DrOTS: Bringing TB Care to Remote Communities in Nepal

Introduction

Tuberculosis has surpassed HIV/AIDS and Malaria as the leading infectious disease cause of death around the world. Annually, 10 million people get TB and 1 million people die of it. Tuberculosis (TB) is one of the most important health problem faced by people of Nepal. TB is the 4th leading cause of death and leading infectious disease cause of death in Nepal. Nepal is a high TB burden country with an estimated 44,000 new TB cases occurring annually. However, of the 44,000 annual cases, around 10,000 cases are missed from diagnosis and hence go untreated. Poor healthcare access is possibly the most important reason for the missed TB cases. Of Nepal's 28 million people, 22 million live in rural areas of which 13 million live in the hills and the mountains, where road transport is extremely poor and many areas are accessible only by foot. Whatever fragile road systems that exist in the rural areas are frequently damaged by earthquakes and landslides. As such, access to food, supplies, and healthcare is never assured. Under the United Nations Sustainable Development Goals (UNSDGs), the World Health Organization aims to eliminate TB globally by 2035. However, the existing TB control efforts in Nepal are majorly insufficient to achieve the global goals. Therefore, we propose a Drone Observed Therapy System (DrOTS) project based on innovative technology to improve TB care in remote and rural Nepal. Specifically, we will improve TB case detection through Active Case Finding (ACF) of TB, drone transport of specimens and supplies, and rapid molecular diagnostics, and improve TB treatment completion through electronic reminders and video curriculums. The DrOTS project will be carried out in three phases: 1) Design Phase, 2) Pilot Phase, and 3) DrOTS Implementation Phase. We consider beginning of each of the three phases as a separate milestone. At the end of the project, we will have generated crucial data and experience that will inform scale up of DrOTS across Nepal with support from international organizations including the Global Fund and World Bank. In this proposal, the SBU Global Health Institute request the Simons Foundation a funding in the amount of US$ 498,525 for the DrOTS project that could be disbursed at the above three milestones. We have described below the three phases of our DrOTS project proposal with accompanying budget.

Aims of DrOTS Project

1. Establish “On-Demand” Drone Service in the mountainous/hilly area: Availability of a drone service that includes an appropriately equipped and staffed base camp and a cadre of health workers who are able to request a drone when appropriate, manage the drone and related technology upon arrival, and launch the drone for its return flight.
2. Remotely Diagnose TB: The same cadre of health workers will be trained to recognize TB symptoms in people, explain to them the need for testing, and safely obtain quality sputum samples to be flown via drones for TB diagnosis with rapid molecular diagnostics.
3. Remotely Observe TB Therapy – By combining conventional health provider interaction and innovative technologies, we will monitor patients during their TB treatment for adverse drug reactions, ensure medication adherence, and assess trends in symptoms.

Progress Made To Date

Dr. Peter Small, MD, and Dr. Kunchok Dorjee, MD, PhD, have visited Nepal twice to initiate discussion on DrOTS with the leadership at Nick Simons Institute (NSI), the National TB Center (NTC), WHO Nepal, and other potential collaborators and interested parties including Save The Children Nepal, Birat Nepal Medical Trust (BNMT), Health Research and Social Development Forum (HERD)/International Organization of Migration (IOM), KNCV Nepal, and WeRobotics Nepal Flying Lab (NFL). Over a series of meetings and discussions, including online

communications, we saw a genuine interest and excitement about our project among stakeholders in Nepal. All parties unanimously justified the need for such an initiative as DrOTS given the overwhelming challenge posed by Nepal's difficult terrains towards delivery of healthcare. The previous head of National TB Program, Dr. Sharat C. Verma, MD expressed NTC's strong support for the project. Likewise, the leadership at the NSI comprised by Dr. Anil B. Shrestha, MD. Mr. Bikash Shrestha, and Dr. Kashim Shah, MD has expressed their support towards the project, felt that DrOTS is feasible, and saw its scope for improving other health conditions in the future in addition to TB. We see the DrOTS as a way for NSI to stay focused at the district level contemporaneously reaching deeper into the villages via community partnership. Over the last 6 months, we have successfully conveyed the concepts of DrOTS to our partners in Nepal resulting in a broad consensus among stakeholders that DrOTS is acceptable, applicable, and useful for improving TB care for the remote and rural Nepali people.

Inspiration from DrOTS Implementation in Madagascar

Stony Brook University's Global Health Institute and Centre ValBio–SBU affiliated facility in Madagascar–have successfully partnered with Vayu Inc. (Drone Manufacturer), Madagascar's government health officials, and Malagasy scientists to implement DrOTS in Madagascar. The DrOTS project in Madagascar is supported by the WHO TB REACH grant. All aspects of DrOTS project, including the drones, MERMs, and video-curriculums are being piloted now in Madagascar and we will apply the experience gained and lessons learned from Madagascar to improve the DrOTS experience in Nepal.

