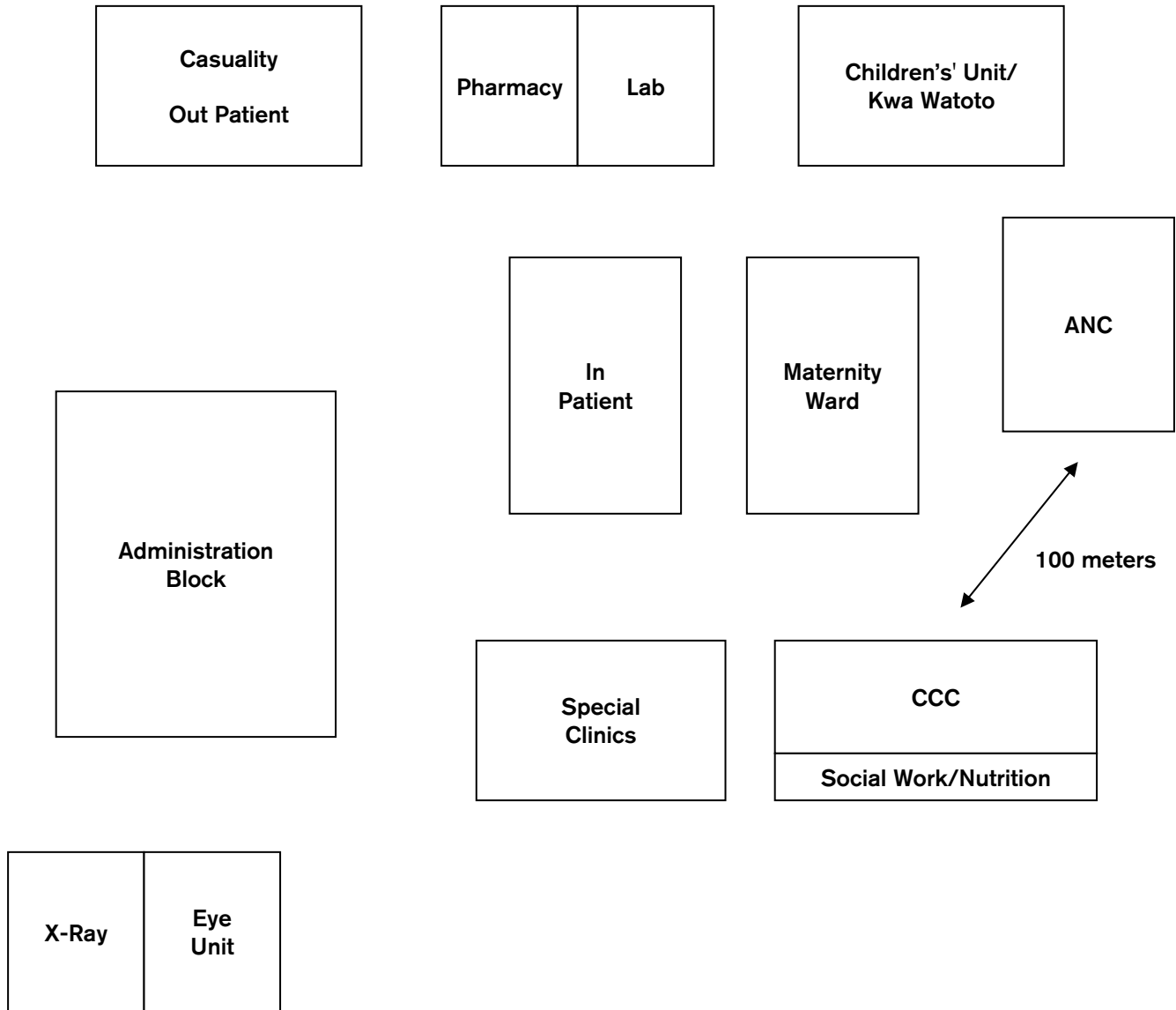
[EXHIBIT 3] FACILITY LEVELS IN THE KENYAN PUBLIC HEALTHCARE SYSTEM

Level	Facility	Description
1	Community Center	small, localized facility where a nurse may offer assistance
2	Dispensary	location, nurse staffed, that provides medication and advice
3	Health Center	larger, more centralized health facility that serves general public health needs: staffed by nurses and clinical officers (equivalent to physician's assistant)
4	District Hospital	main hospital and health facility in each district, staffed by doctors, nurses and clinical officers. may or may not contain in-patient space
5	Provincial Hospital	largest hospital in each province, where most specialized and in-patient procedures take place
6	National Hospital	Kenyatta National Hospital: leading medical facility in the country

