



The Future is Now!

Innovative Digital Solutions to Empower People-Centered Care for TB and HIV-Affected People

DISCLOSURES

- I am a grantee of, and paid consultant to, the Bill & Melinda Gates Foundation.
- I also am or have been a paid consultant for WHO, Medicines for All Institute, Unitaids, and the Stop TB Partnership.
- I have no conflicts of interest to declare.



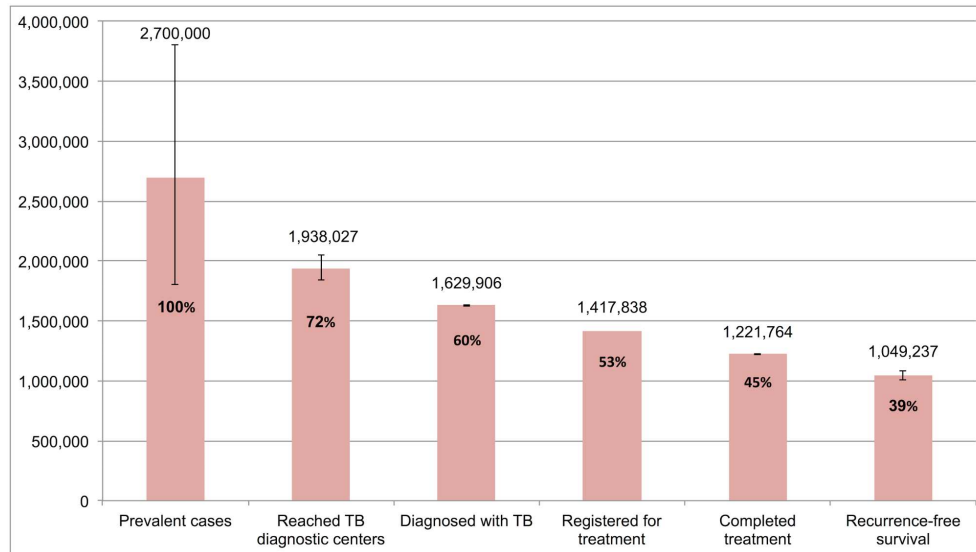
WHAT WE KNOW

- TB is a treatable and curable disease
- For HIV-affected people, TB is a preventable co-infection
- For HIV-affected people with TB, TB is a treatable and curable co-infection

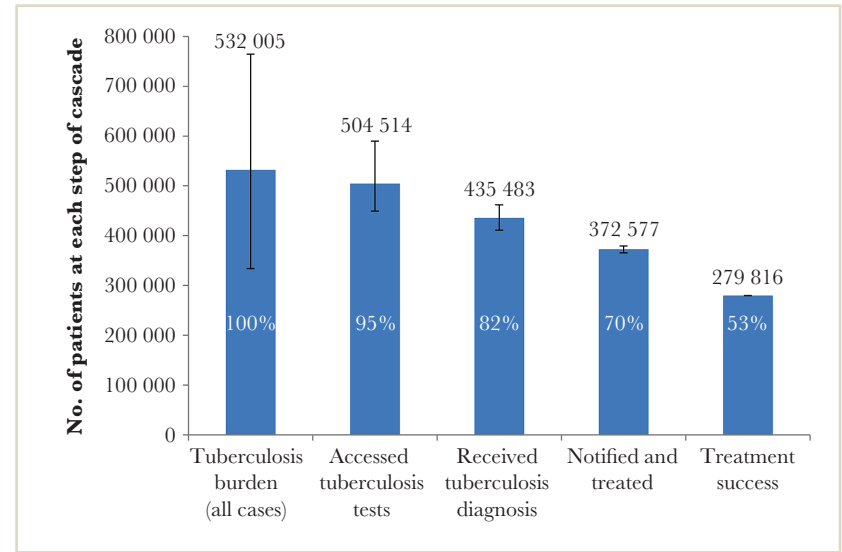
AND YET . . .