DrOTS Design Phase (Months 1-4)

Building up on the progress made, during the Design Phase of DrOTS project, we will further work on identifying our partners on the ground for the DrOTS project. Kunchok Dorjee, MD, PhD, DrOTS project lead for Nepal, will travel to Nepal to identify the partnership through an open, positive, and transparent approach after a holistic assessment of the ground reality including the implementing partner's relationship with the National TB Program and other stakeholders, presence in districts, organizational capacities, and level of interest. Dr. Peter Small, MD, will provide supervision throughout this process. We have identified few possible partnerships: 1) NSI and BNMT, 2) NSI and HERD/IOM, and 3) HERD/IOM. For all partnerships, we that see support from the NTP would be very important. Based on ground realities, we are open to adapt as well and at the end of the Design Phase of DrOTS, we will have finalized the implementing partner(s), pilot district for DrOTS, names of key people involved and will submit to the Simons Foundation a detailed plan for DrOTS implementation including these details.

Pilot Phase (Months 5-12)

The primary goal of the Pilot Phase of DrOTS project would be to launch the project and have the individual components of the project running. This would include having the drone imported and running, and having other components of the DrOTS project including the GeneXpert machine, MERMs, and the video-curricula set up and running. Included into this phase is procurement of the necessary supplies, hiring of the cadre of health-workers for the project, and providing training to them regarding conducting Active Case Finding of TB in the villages, obtaining and packaging sputa samples from TB suspects, management of drones for transport of specimens and supplies, and monitoring of TB cases using MERMs and instructional videos. TB patients will be diagnosed and cared for during the Pilot Phase of the DrOTS project. We envision the project to span for a year from Jan-Dec 2018 and a US graduate with an MPH degree will run the project on the ground in Nepal. Dr. Dorjee will spend time on the ground during the launch and piloting of the project and will then periodically go to Nepal to help with

project and provide technical help on all aspects of setting up and successful running of the DrOTS project.

DrOTS Implementation Phase (Months 13-24)

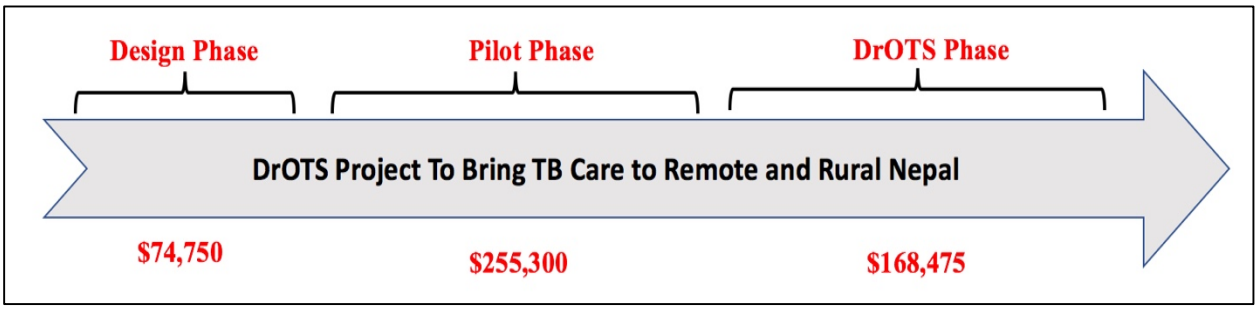
We envision full integration of the DrOTS project into the diagnostic and treatment framework of the National TB Program during the DrOTS implementation phase. DrOTS will become a part of the rural health system to provide and improve TB care for Nepali people living in the remote and rural areas. We look for this phase of the project to generate important data on its effectiveness, operational feasibility, and cost-effectiveness that will inform scale-up of DrOTS across Nepal. To demonstrate effectiveness of DrOTS, we will have an operational research design set up to see the additional yield from DrOTS in comparison to historical data and to neighboring districts without DrOTS. We will also have a US graduate to do monitoring and evaluation of the DrOTS project during this phase.

DrOTS Sustainability and Scale Up

We have already laid a foundation for sustainability and scale up of DrOTS project by involving into our discussions the Principal Recipient of Global Fund AIDS, Malaria, and TB grant (GFATM), the Save The Children Nepal. Ms. Tara Chettry, head of Save The Children Nepal has said that Nepal needs such innovation and expressed interest into the project and encouraged us to move forward with a pilot DrOTS project. In addition to the Global Fund that can provide sustainable funding, we will look to engage the World Bank as we roll out DrOTS and seek their support for sustainability and scale up. Nepal's National TB Program is the most important stakeholder and we are working closely with the NTP as we move forward with the project.

DrOTS Timeline and Funding Request

We request a total funding for the Nepal DrOTS project in the amount of $ US$ 498,525 that could be disbursed in three divided installments at the beginning of each distinct phase of the DrOTS project as shown in figure below.



Conclusion

We feel that DrOTS provides an excellent opportunity to harness the achievements of science to benefit one of the most vulnerable populations of the world. As the world accelerates elimination of tuberculosis globally, we envision increased support from global communities in the coming time to embrace innovations such as DrOTS. We express our deep admiration and respect to the Simons Foundation for their dedication towards improving the health of the people in rural Nepal. We thank the Foundation for considering our proposal for DrOTS project in Nepal.