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**Background:** Sickle cell disease (SCD) is highly prevalent in sub-Saharan Africa; however, resources for accurate diagnosis and treatment are largely unavailable. Prior to December 2014, neither neonatal screening nor standardized methods for SCD diagnosis were routinely available in Malawi.

**Methods:** We initiated alkaline hemoglobin electrophoresis (HbE) for SCD diagnosis in the capital city of Lilongwe in November 2014. Alkaline HbE is an affordable and reliable diagnostic test for hemoglobinopathies including SCD. Site-specific standard operating procedures and protocols were developed and incorporated into an existing laboratory facility maintained by UNC Project Malawi, A 20 year old collaboration between the Malawi Ministry of Health and UNC. An imperative of this work was to train local Malawian laboratory technicians and clinicians on how to use and interpret the test results to ensure long term viability of the test.

**Findings:** Between January and May 2015, a total of 137 sequential patients with clinically suspected SCD were enrolled. Of those enrolled, 117 patients were confirmed to have HbSS, two were HbAS, 12 were HbAA, and the diagnosis was uncertain in six patients. Of 125 children who were chronically cared for as SCD patients prior to enrollment, 107 (86%) were confirmed to have HbSS. Patients were principally from the central region of Malawi with most living within the Lilongwe city limits. However, 9% of patients presented from non-Lilongwe districts and some patients were from up to 500 km away. Alkaline HbE was easy to set up and operate, inexpensive compared to other gold standard tests, and reliably delivered prompt and clinically meaningful results to patients and clinicians. We found that HbE was easily accommodated within existing UNC Project Malawi laboratory infrastructure. Our estimates put the cost per test at 3-4 USD, accounting for equipment and reagents but not indirect costs such as electricity, space, and personnel.

**Interpretation:** The implementation of decades-old technology now provides a foundation for future studies to understand the natural history of SCD in Malawi and develop intervention strategies appropriate for the setting to improve outcomes.

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**Abstract #:** 1.024\_TEC

### **An assessment of essential maternal, newborn and child health equipment at Kenyatta National Hospital: Filling critical knowledge gaps to inform program design**

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**Background:** WHO guidance on essential interventions for the management of reproductive, maternal, newborn and child health includes the availability of high-quality medical equipment that is

accessible, affordable and context appropriate. However, medical equipment is often unavailable in low-resource settings, exacerbated by human resource shortages and training capacity. This paper presents findings from a needs assessment conducted at Kenyatta National Hospital to assess gaps in the availability of equipment in the labor and delivery and neonatal units and to identify the factors that contribute to the limited availability of equipment.

**Methods:** We employed a descriptive study design and collected data from clinical, engineering and administrative staff in the procurement, labor, and delivery, neonatal and biomedical departments. Data collection included hospital statistics, thirty key informant interviews, and twelve clinical observations. Key informants were selected using convenience sampling. The study was approved by the KNH Ethics and Research Committee and written informed consent was obtained from all interviewees as well as patients and guardians (where applicable) participating in the clinical observations.

**Findings:** While hospital statistics revealed a 6% increase in the number of deliveries between January 2010 and December 2013, there was a 46% increase in the number of low birth weight infants delivered at KNH. Examination lights and delivery beds were found to be insufficient in number and often had limited functionality due to defective components like missing light bulbs or faulty hydraulic systems. Suction machines, resuscitation tables, vacuum extractors, and incubators were reportedly regularly unavailable due to frequent breakdowns owing to overuse and irregular maintenance schedules. The difficulty in locally procuring spare parts was a significant finding across all pieces of equipment.

**Interpretation:** Based on these findings, Kenyatta National Hospital and University of Nairobi will co-design prototypes that take into account the unique needs of clinicians and hospital engineers working in low-resource settings with a special focus on the availability of spare parts locally. The first batch of prototypes will be for suction machines, vacuum extractors, examination lights and phototherapy machines.

**Funding:** Innovations for Maternal, Newborn and Child Health, a Concern Worldwide (US) initiative funded by the Gates Foundation.

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### **Technology and innovation in global health leadership education: A new model**

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**Program Purpose:** From addressing outbreaks to climate change, global health professionals increasingly require leadership skills, training, and diverse professional networks to successfully work across teams and cultures. Advances in technology provide opportunity to innovate and transform global health education into virtual global learning experiences where the above can be gained. This study presents an innovative educational model of global health leadership launched in Fall 2015 - "Global Health Live" - which

included the simultaneous participation of various universities and interaction with expert practitioners, faculty, and students from across the globe in a single course.

