CARDIAC CARE CENTER OF EXCELLENCE BUSINESS PLAN

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# EXECUTIVE SUMMARY

## The Concept

The Cardiac Care Center of Excellence (CCCE) will be Rwanda’s first fully-equipped tertiary care center specializing in cardiac care. In partnership with the Government of Rwanda, it will provide high-quality clinical care for adults and children, research and data collection, and training and development for health workers.

## The Problem

In Rwanda, the mortality burden from cardiovascular disease (CVD) is almost as large as the mortality burden from malaria, HIV/AIDS and tuberculosis combined. As the population ages, the number of people suffering from CVDs is only likely to increase. Of particular concern in Rwanda is the high number of children and young adults suffering from advanced rheumatic heart disease (RHD). Considered a disease of poverty, RHD can result from strep throat that goes untreated in childhood. This highly preventable illness can deteriorate the valves of the heart to the extent that patients need full heart valve replacement before the age of 18 year old.

Studies indicate that 2,600 Rwandans may require heart surgery for RHD, more than half of whom have yet to be diagnosed. Rwanda has no internal capacity to care for these patients. Approximately 50 patients are treated annually by visiting international teams and only another 20 are sent abroad for care at high cost to the government and donors. The 1,000 RHD patients already on the waitlist for surgery typically wait three to five years for care. Many may die before having a chance to receive care. In addition to RHD, thousands of adult Rwandans suffer from other CVDs and also face large barriers to accessing care. Approximately 3,000 of these patients could be saved annually through surgery. Additionally, about 4,000 infants are born each year with congenital heart defects, of whom about 1,000 will need surgery. These numbers are amplified across East Africa, where a combination of high prevalence of CVDs, poor preventative cardiac health and low access to cardiac care results in a perfect storm of cardiac-related deaths.

Currently there are no permanent hospitals offering cardiac surgical care in Rwanda, and few on the African continent as a whole. CCCE aims to capture this untapped market and meet the needs of the thousands of East Africans suffering from preventable, treatable cardiac disease.

## The Solution

CCCE will address the high burden of disease from CVD in Rwanda while working to strengthen the underlying Rwandan health system through four main avenues:

1. Providing high-quality patient care
2. Increasing access to care
3. Educating and training a new generation of Rwandan health workers
4. Conducting evidence-based research

The Center will be the first permanent facility in Rwanda where patients can access quality cardiac care. The Government of Rwanda alongside the Center will increase patient access to care through streamlining referral chains and training providers at the primary and secondary levels on proper cardiac disease prevention, diagnosis and referral. They will also create a specialized cardiac training program to ensure Rwanda has the manpower long-term to staff the center. By year 5, the Center will hire 253 staff, 82% of who will be Rwandan (see Table 8). Lastly, through state-of-the-art technology and clinical research, the Center will work to further understanding of CVD in East Africa.

As part of its clinical package, the Center will offer diagnostic services, including imaging, echocardiography, stress testing and laboratory medicine. The Center will also have a fully-equipped cardiac catheterization lab that will offer interventional and diagnostic catheterization services. Lastly, an operating room will offer cardiac surgical care for acquired heart disease, coronary artery disease, and congenital heart disease. Other services included at the center will include dental screening – a high need for many cardiac patients - cardiac rehabilitation and nutrition counseling. The Center will begin operations with 22 beds and gradually increase capacity to nearly 70 beds by Year 5 (See Table 5).

Over the long-term, the Center will gradually increase the scope and quantity of its service delivery in order to meet a wider array of needs. As part of this effort, it will further invest in teaching and training programs for Rwandan cardiac specialists. Marketing efforts across East Africa as well as public education campaigns within Rwanda will increase the Center’s customer base. A greater number of services to treat a wider variety of CVDs will also expand the Center’s impact and diversify its customer base. And lastly, the Center will continue working with the Government of Rwanda on preventative health initiatives that ensure patients with preventable illnesses avoid the need for critical cardiac interventions.

## The Team

CCCE is founded by Team Heart, a nonprofit medical organization based in the United States that is dedicated to addressing the burden of cardiac disease in Rwanda. Since 2007, Team Heart has flown volunteer clinicians to Rwanda to provide life-saving cardiac care to RHD patients. To date, they have provided more than 150 patients with valve replacements. After 10 years of operations, Team Heart has pivoted its strategy towards establishing the Cardiac Care Center of Excellence, a more permanent solution to address Rwanda’s health care needs.

## The Partners

The Government of Rwanda will be the Center’s main partner in this endeavor. As active partners, they will provide financing for ongoing operations through coverage of CHBI clients, streamline the referrals system and conduct public awareness campaigns to increase the number of patients accessing the center, and coordinate with the Center to plan f human resources strengthening efforts.

Narayana Health, an India-based hospital management company, will also partner with the Center to provide the critical human resources and technical assistance to run the Center for the first five years. NGOs, such as Chain of Hope, UK and Belgium will also use the Center as their new base of operations to conduct annual surgical missions where they will provide additional pediatric surgical services.

## The Financial Plan

CCCE will be a not-for-profit institution funded through a combination of Government support, individual and institutional giving, and fee-for-service payments. The Government of Rwanda has identified and donated land for the CCCE as part of a larger medical campus in Masaka area of Kigali. In order to build and furnish the hospital, Team Heart is actively working to raise approximately $10.5 million through cash and in-kind donations. These funds will contribute towards the costs of construction, furniture, and medical equipment.

To cover the center’s operational costs, Team Heart is seeking commitment for funding from the Government of Rwanda and insurance providers to reimburse for services. Annual projected costs of running the center will range from USD 11 to 27 million over the first five years, as the Center gradually ramps up service delivery to a larger population of patients. While the Center will incur losses in its first years, by year three they will experience growing profits to support the growth.

# ORGANIZATION DESCRIPTION

## Team Heart Overview

Team Heart is a non-profit organization based out of Boston, MA, dedicated to treating cardiac disease in Rwanda. Established in 2007, Team Heart has partnered with the Rwandan Ministry of Health and the Rwanda Heart Foundation to fulfill the need of providing cardiac care to a region in which the burden of cardiac disease has been increasing.[[1]](#footnote-1) In particular, Team Heart is focused on establishing a sustainable regional center of excellence in cardiac care that offers comprehensive services, including tertiary care with cardiac surgery.

This goal came from years of witnessing firsthand the current need for health services in Rwanda. Team Heart initially started as a group of highly-skilled medical volunteers traveling to King Faisal Hospital in Kigali, Rwanda to provide heart valve replacements for patients suffering from advanced rheumatic heart disease, a largely preventable illness. Each year, Team Heart sends a core group of 32 clinicians to King Faisal Hospital in Rwanda to provide care. Typically, the team of volunteers provides 16 life-saving, highly-specialized surgeries over the course of two weeks every year. Over the past ten years, this amounts to a total of 150 surgeries that have been provided.

## Mission and Vision

Inspired by their earlier work, Team Heart is motivated to partner with key stakeholders to establish a sustainable model for delivering comprehensive cardiac care and to fulfill a need that is not currently being met. Team Heart’s mission is to provide high-quality tertiary cardiac care through the establishment of a center of excellence in Rwanda. Their vision is for a Rwandan health system in which all citizens, regardless of ability to pay, have access to high quality cardio-vascular care from the primary to tertiary levels.