In Many High Burden Regions (Like India and South Africa) Health Outcomes Remain Suboptimal

All Forms of TB – RNTCP in India



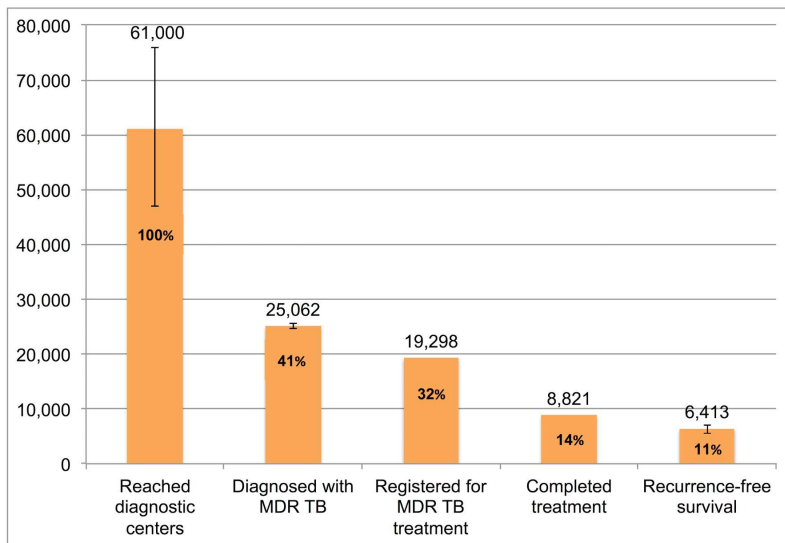
All Forms of TB – South Africa



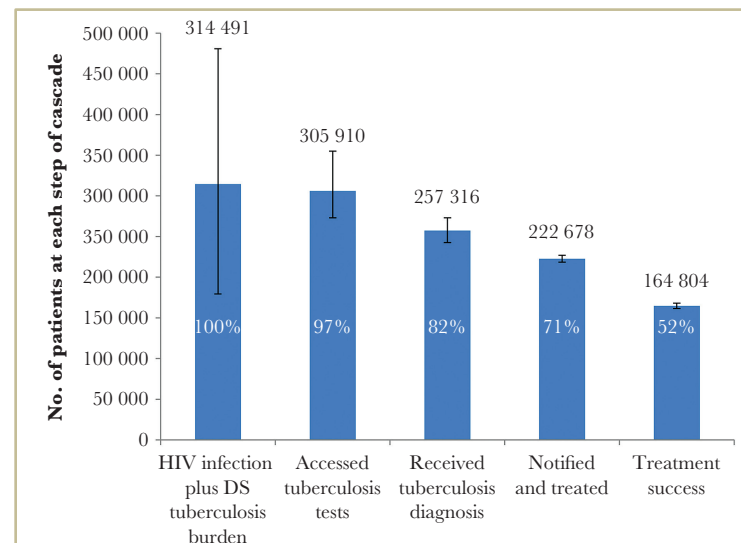
AND YET . . .

For MDR-TB and TB/HIV-Affected People, The Situation is Even Worse

MDR-TB Patients – RNTCP in India



TB/HIV Patients – South Africa



MOREOVER . . .

For Children, We Have A Lot Still to Learn, But What We Know is Alarming!

These Cascades Would Be Even Steeper For Children – Across All Forms of Disease

“The TB diagnosis and reporting gap remains unacceptably high across all age groups, approaching 33% globally, and remains disproportionately high at 63.3% in children under 5 years of age. Despite some improvement, TB preventive interventions continue to struggle to reach eligible children with recent estimates suggesting that only 23% of eligible children receive TB preventive treatment (TPT).” *

* Amanullah et al., Quality Matters: Redefining Child TB Care With An Emphasis On Quality, Journal of Clinical Tuberculosis and Other Mycobacterial Diseases, Volume 17, 2019. Citing WHO Global TB Report, October 17, 2019.

“Children represent a significant but underappreciated proportion of the DR-TB burden with an estimated 30,000 children becoming sick each year. A meta-analysis of DR-TB treatment outcomes in children showed that 80% had positive outcomes; however, fewer than 5% of children with DR-TB ever start appropriate treatment.” *

* Harausz EP, Garcia-Prats AJ, Law S, Schaaf HS, Kredt T, et al. (2018) Treatment and outcomes in children with multidrug-resistant tuberculosis: A systematic review and individual patient data meta-analysis. PLOS Medicine 15(7): e1002591.



