

## PharmaChk: Poor quality medicines screening tool for resource-limited areas

A. Fernandes<sup>1</sup>, D. Desai<sup>2</sup>, M. Zaman<sup>3</sup>; <sup>1</sup>Boston University, Cambridge, MA/US, <sup>2</sup>Boston University, Brookline, MA/US, <sup>3</sup>Boston University, Boston, MA/US

**Program/Project Purpose:** Substandard medicines account for \$75B of a \$962B global pharmaceutical market and over 100K preventable deaths annually, leading to tremendous financial loss and emergence of drug resistance. Estimates indicate that 30–50% of all antimalarials are substandard. Additionally, while oxytocin has demonstrated high efficacy in saving maternal lives, it often fails quality tests in LMICs. Similar challenges are seen with many high impact pharmaceuticals. Production and sale of substandard drugs are indicators of a compromised health system that greatly undermine health programs. In absence of proper storage, drugs that initially pass quality testing often deteriorate before the point of sale. This project's primary objective is to develop a scalable platform that comprehensively screens for substandard medicines, expand implementation from central to regional testing facilities, and create demand through awareness workshops over a four year period.

**Structure/Method/Design:** Project goals: 1) Optimize PharmaChk platform based on pilot user feedback and testing results, 2) Scale-up testing ability to include fixed-dose combination artesunate therapies and oxytocin, 3) Scale-up PharmaChk pilot from one central location to three regional and six community health facilities in Ghana, and 4) Scale-up user demand and awareness by implementing education workshops targeting regulators, pharmacists, manufacturers, and other stakeholders. We work with local stakeholders in Ghana (Procurement and Supplies Department in Ghana's Ministry of Health and leadership at the Ghanaian FDA and Central Medical Stores) through the US Pharmacopeia's Promoting Quality of Medicines program. PQM is well-versed with challenges on the ground and provides valuable input on user and technology needs.

**Outcomes & Evaluation:** PharmaChk was pilot tested at the Center for Pharmaceutical Advancement and Training in Accra, Ghana in March 2014. Samples of artesunate pills and injectables were locally sourced and tested using MiniLab<sup>®</sup>, HPLC and PharmaChk. Quantification: Assay accuracy was tested and showed an average error of less than 6% compared to HPLC. Precision/Reliability: Field test revealed excellent device precision, with tests on both tablets and injectables showing < 5% variability. User-friendliness: User training and sample preparation was reduced. Throughput: Testing time was significantly decreased. MiniLab<sup>®</sup> tests took two hours while PharmaChk tests took 15 minutes.

**Going Forward:** Risk mitigation strategy: Inadequate chemical shelflife might complicate commercial viability of device. User errors and fatigue - we will work closely with users to incorporate their feedback and experiences. Further reduce sample preparation and develop a testing protocol. Basic training protocols need to be designed. Lastly, strong program management, and contingency planning will ensure that we meet our milestones.

**Funding:** US Pharmacopeia, Saving Lives at Birth Consortium, Coulter Foundation, National Collegiate Inventors and Innovators Alliance, Center for Integration of Medicine and Innovative Technology, the National Institutes of Health, USAID.

Abstract #: 011TIS012

## Job satisfaction, self-efficacy, and performance of community health workers participating in a mobile health (mHealth) program to improve maternal, newborn and child health (MNCH) in Rural Tanzania

K.M. Hackett, D. Sellen; University of Toronto, Toronto, ON/CA

**Background:** In Tanzania, frontline CHW are uniquely positioned to offset the country's critical shortage of human resources for health. Despite this potential, CHW performance can be limited by weak delivery of appropriate training and re-training, unsupportive supervision and ineffective job aids. The emerging field of mHealth offers innovative and potentially powerful approaches to strengthen health system support for CHW and increase their effectiveness in achieving key MNCH outcomes. Few studies have evaluated the impacts of mHealth on CHW performance.

**Methods:** A cluster-randomized, controlled, mixed-methods trial design was used to evaluate the process and impact of an mHealth intervention in Singida, Tanzania. CHWs were recruited through a larger MNCH project, implemented by World Vision. Sixteen CHW pairs were randomly allocated to the experimental group, and 16 pairs to the control group (total N = 64); group assignment was unmasked. All CHW were trained on the Ministry of Health's national community-MNCH program. Shortly thereafter, CHW in the experimental group were trained on a smartphone application designed to improve data management, patient tracking, and delivery of key health/nutrition messages to pregnant women and mothers. Using Likert-scale questionnaires, we explored: 1) changes in CHW job satisfaction and self-efficacy over a 6 month period (N = 59); and 2) cross-sectional measures of CHW performance and quality of care as assessed by 14 CHW supervisors and a randomly selected sample of female clients (N = 572). Written informed consent was obtained from all study participants. The University of Toronto Health Sciences REB and Tanzania's National Institutes of Medical Research (NIMR) approved the study.

**Findings:** Data are mean  $\pm$  standard deviation. Scales measuring CHW job satisfaction, self-efficacy, and performance had high levels of internal consistency (Cronbach's alphas > 0.85). Independent-samples t-tests showed that shortly after program implementation, mean job satisfaction scores were higher among experimental group CHWs ( $2.09 \pm 0.25$ ) versus the control group ( $1.89 \pm 0.31$ ),  $t(59) = 2.718$ ,  $p = 0.009$ , however these scores converged over time and no significant difference was observed after 6 months ( $p = 0.422$ ). CHW self-efficacy and assessments of CHW performance by supervisors did not differ significantly between groups. Female clients in the experimental group reported higher satisfaction with CHW performance ( $2.02 \pm 0.34$ ) than those in the control group ( $1.95 \pm 0.40$ ), a difference of 0.07 (95% CI, 0-0.13),  $t(570) = 1.957$ ,  $p = 0.051$ .

**Interpretation:** Smartphone-based tools for CHW can improve job satisfaction in the short term, which may impact perceived quality of care among intended beneficiaries. Further investigation is required to elucidate causal links between CHW job satisfaction, performance and ultimately, MNCH outcomes.

**Funding:** Foreign Affairs, Trade and Development Canada (DFATD) W. Garfield Weston Doctoral Fellowship Program.

Abstract #: 011TIS013

## Using a performance improvement approach to improve quality of maternal and neonatal care in Namibia's Kavango region

M. Hamilton<sup>1</sup>, P. McQuide<sup>2</sup>; <sup>1</sup>IntraHealth International, Chapel Hill, NC/US, <sup>2</sup>IntraHealth International, Windhoek, NA

**Program/Project Purpose:** Maternal mortality has been declining globally, but Namibia continues to experience unacceptably high maternal and neonatal mortality. Meanwhile, best practices are evolving. Health workers need updated training, follow-up, and supervision to ensure that they understand and are putting new procedures into practice. In September/October 2012, IntraHealth