This work includes the following key components:

1. To establish a **regional center of excellence** in cardiac care in collaboration with local partners, including cardiac surgery, heart catheterization, rehabilitation and prevention, research and education.
2. To **treat** those afflicted with cardiovascular disease through surgical and medical intervention.
3. To **prevent** cardiovascular disease, and advanced rheumatic heart disease in particular, through a combined effort of surveillance, public education, health worker training and early intervention.
4. To support **advocacy and fundraising** initiatives to reduce healthcare costs for marginalized individuals who suffer from chronic heart disease but cannot afford the high cost of treatment.
5. To contribute to **strengthen the health system** in Rwanda through increasing educational opportunities for Rwandan medical professionals, strengthening referral systems and conducting evidence-based research.

## Cardiac Care Center of Excellence Overview

CCCE will provide comprehensive diagnostic services, which include a full cardiac catheterization lab, imaging for both pediatric and adult patients, a cardiac echocardiography lab, and laboratory medicine. In order to provide treatment, the center will provide interventional cardiac catheterization and cardiac surgical care for acquired rheumatic heart disease, coronary artery disease, and congenital heart disease. To aid patients in the healing process, they will also provide cardiac rehabilitation and nutritional support services. Lastly, because of the link between CVD and dental disease, the Center will have a small dental clinic in which patients will receive care and clearance before being admitted to surgery. The Center will open with 22 beds in year one and gradually increase to 68 beds by year five (see Table 5). These will include hospital beds, intensive care unit beds, two surgical operating rooms, a catheterization lab, a cardiac testing center with capabilities to perform stress testing, a full diagnostic lab, and a radiology department that includes CT and MRI.

On top of their clinical services, the Center will also support public health strategies throughout the country. These include the participation of a registry to track rheumatic heart disease, research on the extent of the burden of disease, and establishment of standards of care that can be used throughout the existing district hospitals. The Center also plans to invest in the education and training of the Rwandan health workforce so as to provide a pipeline of health care providers who will continue to meet and fulfill the cardiac care needs of the country.

With creation of CCCE, there will be increased access to specialty care for the residents of Rwanda and potential neighboring countries, excellence in patient care, evidence-based research to continue assessing the needs of the country, and an opportunity to provide education and employment to the local community.

# THE NEED AND OPPORTUNITY

## The Need

Recent trends in the burden of disease in Rwanda demonstrate the need for a stronger, more coordinated effort to treat noncommunicable disease (NCD), and cardiac care in particular. Previously, the focus of health care in Rwanda was to treat and prevent communicable, maternal and childhood diseases. In part due to these efforts, Rwanda has made strong gains in recent years in traditional indicators of population health such as life expectancy, maternal mortality, and under-five mortality.[[2]](#footnote-2) However with demographic shifts has come a correlated increase in NCDs, including heart disease. In fact, a 2016 report showed that 14% of deaths in Rwanda come from CVD, more than that of malaria and HIV/AIDS combined[[3]](#footnote-3). Despite this change in health trends, there are only a handful of medical centers that provide cardiac surgery on the African continent.[[4]](#footnote-4) Furthermore, there is an urgent need for surgical care in the world’s poorest regions. In 2010, it was estimated that 16.9 million (32.9%) of all deaths worldwide were attributable to conditions that are treatable with surgery.[[5]](#footnote-5)

## Broad Impact

Team Heart believes that the impact of establishing a cardiac care center in Rwanda will ripple positively beyond the reduction of CVD deaths. The Center will also strengthen the overall Rwandan health system. As part of its approach to creating a center of excellence, Team Heart is pursuing strategic partnerships that will re-engage the Government, medical colleges and insurance companies to strengthening cardiac care and primary care broadly. This broad group of stakeholders will coordinate on several systems-strengthening efforts, including strengthening referral systems, increasing the number of providers trained in cardiac care at the primary and tertiary levels, educating the public about cardiac health, and improving data collection and epidemiological surveillance efforts.

In addition, establishing a cardiac care center will have a strong economic impact. Lowering morbidity and mortality from CVD will avoid lost productivity. This center will also lead to the creation of skilled jobs, through hiring 257 Rwandan staff in the first five years. It will provide opportunities for medical tourism from citizens in neighboring countries, and will keep healthcare spending within the country, rather than sending patients in need of cardiac surgery abroad.

Finally, building this cardiac care center will increase Rwanda’s international standing as a regional hub for medical excellence. Rwanda will be seen as a safe and successful place for international development, business and broader research and development.

## The Opportunity

The Rwandan political and healthcare landscape show that the time is ripe for establishing a cardiac care center. Rwanda has a committed government, health ministry, and accountable health care professionals and administrators who are dedicated to partnering with Team Heart in this endeavor. In addition, established clinical, research, and teaching foundations such as the Ministry of Health, the Rwanda Biomedical Center, the Human Resources for Health Program in Rwanda, the University of Rwanda, the Kigali Teaching Hospital, and the College of Medicine and Health Sciences can provide assistance to Team Heart. Rwanda has a track record of successful global public-private partnerships, such as with Partners in Health, as well as the Human Resources for Health Program in Rwanda. In addition, Rwanda has made great strides in treating other diseases and has shown innovation in health care delivery, particularly in its success in treating malaria, tuberculosis, and HIV and reducing maternal mortality. Finally, the Rwanda Health Sector Strategic Plan places a focus on and commitment to meeting the Vision 2020 goals, which include goals aimed at improving governance, business opportunities, and health care to allow Rwanda to continue moving forward in its national development.

# COMPETITOR AND COLLABORATOR ANALYSIS

## The Government of Rwanda

Since its founding in 2007, Team Heart has worked closely with the Rwanda Ministry of Health (MoH). CCCE will continue to work with MoH as its central partner. The government has already begun collaborating with Team Heart on several health systems strengthening and research initiatives. Team Heart has been working to collect data to better estimate the prevalence of CVD and to establish a national registry to track incidence of the disease. They have been working closely with the NCD unit at the MoH to draft clinical protocols for cardiac treatment from the primary care level onwards.

As part of this partnership, the Government of Rwanda will lead efforts to improve referral systems, educate the public on the need to seek cardiac care, and educate providers at the primary level to ensure patients with CVD are referred to the Center when necessary. They will also support teaching and accreditation efforts to create a cadre of cardiologists and other specialized Rwandan providers.

The Center is also negotiating with the government on several funding opportunities. So far, they have secured a land grant in East Kigali to begin construction. They are working to receive subsidized rates on pharmaceuticals used to treat CVD and its risk factors, as well as grants and tax incentives for educational and public health initiatives. Lastly, the government will provide funding to pay for care of many of the low-income patients the Center will treat.

## Insurance Providers

The second major class of partners are insurance providers. The Center will need to work with insurance providers to agree upon a level of reimbursement for cardiac services according to the amount of pooled funds and benefit packages of each plan. Payments from these providers will form the majority of the center’s revenues. Informal verbal conversations with several insurance providers have been promising for future collaboration.

Currently, 84% of Rwanda’s population is covered by some kind of insurance scheme. Most of Rwanda’s population (81%) are covered through national Community Based Health Insurance (CBHI), Mutuelle de Sante. This voluntary government-sponsored scheme provides basic services with low premiums to families throughout Rwanda, including those who are unemployed or work in the informal sector. The majority of CBHI beneficiaries are low-income. Funding for CBHI comes from member premiums as well as government subsidies and external grants. While CBHI funds will not be sufficient to cover the entire cost of cardiac treatment, CBHI will reimburse the Center for a small proportion of the costs of treating each patient, most of whom will be low-income RHD patients.