SO . . . OBVIOUSLY LOTS OF “OPPORTUNITIES”

- A vaccine
- Better (shorter, more forgiving) treatments
- More affordable TPT
- Improved delivery (e.g., sustained-released delivery systems) of treatments/TPT
- More affordable, more scalable “diagnostics”
- **More patient-centric, more differentiated care – across the entire patient journey**

All Aspects of TB Care Should Be “Re-Imagined”

<https://www.reimaginingtbcare.org/>



Website developed under the leadership of the Stop TB Partnership and in partnership with McGill International TB Centre and The Arcady Group.

COVID-19 AS AN ACCELERATOR

Care for persons affected by TB was already moving away from pure facility-based care (e.g., DOT to SAT)

Health facility access challenges during COVID-19 have accelerated that shift and forced TB programs to rely on alternative options, such as digital health technologies, to rapidly bring required TB services to the people and communities affected by TB

Does anyone believe that post-COVID-19 these trends will decelerate or reverse?



THE GOOD NEWS. LOTS OF DIGITAL TOOLS ARE AVAILABLE!

Clinical Admin

Digital Med Devices

EHR/EMR

Population Health Mgmt

Online Health Communities

Patient Engagement

Genomics

Doctor Networks

Medical Big Data

Services Search

teleHealth

Remote Monitoring

Online Health Destination

Healthcare Mobile Communications

Mobile Fitness / Health Apps

IOT Health & Wellness

Robotics

Healthcare Marketing

Digital Health

509 Companies

\$7.05B Funding

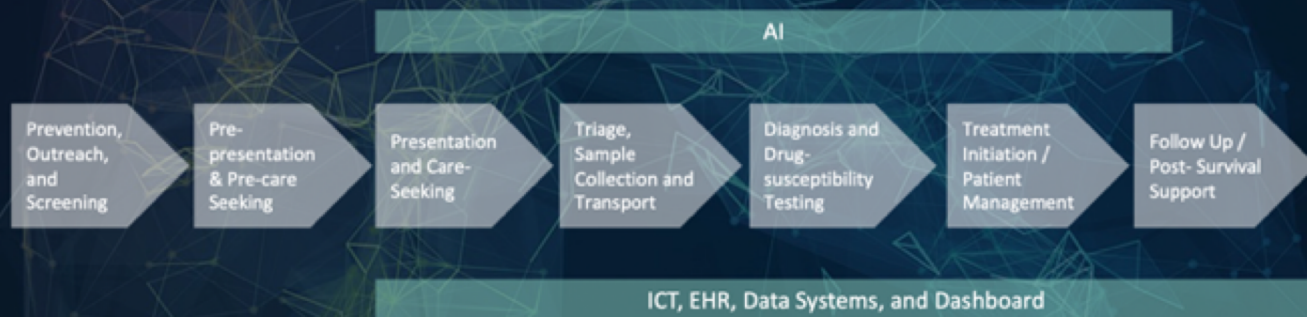
See the updated scan and more:
venturescanner.com/scans/digital-health



INCLUDING MANY SUITABLE FOR PERSONS AFFECTED BY TB

Re-Imagining TB Care

Mapping available digital health tools across the TB patient journey



For each step along this patient journey, we have (I) identified currently available, TB-appropriate innovations, (II) provided links to existing evidence support each innovation, and (III) provided contact information for the innovators.



INTEGRATED DIGITAL ADHERENCE TECHNOLOGIES



Hub

Unified platform with many options for treatment support

Support for Tuberculosis, HIV, COVID, and mental health in various settings



sureAdhere



Three Independent Entities Have Collaborated to Create
One System Providing Three Technology
CHOICES To Patients and Providers



HOW DATs CAN SUPPORT TB-AFFECTED PEOPLE

- **Autonomy:** Person can decide where/when to take their medications
- **Differentiated Care:** Person may receive individualized information, prompted to take action pertaining to their treatment, and/or access treatment information via patient app or SMS.
- **Real-time connection with provider:** Person can communicate directly with health care worker using SMS or TBAP app



