

to detect TB at an early stage in patients. Current diagnostic tests, including sputum sample microscopy and the Mantoux skin test, are very slow and characterized by many false-positive results. Thus, a rapid point-of-care diagnostic for TB remains an unresolved challenge.

Methods: Nucleic acid amplification tests (NAATs) have shown great promise in quickly detecting genes of interest with high specificity and sensitivity. This study employs the combination of a drop-based microfluidics platform and isothermal DNA amplification to create a breakthrough technology that enables the detection of TB bacteria from the bloodstream or sputum. Advantages of drop-based microfluidics include reduced sample size and reagent consumption, short processing times, and enhanced sensitivity. In our device, TB DNA is rapidly encapsulated in microfluidic drops (water-in-oil emulsions), amplified using loop-mediated isothermal amplification (LAMP), and detected via fluorescent signal.

Findings: The method allows for all steps, including emulsification with a pipette, amplification at a single temperature, and quantitative-detection from a reservoir, to be done on-chip in less than 1 hour. Imaging and quantification of fluorescent drops (indicating the presence of TB DNA) can be achieved by a simple color camera.

Interpretation: Such a microfluidic technique would allow for rapid TB diagnosis to be done directly from the blood/sputum in resource-poor locations of the developing world.

Funding: None.

Abstract #: 1.015_TEC

The development of a novel local area network based EMR utilizing handheld devices to serve resource-limited clinics

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Program/Project purpose: Our project describes a practical electronic medical record (EMR) for global use in areas lacking Internet access or significant informational technology (IT) experience. We seek to provide better clinical communication, improved patient safety, and more coordinated and efficient patient care while maintaining patient privacy at resource-limited locations. We designed and beta-tested our new EMR at a remote clinic site with the above challenges. Our system provides an economical, practical, secure, and mobile EMR system useful for a myriad of global health settings.

Structure/Method/Design: We pair a low-cost, commercially available wireless router/hard drive combo with unique software to create a dynamic system not requiring Internet access during encounters. Our portable EMR utilizes an Apple Airport Time Capsule that serves as a wireless hard drive and full-featured Wi-Fi base station. The Time Capsule generates a secure local area network allowing multiple on-site providers to sync with the server and access the chart in real time. Dynamic portable document format (PDF) templates are organized within the iOS application “PDF Expert” providing an individual patient record. The patient PDF template outlines the encounter using free text, check boxes,

and drop down selections that may be customized depending on clinic context. The resulting system allows health providers to share and analyze secure and confidential health information with local stakeholders including hospitals, governmental agencies, or patients themselves.

Outcome & Evaluation: We beta-tested our EMR in the spring of 2015 at a remote health post in the Andes to better understand the individual challenges and aspects of the EMR. The system efficiently managed and securely stored tablet-generated simulated “patient encounters” on the Airport Time Capsule server. The EMR simulation demonstrated a promising model to enhance clinic flow, patient documentation, and medical record communication with local health officials.

Going Forward: While no one template could meet every system’s needs in documentation, ours may be easily adapted for site nuances or research data collection applications. Limitations include tablet and phone connectivity only for iOS devices. Our system offers a technically viable EMR solution in resource-limited settings with potential applications for global health service and research.

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Adoption of information and communication technologies for early detection of breast and cervical cancers in low- and middle-income countries

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Purpose: In response to the growing burden of breast and cervical cancers, low- and middle-income countries (LMICs) are beginning to implement national cancer prevention programs. We reviewed the literature on information and communication technology (ICT) applications in the prevention of breast and cervical cancers in LMICs in order to examine their potential to enhance cancer prevention efforts.

Methods: Ten databases of peer-reviewed and grey literature were searched using an automated strategy for English language articles on the use of mHealth and teleoncology in breast and cervical cancer prevention (screening and early detection) that were published between 2005 and 2015. Articles that described the rationale for using these ICTs and/or implementation experiences (successes, challenges and outcomes) were reviewed. Bibliographies of articles that matched the eligibility criteria were reviewed to identify additional relevant references.

Results: Out of the initial 285 citations that were identified, eight met the inclusion criteria. Of these, four used primary data, two were reviews and two were commentaries. Articles described the potential for mHealth and teleoncology to address both demand and supply side challenges to cancer prevention such as awareness, access, and cost in LMICs. However, there was a dearth of evidence to support these hypotheses.