The second main insurance scheme is RAMA, which covers 2.5% of the population. RAMA is a government-sponsored social health insurance scheme offered to employees in the formal sector, both private and public. Premiums are paid for primarily through payroll contributions. Other private and public insurance schemes make up less than 1% of the insurance market in Rwanda, while 16% are uninsured. RAMA and other specialized insurance schemes currently pay for international travel to South Africa, India or Saudi Arabia for some health services, including cardiac care. There is a strong incentive on the part of these companies to work with Team Heart to develop an alternative to save costs on international travel for health care. Team Heart is negotiating with these companies on a cost structure that will reimburse the Center for the cost of care.

**Figure 1: Rwandan by Insurance Scheme, 2015**

## Narayana Health

Although Team Heart has created long-term strategies to ensure the sustainability of CCCE, having immediate help will be crucial to get the Center up and running. With this in mind, the Center is partnering with Narayana Health for the initial stages of development. Narayana Health is a network of multispecialty hospitals across India. Narayana Health has been successful in opening hospitals with the mission of delivering high-quality, affordable healthcare while also being able to scale its model to serve a wide patient population.

For this reason, Narayana will contract with Team Heart to provide much of the initial critical staffing to establish the Cardiac Center. This comprehensive package will include clinical staff, management, and administration. As Rwanda currently lacks the specialized human resources to deliver cardiac care, this partnership will be necessary in the early years of the Center as Team Heart and other partners work to increase the level of trained human resources in the country. As domestic human resources become available, Narayana will gradually hand over full operations to in-country staff according to a detailed handover plan.

## Other Partnerships

In order to achieve its long term education and training goals, the Center also plans to pursue a partnership with the University of Rwanda College of Medicine and Health Services (UR-CMHS) and non-governmental organizations to train local cardiac surgeons and other health care providers in order to increase the capacity of CCCE. In addition, collaboration with Rwanda Biomedical Center (RBC), UR-CHMS, and other institutions worldwide will be important in order to create research and development strategies to advance knowledge in the field specific to Rwanda. These partnerships will help provide continuous medical talent, which will ensure the Center maintains a long-term capacity to serve its patients. Lastly, a partnership with Brandeis University in Massachusetts has resulted in a health systems analysis, financial analysis and the foundational work to develop the business plan for the Center.

## Competitors

Currently, there is no permanent facility within Rwanda to provide cardiac care. There are only four trained cardiac specialists in the country, none of whom are trained to provide surgery. International teams, such as Team Heart, provide care within the country on an ad hoc basis. To date more than 400 patients have received care from these teams. All funding for these services is provided through grants and fundraising from the organizations themselves with accommodation support from the Ministry of Health.

In other cases, patients seek care abroad. Their choice of facility is limited as there are only a few cardiac centers on the African continent. One study found that there is only one center per every 33 million patients in sub-Saharan Africa[[6]](#footnote-6). There is no official record-keeping of the number of Rwandan cardiac patients that receive care abroad, but experts estimate it is as many as 100 per year. Most of these are middle to upper income individuals who seek care at their own cost. Approximately 30 to 40 adults receive care abroad at the cost of the government or NGOs each year. The Rwandan Referral Board, a government agency, reviews cases and approves a select number of patients each year to be sent abroad for treatment. For those few patients whose insurance plans pay for treatment, patients must pay for airfare themselves, but are reimbursed for the cost of treatment, room and board. Stakeholders estimate the cost of seeking care abroad can range from $10,000 to $40,000 per patient.

Between 20 and 40 RHD patients annually also receive care abroad from NGOs. About half of these patients are sent to the Salaam Centre in Khartoum, Sudan, a pediatric surgery center sponsored by the Italian NGO, Emergency. While the Salaam Centre has made an agreement with the Government of Rwanda to care for up to 30 patients annually with no fee, the actual number has been much lower in recent years. Emergency requires that any patient sent to their facility be accompanied by a physician, a requirement Rwanda is often unable to meet due to limited human resources. Approximately 10 pediatric RHD patients a year also receive care in Israel, thanks to Save the Children.

Currently, there is no data on the number of Rwandan patients that seek cardiac catheterization services abroad, but the numbers are thought to be low. Currently patients seeking such services are likely to go abroad to countries such as South Africa or India for care. A 2015 report surveying private sector insurance plans found that the average cost of cardiac catheterization in South Africa was $2,596, a comparable price to what the Center aims to charge. For cardiac bypass surgery, the average cost ranged from $9,800 in India, to $18,501 in South Africa to $78,318 in the United States[[7]](#footnote-7),[[8]](#footnote-8).

The dental health field, which is a major need for cardiac patients, also has little to no competition in Rwanda. As of 2010 there were only 1.2 dentistry personnel per 100,000 population, approximately 123 dental care workers to serve the entire country[[9]](#footnote-9). This leaves most Rwandans with unmet dental health needs.

## Competitive Advantage

CCCE is uniquely positioned to capitalize on the current market opportunity and meet the unmet needs of the many Rwandans suffering from CVDs. As one of few fully equipped, permanent cardiac center in East Africa, this center will have greater access to patients and provide a better value than any current competitors. The center is being designed with sustainability in mind so as to provide consistent reliable care for Rwandans suffering from CVD. As an academic hub, the Center will help train and recruit Rwandan and expatriate health workers who are specialized in cardiac care. Because there are no true competitors in its geographic area, CCCE will have flexibility in determining a pricing model for its services that facilitates the broadest possible access to care, while ensuring financial longevity of the Center.

# MARKET ANALYSIS

## Cardiovascular Disease

The burden of cardiovascular disease in Rwanda is high, accounting for 15% of all deaths in the country. The two largest contributing CVDs that make up this rate are stroke (5.3%) and Ischemic Heart Disease (4.7%), followed by hypertensive disease (2%) and other unspecified cardiac disease (2%). Other diseases, including rheumatic heart disease make up less than 1% of the total cause of death from CVD3.

Stroke, the largest contributor, requires emergency treatment (typically less than four hours) to be effective. Because of the lack of strong transportation infrastructure in Rwanda, providing this care at one centralized center is not an effective clinical strategy. For that reason the CCCE will not focus on stroke treatment as part of its initial package of services.

Ischemic Heart Disease (IHD) causes damage to the arteries due to factors such as smoking, diets high in fats and/or sugar, and high blood pressure. When IHD is discovered, it requires medical or surgical intervention and regular follow-up. A high proportion of IHD cases are not fatal, but still benefit from intervention. Hypertensive disease can lead to heart failure, IHD, stroke, peripheral vascular disease, pulmonary disease and more. It requires diagnosis for both acute and chronic episodes, as well as normal medical care. Both IHD and hypertensive disease can generally be treated through cardiac catheterization, and in more severe cases, with cardiac surgery. U.S. epidemiological studies show a 3:1 ratio of treatment for these populations of catheter to surgical treatment[[10]](#footnote-10).

The prevalence of adult valvular disease in Rwanda is unknown, likely because this disease is hidden within other causes. Valvular disease can lead to other diseases, such as IHD, pulmonary hypertension and hypertensive disease. Cases of adult valvular disease increase with age and can cause significant morbidity. Care for the disease is usually non-emergent surgical procedures as well as medical management.

