

the number of questions from 30–60 in the original index to 8–18 questions in the new index. The new index has high agreement with the original survey results ($\kappa > 0.75$). The new questions are easier to answer than the original questions, with fewer response options. Data collection has been further simplified through the creation of a phone/tablet-based survey that aggregates and analyzes results.

Outcome & Evaluation: The simplified mobile survey was piloted in India and Colombia where users report satisfaction and ease-of-use. Additional pilots will begin in December 2015.

Going Forward: Our simplified, mobile-version of the DHS wealth asset makes it possible for any social service program to determine the relative wealth of those they are serving through a short client survey, transforming the performance of programs and improving health outcomes. Moving forward we will conduct research to assess the wealth of populations receiving care in a range of facility types using the simplified index and DHS data to contextualize program results.

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Midterm evaluation of health-provider alert functionality in a program of automated telephone monitoring and self-care support for diabetic patients in Colombia

J. Tasset¹, C. Bourdillon¹, R. Philson¹, M. Gomez¹, S. Ferguson¹, J.H. Velasquez Molina², N.L. Salazar Marulanda², N. Marinec³, J.F. Saldarriaga Franco², J. Piette³; ¹The University of Michigan Medical School Global REACH, Ann Arbor, USA, ²La Universidad de Antioquia Living Lab Telesalud, Medellin, Colombia, ³University of Michigan School of Public Health Center for Managing Chronic Disease, Ann Arbor, USA

Purpose: Trials suggest that mobile health (m-health) interventions can improve self-care behaviors and outcomes for patients with diabetes mellitus (DM) [1,2]. Llamada Saludable is interactive voice response (IVR) m-health program used to monitor DM patients and provide self-care education between outpatient visits. The program was implemented in Medellin, Colombia from July–September 2015 in collaboration with the Living Lab Telesalud program at the Universidad de Antioquia and a large insurer for low-income patients (SaviaSalud). In addition to evaluating effects on DM management, this trial assessed the provider alert system with real-time monitoring of patient-reported adverse health events.

Methods: 150 DM patients received weekly, automated calls for 12 weeks. At program entry, patients received education on healthy living and DM symptom management. Patients were informed they would receive a follow-up call from a health professional if their responses indicated a need for additional assistance. During IVR calls, patients answered questions using touch-tone phones, which triggered automated email alerts to clinical staff. Paramedics completed less critical follow-up calls while physicians called insulin dependent patients reporting blood sugar < 90 mg/dl or > 300 mg/dl.

Outcomes and Evaluation: Participants completed roughly 1,300 IVR assessments (72%) and clinicians received 319 email notifications regarding 129 individuals. Although clinicians were concerned about the potential for patients to exploit the alert feature to quickly access a physician, patients expressed reassurance that providers were “accompanying” in their illness. A majority of follow-up (87.5%) included self-care education, while only 6.2% resulted in advising the patient to visit their primary care physician (5.9%) or emergency services (0.3%).

Going Forward: Based on this successful pilot, the Llamada Saludable program is expanding to additional municipalities around Medellin and other chronic diseases (e.g., renal disease, COPD). The functionality of the alert aspect of the program is integral to sustainability and scaling so the system is responsive to adverse health events. Our experience indicates institutions implementing m-health programs with provider-alert feedback mechanisms should consider their role as patient education rather than solely an emergency response system.

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References:

- [1] Piette JD, et al. *Telemedicine and e-Health* 2016.
- [2] Handley MA, et al. *Ann Fam Med* 2008.

Innovating for global health: Study of healthcare technology failure in southern Malawi

A.R. Taylor¹, P. Muelenaer², K.B. Kochersberger¹, A.A. Muelenaer², L.R. Bickford¹, K. Redican¹; ¹Virginia Polytechnic and State University, Blacksburg, VA, USA, ²Virginia Tech Carilion School of Medicine, Roanoke, VA, USA

Background: Physicians in low and middle-income countries (LMIC) face many challenges, including overwhelming patient-to-staff ratios, an unstable electric grid, and a general lack of resources. Technology in LMIC often fails, further compounding the difficulty of providing adequate healthcare. Few medical devices are manufactured locally, making equipment problematic to maintain and repair. In 2013, the World Health Organization estimated 70% of medical devices in LMIC are non-functioning, affecting the ability to provide adequate healthcare. Additionally, devices that cannot be repaired locally are placed in “medical device graveyards”, potentially causing adverse long-term health effects due to chronic exposure to electronic waste sites. Therefore, the aim of this study was to establish an understanding of challenges associated with medical device donations, repair, and maintenance in LMIC in order to improve short- and long-term health outcomes.

Methods: To understand LMIC barriers to acquiring, maintaining, and repairing medical equipment, an exploratory study was conducted at clinical settings in southern Malawi. Thirty-six clinical staff participated in surveys and focus groups to provide information on medical device challenges. The study was approved through the Virginia Tech Institutional Review Board as well as hospital administrators at collaborating institutions.

Findings: Results from the study emphasize the inadequacy of donating medical devices and the importance of community-based