[EXHIBIT 4] PHOTO OF NAIROBI DISTRICT HOSPITAL

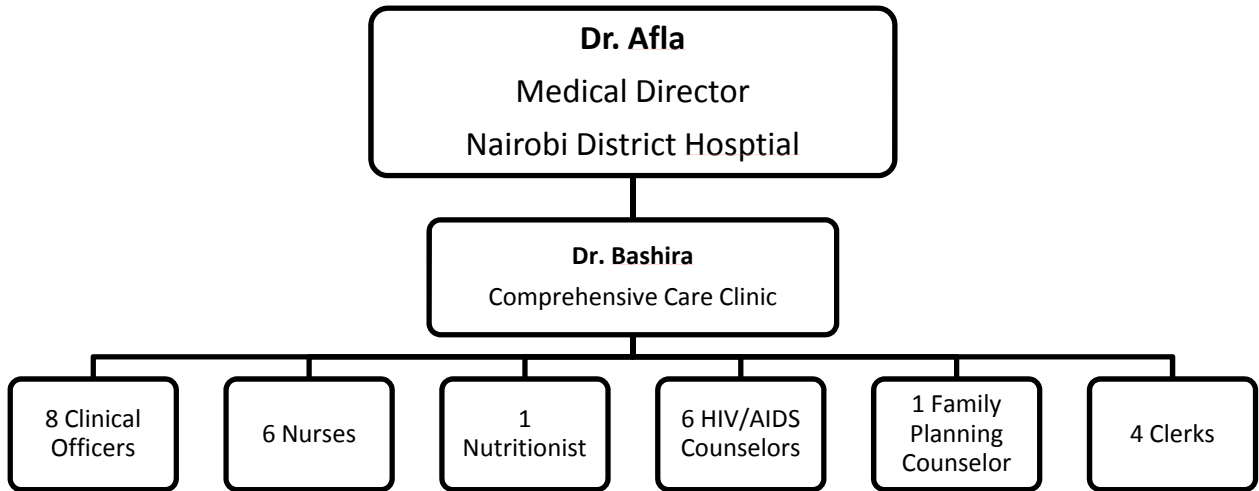


[EXHIBIT 5] NAIROBI DISTRICT HOSPITAL LAYOUT

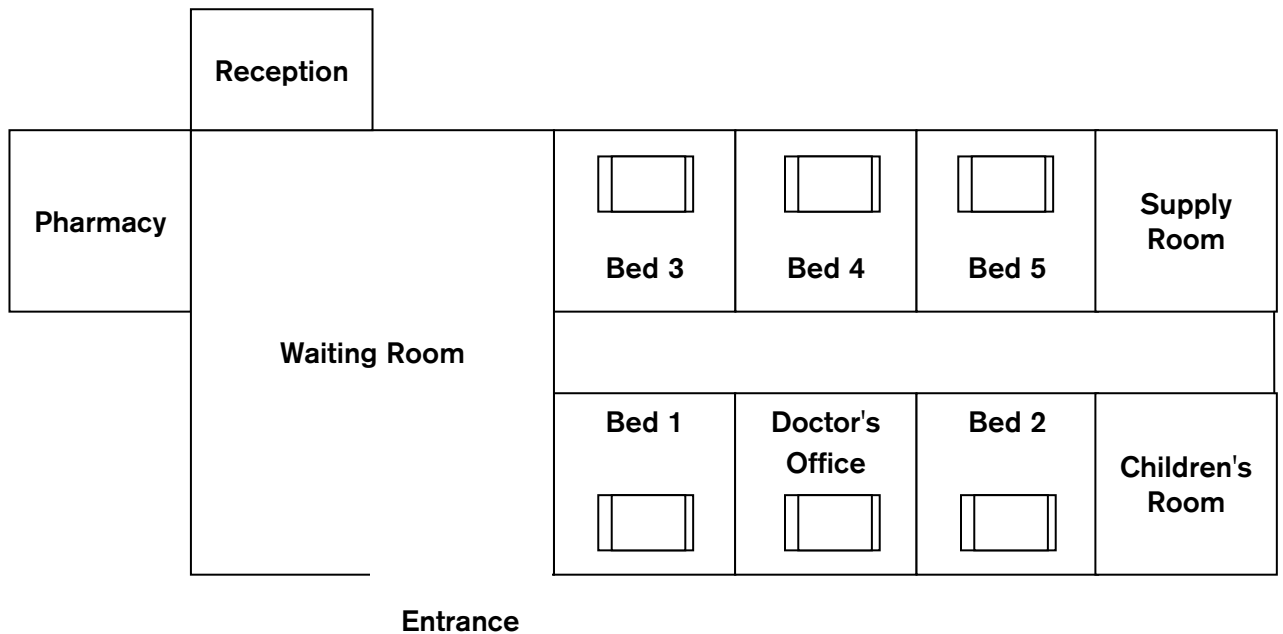


Entrance

[EXHIBIT 6] CCC ORGANIZATION CHART, NAIROBI DISTRICT HOSPITAL



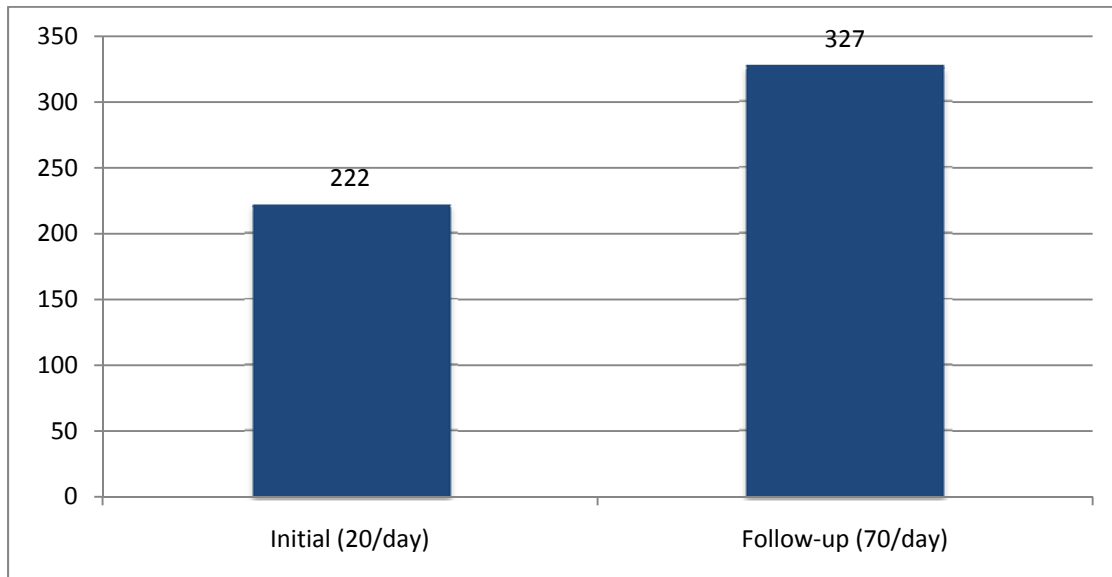
[EXHIBIT 7] FLOOR PLAN OF CCC AT NAIROBI DISTRICT HOSPITAL