Rheumatic heart disease (RHD) is caused by complications due to rheumatic fever, which often occurs from untreated group A streptococcus bacterial infections, such as strep throat or scarlet fever. RHD patients must be treated with chronic medical management. When RHD goes unmanaged, surgery is required. In some cases surgical intervention can be done via catheterization, but those with an advanced degree of heart damage require full cardiac surgery. Without these interventions, advanced RHD is fatal.

Congenital heart disease (CHD) are heart defects that occur since birth, generally due to genetic causes. CHD is positively associated with Down syndrome, use of alcohol or drugs during pregnancy, or viral infections that occur during pregnancy. CHDs are a frequent cause of infant death.

Many studies have documented a link between cardiovascular disease and oral health. Periodontal disease has been shown to be a risk factor for cardiovascular disease. Experience in Rwanda also shows that most of the advanced cardiac patients in need of services also present with serious oral health issues. For safety reasons, all cardiac care patients need to receive a dental health clearance before preceding to surgery or catheterization.

## The Rwandan Market

The fact that 14% of deaths in Rwanda are due CVD corresponds to approximately 1.7 million patients out of the total current population of 11.5 million who require cardiac care. As the Rwandan population is currently relatively young, with 52% of the population under the age of 20 year old, these numbers are only likely to grow as the population ages. The below table summarizes the total available market for CVD treatment in Rwanda and the Center’s target market in its first year of operations.

*Rheumatic Heart Disease:*

RHD, while only reported as 0.26% of the overall burden of disease in Rwanda, is considered to be seriously underreported. A recent study performed by researchers affiliated with Team Heart found 17 cases of RHD out of a sample of 2,501 school-aged children, all of whom were previously undiagnosed. This corresponds to an RHD prevalence of 6.8/1,000, which would mean there are approximately 26,527 children under the age of 18 in Rwanda with RHD[[11]](#footnote-11). Of these children, Team Heart estimates that 2,635 require cardiac surgery. Currently in Rwanda there is a waitlist for cardiac surgery, estimated by care givers, of 1,000 patients. This means that another estimated 1,635 children with RHD are undiscovered, pointing to a need for broad-based community screening.

Despite a need for cardiac surgery, Rwanda has no domestic capacity to provide it. Several international surgical teams visit Rwanda each year to focus on surgery, but only have an annual capacity of 50-75 surgeries a year, with a total of 409 total recorded surgeries completed. This gap in demand has led to a 3 to 5 year waiting time for children on the list for surgery. Children on the wait list are most often severe cases in an outpatient setting and face high mortality rates.

*Ischemic Heart Disease and Valvular Disease:*

3,154 patients die each year from IHD in Rwanda according to global burden of disease data. Many of these deaths could have been prevented through acute management, such as cardiac catheterization or surgical procedures. According to the literature, there is an average catheterization to surgery ratio of 3:1 in comparable countries, meaning that 2,366 patients could be saved each year through emergency catheterization, while 789 could be saved through surgery. While difficult to estimate, another proportion of those suffering from IHD who are not at high risk of death, would benefit from elective catheterization. Lastly, there is an unknown number of adults in Rwanda with other CVD disorders, such as adult valvular disease, who require full heart valve replacements. These adults would form an additional pool of likely surgical patients at the center.

*Congenital Heart Disease:*

No studies gave been done to estimate the exact prevalence of congenital heart disease in Rwanda, but globally, CHD averages at about 1% of all births. For Rwanda, this rate would equate to about 3,800 infants born annually with CHD. About 25% of these infants, or 950, will have critical forms of CHD and need surgery within their first year of life[[12]](#footnote-12). These patients will form the core of the Center’s pediatric patients.

*Market Segmentation:*

In order to estimate the number of patients that the Center can afford to treat, we estimated the likely number of individuals needing care that belong to various market segments. As of 2015, 81.2% of the population fell under the CBHI insurance plan while 3.2% fell under RAMA or other plans. As RAMA and other plans only cover formally employed workers, members are all adults and tend to be higher income. Therefore no adolescent RHD patients were assumed to fall under those plans. As RAMA and other insurance plans will be able to contribute a higher amount towards the cost of care, marketing services to these patients will be a key strategy to ensure the Center generates enough service revenue.

**Table 1: The market for cardiac care services in Rwanda**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Disease | Required Treatment | Total number needing care | Potential market with CBHI insurance | Potential market with RAMA/ other insurance |
| Rheumatic Heart Disease | Cardiac Surgery | 2,635 | 2,140 | 0 |
| Ischemic Heart Disease | Cardiac catheterization | 2,366 | 1,921 | 77 |
| Adult cardiac surgery | 789 | 640 | 25 |
| Congenital Heart Disease | Pediatric cardiac surgery | 950 | 771 | 30 |
| Total patients |  | 10,136 | 8,230 | 240 |

## The Regional Market

In addition to its significant domestic need, Rwanda is in an ideal location to receive medical tourists from neighboring East African countries with high rates of CVDs. Uganda and the Democratic Republic of the Congo have a mortality rate from CVDs of 12%, followed by Kenya (11%), Tanzania (10%), and Burundi (9%). Currently there are limited facilities to access cardiac care in Kenya and Tanzania, but not in any of the other mentioned countries. Citizens of these countries also most pursue care abroad. In 2015, East Africans spent almost $1 billion seeking medical care in India[[13]](#footnote-13). In a study looking specifically at medical tourism in India, the two biggest reasons for choosing India were the low cost and the perceived high quality of care[[14]](#footnote-14). An estimated 100,000 medical tourists from Kenya travel abroad each year due to lack of proper facilities in Kenya.

The large burden of disease across East Africa is a potential growth market for the Cardiac Center. If the Center can market its services to just 2% of CVD patients in East Africa and increase its level of staffing accordingly, it could add another RHD surgery per day as well as more potential IHD patients than it could feasibly accommodate in a year. Table 3, below, summarizes the number of potential CVD patients in East Africa.

**Table 2: Annual Deaths due to CVD in East Africa**

|  |  |  |  |
| --- | --- | --- | --- |
| Country | All CVD | IHD | RHD |
| Burundi | 15,818 | 4,548 | 328 |
| DRC | 100,812 | 31,133 | 2,754 |
| Kenya | 32,576 | 8,517 | 532 |
| Tanzania | 56,997 | 21,145 | 834 |
| Uganda | 36,101 | 24,937 | 328 |
| South Sudan | 15,684 | 4,908 | 307 |
| Total | 257,998 | 100,098 | 5,355 |

The potential East Africa market that the Cardiac Center aims to target was estimated for each service at two percent of the total number of individuals needing care.

**Table 3: Target CVD Market in East Africa**

|  |  |  |  |
| --- | --- | --- | --- |
| Disease | Required Treatment | Total number needing care | Target market (2% of total) |
| Rheumatic Heart Disease | Cardiac surgery | 5,355 | 107 |
| Ischemic Heart Disease | Cardiac catheterization | 114,714 | 2,294 |
| Cardiac surgery | 19,119 | 382 |

Rwanda is a central location to become a hub for East African medical tourism and is thought to be the most competitive market in East Africa by the World Economic Forum (WEF). It has attracted more new foreign investments than its neighboring countries[[15]](#footnote-15). Rwanda has the potential to tap into the regional market by offering cardiac care at a reasonable cost with high-level trained practitioners in a quality cardiac center. As part of its growth plan, the Center plans to increasingly market services to international patients as an additional source of revenue. International marketing efforts will begin in year one and expand thereafter.