ONE IMPACT – EMPOWERING COMMUNITIES AFFECTED BY TB

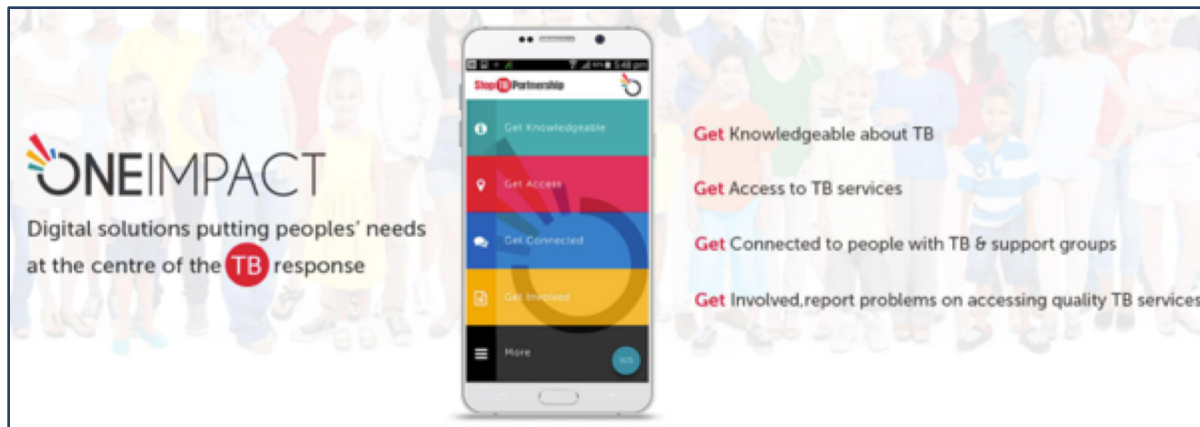
Get Knowledgeable

- Scientific information about TB, transmission, prevention and treatment
- Myths and Facts about TB
- Frequently Asked Questions and Answers from the affected TB Community
- Know your Rights
- Messages from people with TB
- Video messages from people who had TB
- Tips from people who had TB

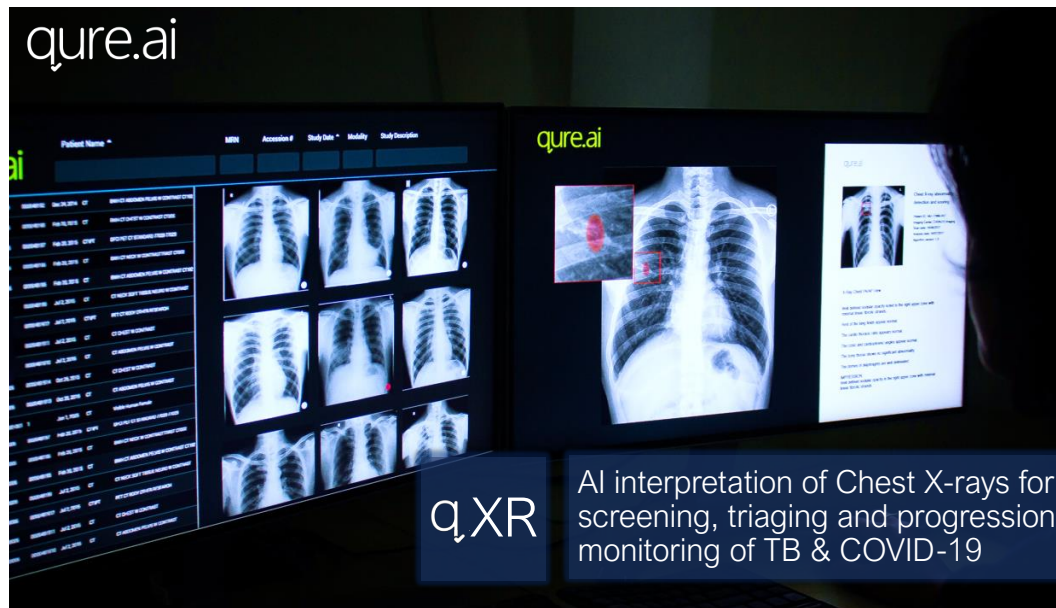


Get Access: A TB service locator App that helps access nearby TB health services

- Find nearby TB health facilities (DOTS Centers, Laboratories, Hospitals etc.)
- Access information about the facilities (when they open and close etc.)
- Sort facilities by distance