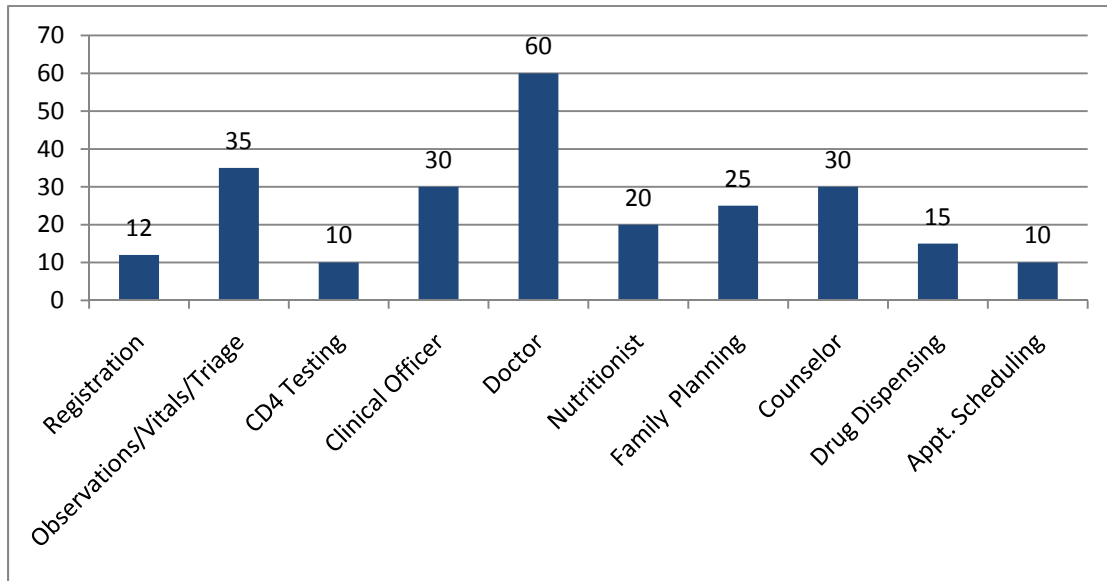
[EXHIBIT 8] PERCENT OF PATIENTS REQUIRING A GIVEN RESOURCE BY VISIT TYPE

	Initial Appointment	Follow-up Appointment
Registration	100%	100%
Observations/Vitals/Triage	—	100%
CD4 Testing	100%	—
Clinical Officer	—	95%
Doctor	—	5%
Nutritionist	—	25%
Family Planning	—	15%
Counselor	100%	100%
Drug Dispensing	100%	100%
Appt. Scheduling	100%	100%