## Projected Capacity

Based on staff capacity and market availability, the Cardiac Center projects service provision will follow the table below. Services will gradually increase throughout the first five years of operations. As the Center hires more staff, it will also work with partners to strengthen referral pathways and increase patient knowledge about CVD in order to generate greater demand for services. Given a 260-day working year, the center will treat an average of 1.5 adult and adolescent surgeries per day in year one and 2.5 in year two and 3.5 in year three. During year one, the center will not conduct any pediatric surgeries with its own staff, but will provide space to visiting NGO teams to provide up to 30 surgeries. By year two, they will hire pediatric specialists to begin treating a greater number of pediatric cases. In years four and five, the Center aims to provide 4.5 surgeries per day.

This level of service provision will satisfied by the existing market in Rwanda and other East African countries. As the total Rwandan population covered by RAMA insurance is quite small, only a small proportion of the total number of surgeries will be utilized by the RAMA pool. The remaining cases are assumed to have CBHI insurance.`

Based on staff capacity and projected marketing outreach, the Center will be able to attract and accommodate two catheterization procedures daily in year one, corresponding to 520 annually. As marketing efforts accelerate, they will gradually ramp up to three per day in year two, four in year three, six in year four and eight in year five. For catheterization services, the Center will strive to achieve a patient mix that sees the maximum number of paying patients possible (RAMA/other insured and international). Because of the difficulty in marketing catheterization services internationally, the Center expects to begin seeing international catheterization patients in year two. This level of service provision is summarized in the table below for each service and market segment.

**Table 4: Schedule of Service Provision Years 1 to 5**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| Surgery (all segments) | **420** | **650** | **910** | **1,170** | **1,170** |
| Surgery RAMA/other | 30 | 30 | 30 | 30 | 30 |
| Surgery CBHI (adult/adolescent) | 260 | 260 | 390 | 520 | 520 |
| Surgery CBHI (pediatric) | 30 | 130 | 130 | 130 | 130 |
| Surgery International | 100 | 230 | 360 | 490 | 490 |
| Catheterization (all segments) | **520** | **780** | **1,040** | **1,300** | **1,560** |
| Cath RAMA/other | 90 | 90 | 90 | 90 | 90 |
| Cath International | 0 | 150 | 250 | 400 | 550 |
| Cath CBHI | 430 | 540 | 700 | 810 | 920 |
| Total patients (cath and surgical) | **910** | **1,300** | **1,080** | **2,340** | **2,600** |

# MARKETING STRATEGY

As part of its mission, the Center and the Government of Rwanda will collaborate on broader public health initiatives to increase awareness of the services available, as well build existing referral infrastructure in Rwanda. In the initial years of the Center’s operations it will focus on building a market within Rwanda. By the end of year one, the Center will increase marketing services towards the broader East African population. As part of a long-term growth plan, the Center will gradually expand marketing efforts international markets. The initial marketing strategy has four main objectives, the first two of which will be led by the Government of Rwanda:

(1) Strengthen community health programs to raise awareness on cardiac disease in Rwanda

(2) Acquire new Rwandan patients through a streamlined referral pathway

(3) Attract new human resources to train and work at the Center for Excellence

(4) Acquire new international patients through partnerships and outreach across East Africa

## Strengthening Community Health Programs

At the core of Team Heart’s mission is the goal to improve the cardiac health of individuals and communities. Although the Cardiac Center will be able to provide advanced cardiac care to patients who need it, Team Heart recognizes the importance of population health and the critical role that preventive health measures play in keeping communities healthy. From a business perspective, increased awareness around cardiac disease also provides an opportunity to bring more patients into the Cardiac Center who might not otherwise have received treatment.

In order to increase patient awareness about cardiac disease, the Government of Rwanda will participate in community engagement campaigns to raise awareness about cardiac health. In partnership with Team Heart, they will also train community health workers to be public educators and advocates for cardiac health so that they can identify heart disease and act as the first step in a referral chain. Once identified by a community health worker, patients can go to their community health center and access referral pathways to receive appropriate care. Community health workers will be trained on how to stay heart-healthy, symptoms and signs of a heart attack, and the importance of antibiotic treatment for strep throat infections to prevent RHD.

## Streamlining Referral Pathways

In order to ensure patients with CVD are being identified, diagnosed and referred to the Cardiac Center in a timely manner, the Center will work with the Government to create a direct referral pathway between rural health centers and the Center itself. In order to achieve this, the Center and its partners must simultaneously work on three strategies. First, providers must be trained on which types of cardiac cases require emergent attention and referral to a diagnostic center and which can be managed at lower level facilities. Next, they must be educated on the Cardiac Center and what services it provides. Finally, the Government must invest in transportation infrastructure within Rwanda so that patients from around the country that require emergency care can be transported quickly and safely to the Cardiac Center.

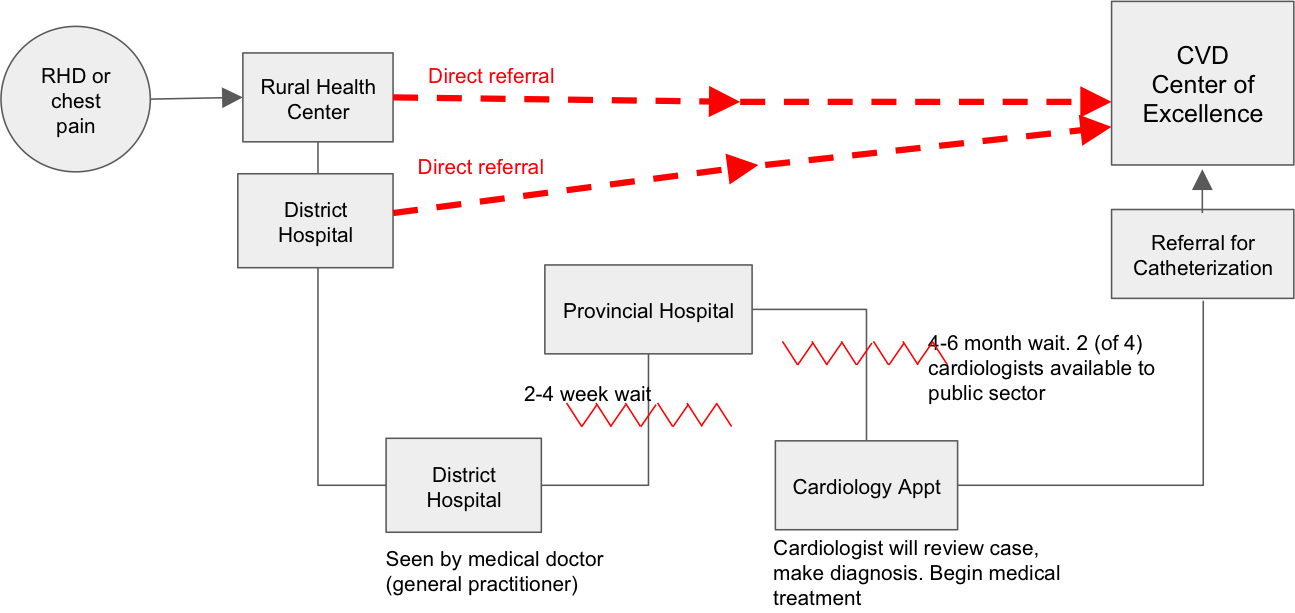
The current and newly proposed referral pathways for cardiac care in Rwanda are displayed in the figure below. In the current system, a patient with a health problem visits their rural health center, where they are seen by a nurse or community health worker. If their medical problem requires further evaluation, they are referred to a district hospital, where they may see a medical doctor. From there, if the patient requires a higher level of care, the physicians from the district hospital will refer the patient to a provincial referral hospital. At this juncture, it can take approximately two to four weeks to obtain an appointment. Once the patient has reached the provincial hospital, they are put on a list to see a cardiologist, who will evaluate and diagnose them with heart disease with an echocardiography machine. Patients typically wait four to six months to see a cardiologist, as there are only four cardiologists available in the whole of Rwanda, and only two in the public sector. After the patient has been seen by the cardiologist, they will receive a diagnosis and begin treatment.