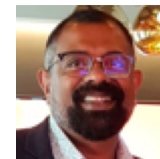


QURE.AI – AI CHEST X-RAY



Qure.ai's chest X-ray solution helps in early identification of probable TB cases and helps doctors in fast-tracking of TB patients for confirmatory diagnosis. AI will act as a force multiplier for early and fast detection

Dr. Shibu Vijayan,
Director TB/HIV, PATH India



HYFE: AI-POWERED, PASSIVE COUGH TRACKER

AI-Powered Cough Frequency Tracker



Model Highlights:

- >1.3 million explosive sounds;
- >300k labeled sounds;
- Sensitivity: 0.95;
- Specificity: 0.954;

Cough Detection Algorithm that runs on a smartphone and tracks cough over space and time.

Users and health professionals use coughing as an objective clinical finding to track acute and chronic conditions over time.

Researchers use Hyfe as an ops research tool to collect and annotate coughs in the field.

Public health professionals use Hyfe for early outbreak detection.

The Fitbit for Cough



Users track their own cough

- management of acute/chronic condition (pneumonia/TB)

The Strava for Cough



Users can share their data securely

- Remote monitoring of patients/family
- Early warning in nursing homes

Holter Monitor for Cough



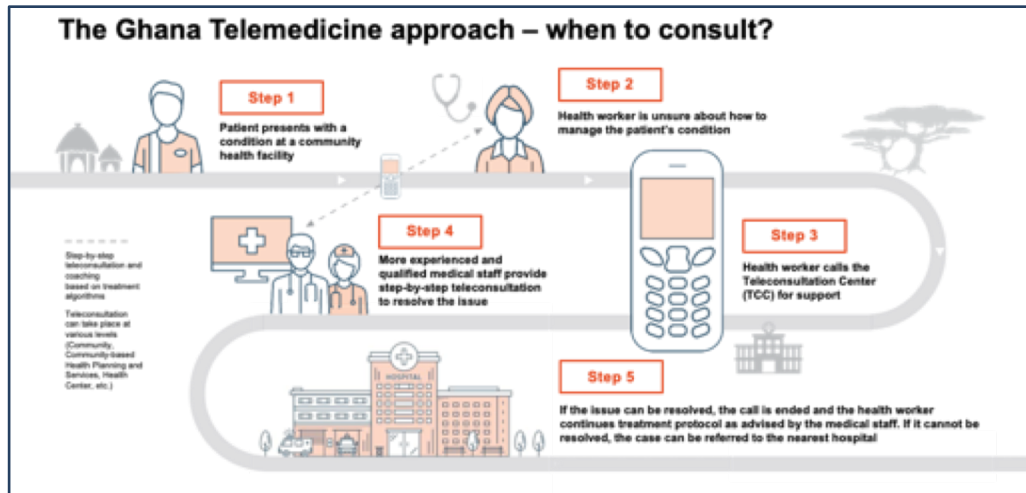
Custom app designed for research and surveillance

- Science-specific
- Researcher-administered

Available free on App Stores



TELE-CONSULTATION



The Ghana telemedicine approach is **replicable** and **scalable** in other low- and middle-income populations who wish to expand access to healthcare

- Proven approach →
- Leverages existing mobile networks and services →
- Considers all levels of health care practice →

It should be recognized that other, more comprehensive telemedicine systems exist. The Ghana approach is a model for countries that are similarly placed in terms of social, health and IT infrastructures



Find out more
Learn about different types of telemedicine systems in a report by the RWG Asia Task Force on Telemedicine

GHANA TELEMEDICINE TOOLKIT

Telemedicine toolkit fact sheet

Practical tools to implement Telemedicine and expand access to healthcare

Based on the success of the Telemedicine model in Ghana¹, the Novartis Foundation has developed a toolkit designed to help the implementation of Telemedicine in low- and middle-income communities and populations.