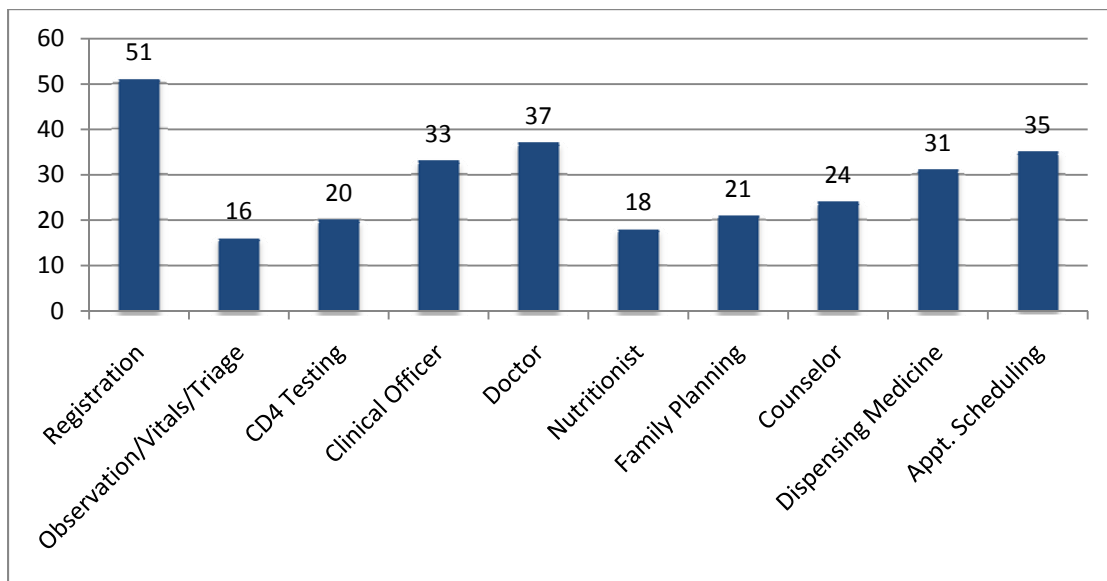
[EXHIBIT 9] AVERAGE TIME IN CLINIC BY APPOINTMENT TYPE (IN MINUTES)



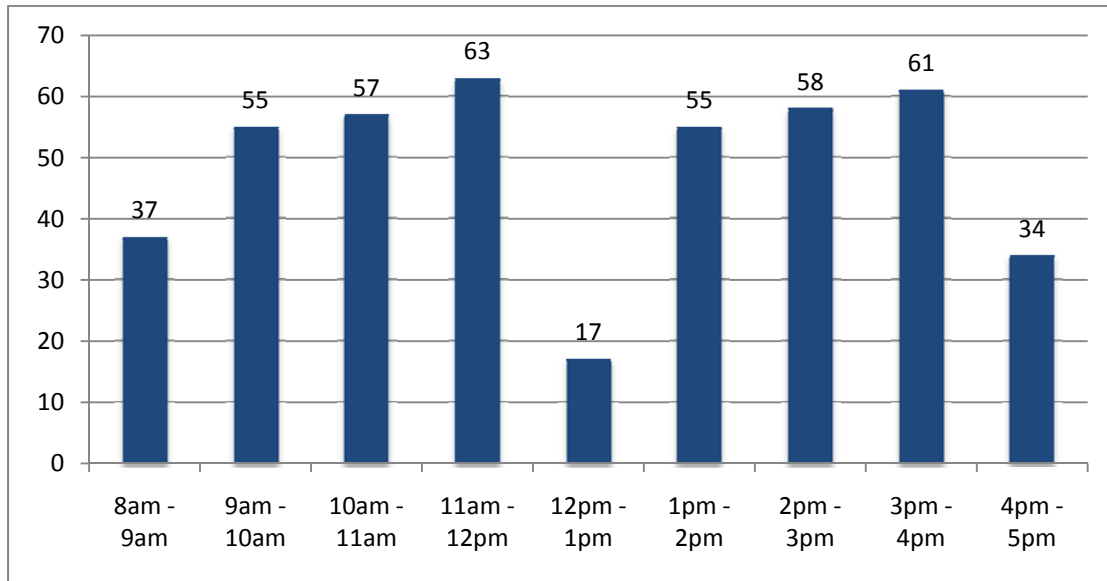
[EXHIBIT 10] AVERAGE PROCESS TIMES (IN MINUTES)



[EXHIBIT 11] AVERAGE WAIT TIMES (IN MINUTES)



[EXHIBIT 12] ARRIVALS PER HOUR (TOTALS AGGREGATED OVER A FIVE DAY WEEK)



[EXHIBIT 13] PROCESS WAIT TIMES BY TIME OF DAY (IN MINUTES)