Since there are only six provincial hospitals in the country, some patients travel up to four hours to seek care. Once there, most patients with CBHI insurance can expect to pay a copay of 10% of the projected cost. There is no banking structure in place for patients, and many of the poorest may turn to loans from private lenders to fund their treatment, which often charge exploitative interest rates. Furthermore, the time and resources it takes to visit facilities multiple times on the path to referral results in patients dropping off along the referral chain before diagnosis.

Not only does the current referral pathway result in long wait times and high transactional costs, it also only addresses RHD and not other types of cardiac issues, such as acute coronary disease. Without a clear referral pathway to treat other acute cardiac problems, many of these patients may die. Those patients that do receive treatment for RHD do so only after navigating a complex system full of delays and potentially prohibitive costs.

In the new model, a patient will present to a rural health center where nurses and community health workers are trained on the signs of acute episodes of cardiac disease that require urgent referral. If deemed acute, the patient will receive a direct referral and immediate transportation to CCCE. There, the acute episode will be treated. If the patient does not require emergency treatment, but instead has chronic, but significant, cardiac disease, they will receive a delayed referral to the Center. According to a protocol being jointly developed by the Ministry of Health and Team Heart, some non-emergency cases may be evaluated by physicians at district and provincial hospitals before making it to the Center for care. Integrated programs within the Center will work with patients to arrange for transportation, payment/insurance counseling, and guesthouse services in anticipation of patient arrival. Follow-up will be provided through integrated tertiary and community health center programs.

**Figure 2: Proposed Referral Map of Cardiac Center**



In order for this new referral pathway to succeed, the Cardiac Center and Government must work together to ensure there is sufficient provider knowledge and existing protocols for cardiac disease screening, diagnosis, and management at all facilities. They should also develop a patient database to track emerging trends in disease and share patient records between facilities. Lastly, they should ensure there is sufficient diagnosis equipment and skills at the provincial level.

## Acquiring Talent

In addition to marketing services to patients, the Cardiac Center also needs to attract a health workforce that can care for the cardiac needs of the Rwandan population over the long-term. As part of its strategy as a center of excellence, the Center aims to develop into a training institution that can develop future generations of Rwandan cardiac specialists. By year three of operations, the Center will partner with the Government to develop a two-year training program for cardiologists. Government-funded providers will train at the Center under expatriate professors and then undergo clinical rotations in provincial hospitals alongside existing cardiologists. In addition, Team Heart is currently supporting the costs of one Rwandan physicians to pursue advanced training in cardiac surgery in South Africa. When they return, they will be integrated into the functioning of the Cardiac Center. As the educational capacity of the Center develops, they will also train Rwandan nurses in cardiac care, including post-operative care.

## International Marketing

In order to solicit patients across East Africa, the Center will recruit and hire international marketing representatives, based in East African metropolitan centers, who will work on commission. These representatives will liaise with foreign Ministries of Health, private hospitals and insurance companies to promote the Center and solicit referrals.

The Center will also conduct a series of marketing campaigns through radio, TV and billboard advertising to promote the Center. These campaigns will seek to funnel customers to visit the Center’s website, which will have information on services offered, pricing for foreign patients and scheduling appointments.

## Pricing

Costs of services at the Center will be negotiated for a fixed cost according to individuals and insurance companies’ abilities to pay and the overall financial needs of the Center. Team Heart will negotiate with MoH and insurance companies about the appropriate level of reimbursement that they can provide to the Center for care. RAMA and privately insured patients could be charged a higher fee as they are a larger pool of funds and a more generous benefits package. CBHI patients, the majority of whom are low income, will be charged a reduced fee and no copay. Service revenue from RAMA-insured and international patients could be pooled to subsidize the cost of CBHI patients. Pricing will include a flat fee reimbursement for the cost of service, including pre-operative consultations, imaging, diagnostics and operation, as well as an additional daily rate charge based on the patient’s length of stay.

# FUNDRAISING PLAN

Team Heart is reaching out to the Government of Rwanda and multiple institutional and individual donors to help make the Cardiac Center a reality. So far, the Government of Rwanda has donated a large tract of land to the center, valued at $500,000. An estimated $3.5 million has also been committed from individuals. Multiple institutional donors have committed to provide in-kind donations in the form of costly medical equipment or discounted pharmaceuticals and medical supplies. About $30,000 has been acquired from private sector institutions. In addition, nearly all of Team Heart’s current $500,000 operating budget will be redirected to the Cardiac Center.

# IMPLEMENTATION AND DEVELOPMENT

## Underlying Goals

Team Heart has identified five critical needs to strengthen the health system for cardiac care in Rwanda which will drive its overall operational plan:

1. Leadership and partnerships with Government agencies to promote awareness, accessibility, and affordability of cardiac care. Team Heart has the opportunity to drive the national strategy on cardiac care through its innovative business model and key partnerships.
2. High quality cardiac care, including surgical care. Team Heart must overcome a current lack of human resources, medical technology, accreditation, and dedicated space for cardiac care.
3. An insurance or payment scheme to pay for the high cost of tertiary care. In partnership with Government and private insurance companies, Team Heart has an opportunity to establish a payment model that will cover the costs of cardiac care in the short-term while strengthening primary care to lower costs in the long-term.
4. Clinical trials as well as research and development to collect data about CVD in Rwanda. Team Heart will partner with stakeholders and investors for research and development with the aim of becoming a regional hub for high quality research and development.
5. A national registry to track patients with cardiac disease. Team Heart can partner with on-going initiatives and help in the development of this national registry.

## CCCE Operations

Initial priorities in the new CCCE will address many of Rwanda’s core needs. Within the first few years, the Center will focus on the hiring and training of staff, the formation of partnerships with the government and other stakeholders, the design of an affordable insurance scheme, the development of the Center’s education and training capacities, and the development of a national CVD registry. They will also engage in broader health systems strengthening efforts that streamline referral systems and ensure a steady supply of patients. During the first five years of operations, the clinical focus of the Center will be on the treatment of rheumatic fever and heart disease, congenital heart disease, coronary artery disease, chronic heart block and trauma. As the Center becomes more established, it will be able to expand its scope of services.