Available to download from October 2018, the toolkit comprises:

- A high-level overview of the Ghana Telemedicine approach and Toolkit
- An interactive implementation guide designed to guide the user through the process of implementing Telemedicine
- Fever disease pack – editable template is adaptable to local practice
- Post-partum hemorrhage disease pack – editable template is adaptable to local practice
- Rollout plan template
- Communication one-pager
- What to watch out for one-pager



For more information on the toolkit and associated programs, please contact the Novartis Foundation at novartis.foundation@novartis.com or visit novartisfoundation.org

¹In the Ghana telemedicine model, local health workers are provided with 24/7 telephone support from experienced medical staff at Teleconsultation Centers



Through the Ghana Telemedicine program:

>50% of all teleconsultations could be resolved directly by phone
31% unnecessary referrals were avoided
110 Ghana cedis (USD 31) average savings per avoided referral



THE ARCADY GROUP

TRUE TELE-HEALTH: GAME CHANGER FOR PATIENTS/**CAREGIVERS**



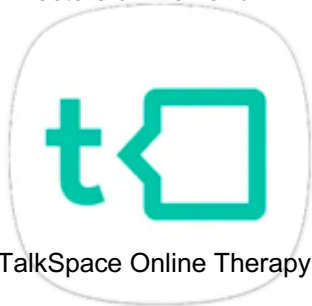
LiveHealth Mobile



Doctors on Demand



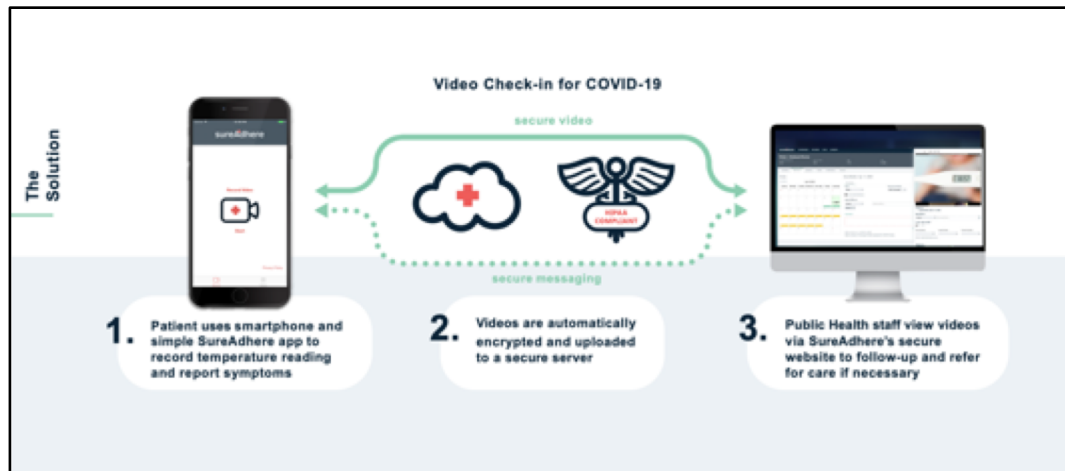
AmWell Doctor Visits 24/7



TalkSpace Online Therapy

Many, Many More –
All Free Apps for Android and iPhones

sureAdhere



We Can Use Well-Respected VOT Tools for More VIRTUAL CARE Right Now!

Some Of The Real-World Advantages of An Asynchronous Approach:

- 'Check-in' videos may be recorded according to personal schedules;
- Videos can be uploaded using cellular OR WiFi networks to minimize data charges;
- Videos can be recorded with or without a network signal;
- Video upload process is fully automated to prevent mistakes or tampering;
- Provider may view videos when convenient and follow up as required.

CONCLUSION

- Again, LOTS of digital tools are available
- Many may be perfectly appropriate for TB
- The solutions I've highlighted were developed by people who understand TB, HIV, and people affected by both
- We actually have all of the digital tools required to meaningfully “re-imagine” care
- COVID-19 has created unprecedented willingness to consider digital tools in routine care
- To take full advantage:
 - Innovators need to think **INTEGRATION** – country programs cannot string all these “point solutions” together
 - Health systems and providers need to embrace the vision for largely “*at home care*”