Conclusion: This review indicates that there are few publications that reflect specifically on the role of mHealth and teleoncology in cancer prevention, and even fewer that describe or evaluate interventions. Although articles suggest that mHealth and teleoncology can enhance the implementation and utilization of cancer prevention interventions, more evidence is needed.

Abstract #: 1.017_TEC

Stanford-India Biodesign: Outcomes from an eight year collaboration with the government of India to promote medical technology innovation in India

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Background: Begun in 2007, the Stanford-India Biodesign (SIB) program represents a first-of-its-kind collaboration between Stanford University, the All India Institute of Medical Sciences (AIIMS), and the Indian Institute of Technology (IIT) Delhi. Supported by the Department of Biotechnology (DBT), Government of India, the program is now in its eighth year. The goals of this ambitious program are threefold: train the next generation of medical technology innovators in India; commercialize novel medical technologies for India's medically underserved; and help catalyze the Indian medical technology industry. The primary offering of the program is a 1-year fellowship in which Indian nationals are trained in our Biodesign process of need-driven innovation at Stanford and then return to AIIMS in New Delhi to identify clinical needs and create India-specific solutions and business models.

Results: This international collaboration has resulted in the training of 32 fellows. Rights to eight separate technologies have been licensed to third parties including to seven startup companies that have been founded by SIB fellows. One product, a leg immobilization device for road traffic accidents is now commercially available in India. A second product has received FDA clearance and is being jointly commercialized in both India and the US. Inspired by the success of the SIB program, several other Biodesign programs located across India have been created and funded by DBT, with more planned. The program has coordinated eight nationwide medical technology summits in India, aimed at developing the medical technology ecosystem in India. Finally, methodologies created and disseminated by the Stanford-India Biodesign program are now being used by global health agencies and both Indian and multinational companies to create products and services for India's underserved population.

Conclusion: Now in its eighth year, Stanford-India Biodesign represents a novel international collaboration to advance medical technology innovation in India. The success of the program may serve as a model for the development of sustainable healthcare innovations in India and other developing nations.

Abstract #: 1.018_TEC

Increasing access to quality health care using health technology to 'cut-out' urban communities in Nigeria

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Program/Project Purpose: Quality health is a fundamental right of all citizens. While primary health care (PHC) centres are relatively uniformly distributed throughout local government areas (LGAs) in Nigeria, the rural people tend to underuse the basic health services, while those in urban communities crowd the already stretched health facilities that are either understaffed, or underfunded. Unfortunately, there is a huge gap in the implementation of medical breakthroughs due primarily to distance to health centers and rugged topography to access quality healthcare centers. With a population of about 178 million and reporting more deaths due to malaria than any country in the world, Nigeria became the seven-teenth PMI country in 2010. Malaria accounts for 60% of outpatient visits and 30% of hospitalizations among children under-five in Nigeria. The main goal of this article is to take a critical look at how to build local/traditional capacities to reach the 'cut-out' populations and communities, "marginalized" in the health coverage.

Structure/Method/Design: The Nigerian Demographic and Health Survey (DHS) 2013 reported an infant mortality of 69 per 1,000 live births and an under-five mortality of 128 per 1,000 live births in the preceding five-year period. Our primary focus is on Northern Nigeria with covering places like Madala - Niger State, Abuja-FCT, Kujipi - Nasarawa State, and Ancha - Kaduna State. Other communities focused on are communities in the troubled North East Nigeria, but with this region, data figure changes rapidly and thus we may not get accurate data. Interviews were conducted, test results were analysed to determine access and use health facilities and ease of use and the quality of services provided in the visited medical facilities.

Outcome & Evaluation: The goal of primary health care (PHC) was to provide accessible health for all by the year 2000 and beyond. Unfortunately, this is yet to be achieved where about two-thirds of Nigerians reside in rural according to the FAO report, therefore slowing the pace of health coverage to all. From the focus groups and communities under review, it was discovered that most people in 'cut-out' communities rarely have access to quality health services and the other population matrix who reside in urban settlements complain of high cost of accessing quality healthcare services at the underserved health facilities thus leaning towards traditional medicine, or unprofessional, unqualified medical services.