In order to provide clinical services in the first five years, the Center will start out with an outpatient clinic, a catheterization lab, laboratory and imaging space, two operating rooms, an ICU, and an inpatient ward serving pre-operative, step-down, and readmitted patients. By year three, the center will add a third operating room. The number of ICU and other inpatient beds will gradually increase each year, according to the table outlined below.

**Table 5: Number of Beds by Unit and Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| ICU | 5 | 8 | 11 | 14 | 14 |
| Step-down unit | 11 | 18 | 25 | 32 | 32 |
| General (pre-operative, readmissions and surplus) | 6 | 11 | 17 | 19 | 22 |
| Total beds | 22 | 37 | 53 | 65 | 68 |

## Staffing

As part of its comprehensive contract, Narayana Health will provide much of the specialized workforce, administration and management to run the Center during the first five years. After that point, Narayana and Team Heart will jointly develop a detailed handover plan with consultation from the government in order to gradually transfer responsibilities as the Rwandan workforce develops enough to take over clinical positions. By year three, the Center aims to have established a training program for Rwandan cardiac specialists which will serve as a talent pipeline for the center. In addition, Team Heart will support training initiatives for staff to enhance knowledge around cardiovascular therapy and support skills. It will be imperative for this training to reach the provincial and district hospitals such that diagnosis and follow-up care can be provided in these centers.

The complete listing of staff cadres needed to staff the Center are summarized in the below table, including those staff who will be hired by Narayana Health.

**Table 6: Staffing Cadres**

|  |  |  |  |
| --- | --- | --- | --- |
| Senior Management | Physicians | Other Clinical | Non-clinical Support Staff |
| * Chief Executive Officer * Chief Financial Officer * Chief Medical Officer * Chief Nursing Officer * Human Resources Manager * Infectious Disease Specialist * Quality Control Officer * Environmental Services Manager | * Cardiothoracic surgeons (adult and pediatric) * Cardiologists * Anesthesiologists * Perfusionists * Intensivists * Hospitalists * Radiologists | * Nurses (OR, ICU, and general) * Catheterization technicians * Anesthetist Technicians * Radiologist Technicians * Sonographers Dietician * Physiotherapist * Dentist * Dental Hygienist * Clinical Psychologist * Laboratory Staff * Pharmacist | * Biomedical Engineers * Maintenance Staff * Social Worker * Receptionists/ secretaries * Phone operators * IT staff * Marketing staff * Accountants/ billing staff * Housekeepers * Cafeteria staff * Transport staff |

The number and mix of providers to staff the center was determined using accepted minimum staffing ratios from the United States. As all inpatient units (ICU, step-down and other) require round-the-clock staffing, the required number of staff were multiplied by four to allow for three shifts a day, plus coverage for weekends, sick leave and holidays. Staff in the operating room, catheterization lab, and outpatient unit will only work Monday through Friday during the day. Staffing needs per unit and per patient are listed in the table below.

**Table 7: Minimum Staffing Ratios per Room**

|  |  |  |  |
| --- | --- | --- | --- |
| Unit | Physicians | Nurses/techs | |
| Operating room | 2 surgeons, 1 perfusionist, 1 anesthesiologist per operation | | 2 nurses per patient |
| Catheterization Lab | 1 Cardiologist per patient | | 2 cath techs, 1 radiologist tech per patient |
| ICU | 1 Intensivist per 12 patients | | 1 nurse per 1.5 patients |
| Step-down unit | 1 Hospitalist per 15 patients | | 1 nurse per 3 patients |
| Hospital Inpatient | 1 nurse per 4 patients |
| Hospital outpatient | 1 cardiologist per 10 patients | | 1 nurse per 5 patients |

As part of its commitment to health systems strengthening, CCCE will gradually increase the level of Rwandan staffing and decrease the number of expatriates as specialized Rwandan providers are trained and can be hired. The table below lays out the percent of Rwanda and expatriate staff to be hired in each cadre in years 1 and 5.

**Table 8: Staff by Nationality, Years 1 and 5**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Total Year 1 | Year 1 Rwandan | Year 1 Expat | Total Year 5 | Year 5 Rwandan | Year 5 Expat |
| Top Management | 8 | 62% | 38% | 9 | 67% | 33% |
| Physicians | 17 | 18% | 82% | 42 | 48% | 52% |
| Other Clinical | 57 | 84% | 16% | 141 | 91% | 9% |
| Support (non-clinical) | 48 | 92% | 8% | 61 | 87% | 13% |
| Total Staff | 129 | 77% | 23% | 253 | 82% | 18% |

## Progress to Date

Team Heart has been active in pursuing its goals to create CCCE. In August of 2014, they signed a Memorandum of Understanding with the Government of Rwanda which established the intention of building the Center. The Government provided a large land grant to Team Heart in East Kigali for its creation, with a letter that guarantees a 99-year lease for $1 per year. Team Heart has also hired architects who have completed a concept drawing of the building. In February of 2015, Team Heart commissioned a study to establish the financing model for the hospital, finalized the location for the Center, formalized the board, drafted a mission statement, and launched a capital campaign. Preliminary conversations with donors have promised an estimated $3.5 million in individual donations.

In 2018 and beyond, Team Heart is working to get formal commitments from the Government of Rwanda, secure full funding for construction and furnishing, hire the management team and finalize architectural plans. In 2019, building is projected to begin and key positions will be trained or recruited abroad. The marketing campaign within the country and tourism marketing will also begin. Finally, nurses and other key staff will be recruited.

**Figure 3: Initial Design of the Cardiac Care Center of Excellence**



## Long-Term Growth Plan

As part of its long-term goals, the Center aims to expand its portfolio into broader treatment and health systems strengthening efforts. After year five the clinical focus of the Center will expand to include cardiac death, severe heart failure, cardiac aneurysm and complex congenital surgical care. As it expands clinically, the Center will also continue training more providers within the center and at the primary care level. In the initial state of the Center, diagnosis will rely on patients traveling to the Center in order to access diagnostic tools such as the echocardiography lab, the electrocardiography lab, and the radiology department. However, Team Heart envisions a future state in which remote diagnosis may be possible from referral or provincial hospitals, district hospitals, and hospitals in surrounding countries.

As the Center gradually scales up operations, it will increase marketing and outreach efforts across Africa so as to be able to treat more patients who can pay the full cost of services. This new revenue stream will provide a pool of funds that can subsidize Rwandan patients. In addition, the Center hopes to gradually scale up research activities to become a center of knowledge around CVD regionally.

## Evaluating Our Impact

Through establishing its Center of Excellence, Team Heart will have a major impact in reducing the mortality and morbidity of CVD. Initial staffing will include a full-time Rwandan quality assurance officer who will be responsible for insuring that the Center provides the highest quality care and that overall operations are contributing the Center’s mission and goals. Key metrics will be used to evaluate impact and performance of the Center. Major outcome indicators will include the number of Rwandan health care providers trained, the number of patients treated, the number of surgeries performed, the number of NGO surgeons who have practiced there, and the reduction in mortality and morbidity due to rheumatic heart disease and cardiovascular heart disease. Other metrics will include the number of internships, the number of patients referred from district hospitals, the number of educational events, the types of clinical studies conducted, the reduction in health care dollars spent out of Rwanda on cardiac care, and the increase in health care dollars spent in Rwanda on cardiac care from foreign nationals.

# FINANCIALS

The full financial model for the cardiac center is explained in detail in the financial statements in the attachments, which include an income statement, balance sheet, and cash budget.

