**Executive Summary**

Rheumatic heart disease (RHD) has been practically eradicated in wealthy nations, but in the developing world the disease remains a major cause of morbidity and mortality, particularly in children and young adults. RHD is caused by untreated streptococcal infections. It is one of the few truly preventable chronic diseases if diagnosed at an early, clinically silent stage. With the Lusaka University Teaching Hospital (UTH) and the Ministry of Health in Zambia, we will screen children for silent RHD at public schools in the Lusaka area using echocardiography. The data will be entered into an electronic registry to document disease prevalence and monitor penicillin treatment of RHD patients. The Lusaka effort has been endorsed by the Pan-African Cardiology Society as a RHD demonstration site. This effort will raise awareness about strep throat, rheumatic fever and RHD and the importance of penicillin prophylaxis to prevent RHD-related morbidity and mortality.

**Program Overview**

**Objectives:** Working with Dr. John Musuku at UTH, as the Principal Investigator and the Ministry of Health, we plan to establish a community-based registry for children with RHD in Zambia. The goal of the study is to 1) document prevalence of the disease in school-age children, 2) raise awareness about strep throat, rheumatic fever and RHD, 3) provide primary and secondary penicillin prophylaxis; and 4) improve adherence to RHD treatment and prevention regimens.

**Plans:** The initial plan is to screen 3,000 children, ages 9-10, in 50 Lusaka-area public schools. Study protocols have been developed in collaboration with the Pan-African Cardiology Society (Drs. Bongani Mayosi and Mark Engel at Cape Town University). The screening will be carried out by Zambian healthcare staff using portable echo devices, in accordance with the international guidelines for echocardiographic diagnosis of RHD by the World Heart Federation (ref.1). The screening will be validated remotely at the MGH (by Dr. Michael Picard). The anticipated 1-2% RHD-positive children will be put on secondary prophylaxis of monthly intramuscular penicillin injections. Injectable benzathine penicillin G will be provided by Sandoz for the duration of the study. Records for RHD-positive children will be entered into an electronic registry, a cloud-based mobile clinical data-entry system. The registry will be developed for this project and made available to similar efforts by Dimagi, Inc., a US-based social enterprise that develops open-source software to improve healthcare in developing countries.

**Disease Pathogenesis**

![Figure 1: Pathogenic pathway for acute rheumatic fever (ARF) and rheumatic heart disease (RHD) (ref. 2). Clinical symptoms of ARF are illustrated by posters at Lusaka University Teaching Hospital (UTH) in Zambia.](image)

**Registry System**

![Figure 2: In Feb 2012, the World Heart Federation published evidence-based guidelines for echocardiographic diagnosis of clinically silent RHD (ref 1.). The use of portable echocardiographic devices allows screening of children in the community to address the problem of RHD in developing countries.](image)

![Figure 3: Currently, hospital patient records are paper-based and stored in a designated record room at UTH in Lusaka. To make data analysis and patient monitoring more efficient, we will introduce a cloud-based, mobile clinical data-entry system (electronic RHD registry).](image)

**Disease Diagnosis**

**Current Status and Next Steps**

- **The first phase of the community-based RHD effort has been initiated in October 2012 and will be carried out in 2013 and 2014. This initial effort covers development of the electronic RHD registry, echocardiography training of the Lusaka medical team, and screening of school-age children in the Lusaka area.**

- In December 2012, the Pan-African Cardiology Society has endorsed Lusaka as one of the RHD demonstration sites, similar to sites in South Africa, Ethiopia and Ghana. The plan is to use these sites in the future for the development of a Group A streptococcal vaccine.

- In addition to the community-based RHD effort in Zambia, Dr. John Musuku at UTH is also one of the investigators in the ongoing REMEDY study, a prospective, multi-national, multi-center study that aims to develop a hospital-based registry of children with RHD. The study is led by the University of Cape Town in South Africa and involves 16 countries, mostly in Africa.

- In a second phase II, the plan is to expand and scale up the screening, prevention and awareness programs. Based on the experience of the initial Lusaka-based effort we plan to rollout the RHD effort to Provinces across Zambia, with the ultimate goal of eliminating RHD in Zambia.

**References**