**Structure/Method/Design:** Collaboratively developed by faculty at the University of Southern California (USC) and University of California Irvine (UCI), the course was offered by three additional universities – National Taiwan University (NTU), Chinese University of Hong Kong (CUHK), and University of Tokyo – constituting a global learning environment. Approximately ten graduate students participated from each university, totaling about fifty students. While four of the universities participated using a distance education classroom setup, USC participated entirely virtually as common to other courses in its Online Master of Public Health (MPH) program. Asynchronous methods including discussion boards, readings, and assignments were designed and housed in Piazza which was free and equally accessible to all universities. Once a week for ten weeks during a mutually agreeable time across all five universities, synchronous learning occurred through live videoconference sessions with expert practitioners working in various global health settings including governmental agencies, NGOs, social enterprises, etc. across the globe, using Google Hangouts. Teams composed of students representing each university worked together on group projects.

**Outcome & Evaluation:** In addition to increased knowledge and skills, students benefitted from cultural exchanges in an expanded network. Faculty benefitted from an expanded network including access to guest experts. Course evaluations reflected student satisfaction and their perceptions of the course as a valuable learning experience which would not have been possible in traditional courses offered by a single university alone.

**Going Forward:** While additional technologies may provide added value in future courses, this course presents a model to implement global health education in collaboration with university partners across various countries and regions for a robust and culturally diverse experience.

**Abstract #:** 1.026\_TEC

### The first Myanmar-based telemedicine solution for the people of Myanmar: A pilot study at 3 diverse facilities

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**Background:** Myanmar ranks 190<sup>th</sup> (out of 190) in the WHO's global ranking of healthcare systems. Approximately 70% of the population is rural while physicians and nurses are concentrated in urban centers. As a result, access to health workers remains well below the global standard of 2.28 per 1,000 people. However, the recent adoption of mobile technology has grown at unprecedented rates, such that Myanmar will soon be the world's first mobile-only country. Current estimates suggest that 80% of citizens will own a cell phone (mostly smartphones) by the end of 2015. The combination of health system challenges and the

expansion of the telecommunication infrastructure introduces an opportunity to expand the reach and quality of healthcare throughout the country.

**Methods:** A needs assessment, utilizing site visits and stakeholder discussions with general practitioners at private rural clinics, identified four critical needs that could potentially be met through a telemedicine partnership: x-ray interpretation; ECG interpretation; ultrasound technique and interpretation; and video consultation with specialists. To assess the feasibility of utilizing telemedicine in Myanmar, three pilot clinics were selected, each in a different type of community (village, township, city) with an average physician availability of 0.08 per 1,000 people. Radiologic images were transmitted to and interpreted at Parami Hospital while video teleconsultations began with a Yangon-based emergency medicine physician, who then coordinated additional specialty consultations as needed.

**Findings:** Between May 2014 and October 2015, three sites (Kyaihto in the state of Mon, Kin Mon Chone in the Bago region, Pathein in the Ayeyawaddy region) completed the 10-month pilot period without interruption. The clinics of Pathein and Kin Mon Chone determined that they would review their ECGs and x-rays autonomously. During the combined 30 months, 2,644 x-rays and 876 ultrasounds were interpreted via teleradiology, 871 ECGs were remotely interpreted, and there were 122 teleconsultations. In total, 4,513 services were provided.

**Conclusion:** Piloting the first Myanmar-based telemedicine solution in three diverse and underserved regions demonstrates that teleradiology and teleconsultation are feasible in Myanmar. Expanding the clinical and technological infrastructure for telemedicine could help Myanmar progress towards achieving universal health access.

**Funding:** Golden Zaneka Public Co, Ltd.

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### If we build it, will they come? Deploying a medical mobile clinic in the Philippines

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**Program/Project Purpose:** Around the world, non-communicable diseases (NCD) account for most of mortality and morbidity. The Philippines is no different. By 2016, the number of premature deaths is projected to double from 140,000 reported in 2000. In an effort to mitigate the country's most preventable diseases, a medical mobile clinic (MMC) will drive to the heart of some of the poorest communities and provide continuous, cost-effective care with emphasis on collaboration, prevention, and health education.

**Methods:** The MMC will operate 20 days out of the month and offer services to a village for one day. The proposed van will have its presence in 20 villages, poised to serve about 40,000 people in Tacloban, Leyte, year-round for the life of the van, which can be anywhere from 10–15 years. Each MMC will have a coordinator from both the United States and the Philippines, as well as a team consisting of a physician, nurse, and driver. Community