## Revenues

CCCE will be funded as a public-private partnership. Some of the financing for the hospital will come directly from the Rwanda government and Rwanda insurance organizations. Private financing will come from individual and institutional donors. Team Heart has launched a capital campaign that started in early 2017 and has been focusing on raising funds to build and furnish the hospital. Medical equipment and furniture will largely be secured as in-kind donations. Approximately $5.6 million is needed to fund construction of the Center. Another $5 million in grants or loans will be needed leading up to year one in order to provide sufficient cash to cover the expected shortfall in service revenue during the first several years, before the Center becomes self-sustaining.

Other financial inputs to the Center include grants, fee-for-service revenue from insurance providers and out-of-pocket payments. Insurance reimbursements from CBHI, RAMA and other insurers will cover the direct costs of treatment for catheterization and surgeries, as well as a portion of the many indirect costs of running the hospital. Private payments from international patients will also be a central revenue stream, as they will be charged a premium for services in order to subsidize the care of lower income patients. Finally, service revenue from the dentistry practice will be collected through a mixture of insurance reimbursements and small copayments.

Individual unit costs for each service were calculated by adding direct costs (disposable medical supplies, pharmaceuticals, lab and radiology variable costs) to the cost of an inpatient stay. The cost of an inpatient stay was calculated by dividing the total hospital overhead (labor, nonmedical supplies, utilities, marketing and other administrative costs) over the expected number of inpatient days each year to get the cost of one inpatient day. These calculations assumed that surgical patients stayed on average 10 days, while catheterization patients (an outpatient service) stayed between half and a quarter of a day. According to these assumptions, the total cost of an inpatient day varied from year to year due to fluctuations in patient volume from $1,134 to $1,556. The average cost of an inpatient day over the five year period was $1,280.

Based on these calculations, the total cost of services (variable costs plus inpatient stay) ranged from $2,773 to $3,268 for catheterization and $18,127 to $22,344 for surgery over the five years. In order to ensure that the hospital can remain profitable, prices charged reflect the upper end of this range. In addition, prices charged to international patients were inflated in order to subsidize the cost of treating domestic patients. Services were preliminarily priced at $3,000 for catheterization, $20,000 for surgery, $150 for outpatient consultation and $100 for dentistry.

**Table 9: Summary of Average Prices for Services**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Surgery | Catheterization | Outpatient Consultation | Dentistry |
| Cost | $20,000 | $3,000 | $150 | $100 |

Service revenue was estimated as a lump-sum cost of treatment per patient, including all labs, diagnostics, dental screening and pre-operative and post-operative visits and consultations. Prices charged to payers was increased by 5 percent annually to account for inflation. The total revenue per service stream is summarized in the table below.

**Table 10: Summary of Revenue Streams**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| Surgical Revenue | $8,400,000 | $13,650,000 | $20,065,500 | $27,088,425 | $28,442,846 |
| Catheterization Revenue | $1,560,000 | $2,457,000 | $3,439,800 | $4,514,738 | $5,688,569 |
| Outpatient Revenue | $195,000 | $409,500 | $859,950 | $902,948 | $948,095 |
| Dentistry Revenue | $52,000 | $81,900 | $128,993 | $180,590 | $189,619 |
| Total | $10,207,000 | $16,598,400 | $24,494,243 | $32,686,700 | $35,269,129 |

The majority of the Center’s service revenue is from surgeries, the most expensive and staff-intensive service, while catheterization forms the second largest portion of revenue.

**Figure 4: Service Revenue by Stream, Year 1**

## Expenses

Major fixed costs for the Center include capital costs, personnel, medical disposables, nonmedical supplies, marketing, utilities and other costs. Costs for supplies and equipment were estimated based on available cost data from the U.S. Capital items will be depreciated using the straight-line depreciation method and are assumed to have a useful life of between 3 and 15 years with no salvage value. As all major equipment purchases come with a maintenance contract valid for the first five years, these costs were not included in this financial plan. Other maintenance for equipment will be handled in-house by a staff of Rwandan biomedical engineers, included in the staffing plan.

Personnel expenses include the hiring of 129 staff in year one plus 36 additional hires in year two, 48 in year three, 33 in year four and 6 in year 5. It is assumed that all full-time staff will receive fringe benefits consistent with the Rwandan system, including pension (3%), maternity (0.3%), and RAMA health insurance (7.5%). In addition, all employees will receive an annual 3% salary increase. These benefits will only be given to full-time employees. Domestic salaries were estimated using salary data from the Government of Rwanda for comparable positions. For expatriate positions, salaries were estimated using equivalent positions in Indian hospitals. Salaries for expatriates and local Rwandans are different in most cases, in order to reflect market rates for positions in respective countries of origin.

Lastly, utilities are another fixed cost. Costs for water was estimated based on the Government of Rwanda’s publically available utilities tariffs. Water needs were estimated based on the expected consumption per hospital bed based on averages published across Europe. As the Center will purchase solar panels and a water filtration system, water needs will be significantly decreased. As the center aims to be completely solar powered, electricity costs from the grid were assumed to be negligible and were not included in the financial model.

Variable expenses include medical supplies and disposables required for each type of procedure. Major costs in this category include heart valves, estimated at $3,000 per valve based on market averages and medical disposables per patient for surgical and catheterization procedures. Marketing costs were estimated at a flat 2% of overall expenses. Finally, an overall contingency fund of 2% of total non-personnel expenses was added to the budget to allow for any unanticipated expenses.

**Table 11: Operating Expense**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| Clinical Wage expense | $4,801,780 | $6,785,113 | $8,926,267 | $10,799,815 | $11,389,729 |
| Non-clinical Wage expense | $2,065,312 | $2,266,879 | $2,552,054 | $2,695,095 | $2,820,268 |
| Variable Medical supplies | $4,162,646 | $6,376,362 | $8,800,043 | $11,223,723 | $11,871,044 |
| Fixed supplies | $10,239 | $- | $10,239 | $- | $10,239 |
| Marketing | $204,140 | $331,968 | $489,885 | $653,734 | $705,383 |
| Utilities | $10,000 | $13,000 | $15,000 | $18,000 | $20,000 |
| Contingency/other | $197,393 | $301,174 | $414,172 | $526,781 | $565,865 |
| Total | $11,451,511 | $16,074,497 | $21,207,659 | $25,917,149 | $27,382,528 |

Operating expenses include all expenses other than purchases of capital items or depreciation. Wages are the largest portion of operating expenses, at 60% of total operating expense. Variable medical supplies (medical disposables, medical devices, pharmaceuticals, etc.) are the next biggest expense, at 36%.

**Figure 5: Operating Expense, Year 1**

The financing model shows minimal profits in years one and two and then increasing profits from years three onward.

**Figure 6: Net Operating Income, Years 1-5**

# MANAGEMENT TEAM

## Executive Team

Ceeya Patton-Bolman

Chip Bolman

Narayana Health

Chief Executive Officer

Chief Financial Officer

Chief Medical Officer

Chief Nursing Officer

Others To be determined

## Advisors

Other key people peripherally involved. Make sure there is some Rwandan representation and diversity of experience

* Diana Bowser
* Viren Shetty
* MoH representative
* Others To Be Determined

## Board of Directors

To be determined.

# ATTACHMENTS

## Financial Statements

See attached

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