

**Outcomes & Evaluation:** The results confirm that the problem of cold chain breaches is a global issue, occurring extensively in developed and developing countries. The severity of the problem relates, in part, to the type of medical product. Research indicates that temperature-damaged medicines can cause disease outbreaks, adverse events and inaccurate diagnoses. Regardless of the type of medical product, improper temperature control contributes to costly waste. Some of the most effective cold chain solutions have been implemented by countries with the most challenging delivery systems. These solutions should be considered for broader adoption globally.

**Going Forward:** One meta-analysis cannot transform the issue of cold chain integrity into a burning priority for public health stakeholders. It is hoped, however, that this study's findings will increase public health leaders' awareness and prioritization of cold chain problems and solutions. One fundamental next step would be a global forum in which cold chain innovations and best practices are shared.

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### **Uterine balloon tamponade as a second line treatment for uncontrolled postpartum hemorrhage: A qualitative study exploring lower level provider perceptions of effectiveness, feasibility, and acceptability in lower level health facilities in Kenya**

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**Background:** Postpartum hemorrhage (PPH) remains the leading cause of maternal mortality in developing countries. Lower level facilities often lack resources for managing PPH including blood, surgical interventions, and timely transportation to higher levels facilities. Condom-catheter uterine balloon tamponade (UBT) represents a very low-cost, readily available second line treatment for uncontrolled PPH. Several case series have documented the effectiveness of UBT inserted by experienced providers in hospital settings. However, little is known about the use of UBT by lower-level health providers in the community setting, where the majority of deliveries in low-income countries occur. The aim of this study is to use qualitative methods to assess provider perceptions regarding the effectiveness, feasibility, and safety of the condom catheter UBT for uncontrolled PPH.

**Methods:** This is a qualitative study in which data were gathered from in depth interviews conducted between February-April 2014. Approximately 6–12 months after a PPH-UBT training, health facilities in Kenya were purposefully sampled to represent a range of size, geographic region, and experience with UBT use. All trained providers at each facility who had managed PPH were interviewed. Interview transcripts were analyzed using standard qualitative methods. Facilities were sampled until theoretical saturation had been achieved. Verbal informed consent was obtained from all participants. Ethical approval obtained from the IRBs of Partners Healthcare and Maseno University School of Medicine.

**Findings:** Sixty-eight providers were interviewed at 29 facilities in 6 different counties in Kenya. The majority of providers (85.3%) were midwives. Qualitative analysis revealed several major themes. UBT was most commonly used when bleeding was unresponsive to uterotonics, hysterectomy was unavailable, and referral times distant. In all but two

patients that appeared to have DIC, UBT rapidly arrested bleeding. Providers inserted the UBT appropriately within the PPH algorithm, although the timing and clinical severity of the patient varied. The vast majority of providers described UBT as technically easy to use, though a small minority experienced displacement of the balloon. Patient follow-up was inconsistent, but no known complications were reported. The vast majority of patients reportedly expressed no concerns about the social acceptability of the condom component of the balloon.

**Interpretation:** In lower level facilities that lack life saving treatment modalities for uncontrolled PPH, UBT represents an effective and feasible option to arrest bleeding either as a primary endpoint or en route to obtaining further care. Non-physician providers can easily place the balloon following focused training on UBT. Well designed studies are needed to assess the direct impact of UBT on PPH related morbidity and mortality. The major limitation includes social desirability bias.

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### **Operative trauma in a tertiary care center in Kenya: Detailed causality, demographics, and mortality**

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**Background:** Over 90% of global deaths from injuries occur in low and middle income countries (LMIC). The World Health Organization (WHO) reports that lack of reliable statistics has largely hidden the health and development impacts of injuries. Healthcare systems in LMIC cannot accurately assess the trauma burden on the operative case volume because they lack a secure tool that is functional in the low-resource surgical environment with limited information technology infrastructure. We report preliminary results from a perioperative data collection tool using point-of-care, off-line input by anesthesia care providers followed by asynchronous transmission to a central server. This tool is being utilized in a tertiary referral hospital in East Africa with a large surgical trauma volume due to its location along a major highway and semi-rural population density.

**Methods:** After IRB approval and education on data collection logistics, anesthesia care providers began collecting case-specific data on June 2014. Data fields include patient demographics, surgery and anesthesia specifics, safe surgery checklist verification, perioperative complications and 7 day perioperative mortality. The tool focuses on trauma impact while highlighting mechanism of injury, trauma to surgery time, mode of transportation of trauma patients to hospital, blood transfusion, and perioperative mortality rate (POMR).

**Findings:** From June – October 2014, data was collected on 3,140 surgical patients, including 227 (7.3%) cases classified as trauma patients. Of these patients, 94.7% were previously healthy and ASA 1 or 2, 77.8% male, and 88.5% were older than 18 years of age. Mode of trauma included motor vehicle accident (35%), motorcycle (21.3%), fall-related (21.2%), blunt trauma (10.1%), penetrating injury (gunshot or knife, 7.4%), and auto-pedestrian (5.1%). The mode of transportation after the traumatic event demonstrates poor emergency service infrastructure with only 4.6% arriving by ambulance, 87.2% arriving by public or private transportation, and 2.6% by motorcycle. The median time from trauma to surgery was 48 hours. POMR was 1.5%, and 11.4% of patients received 1 or more units of blood.

**Interpretation:** Surgical trauma patients in a large trauma referral hospital in Kenya are young, male, previously healthy and primarily

involved in motor vehicle and motorcycle trauma. Delayed presentation and a low rate of ambulance delivery indicate a lack of options for trauma care and poor infrastructure for coordinated care from field to hospital. The point of care perioperative data collection tool utilized by anesthesia personnel can provide detailed information that guides interventions for the development of a trauma system within a country in East Africa. Future directions will include utilizing this tool in more rural hospitals to define where interventions in the trauma care pre-referral hospital transfer are needed.

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### Implementation of an electronic medical record for HIV programs in resource-limited settings: A Nigerian case study

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**Program/Project Purpose:** Nigeria's HIV treatment scale-up has stressed pre-existing inadequacies in the paper-based health information system (HIS). A 2013 nationwide Quality of Care exercise reported a 21% completion rate for HIV clients' medical charts. Poor documentation limits the integrity and impact of clinical decision-making, and compromises the quality of services delivered. The Institute of Human Virology Nigeria is a large local NGO that supports healthcare facilities (HCFs) to provide HIV services. We piloted an EMR system at public HCFs in North-Central Nigeria to improve documentation, data reporting and ultimately, patient care.

**Structure/Method/Design:** Between May 2011 and December 2012, a 5-member core team of engineers and programming staff piloted the Open MRS EMR in 23 of 629 public HCFs in Nasarawa State. We selected 13 Primary Healthcare Centers (PHCs), 8 secondary and 2 tertiary HCFs according to results of baseline assessments for telecommunications/electricity coverage and Human Resource capacity. HCFs with  $\geq 500$  HIV-positive clients enrolled were prioritized. Agreements were signed with facility ART Coordinators, and Medical Records heads were designated EMR Focal Persons. Computers, Local Area Networks and internet modems were provided, and site-level pre-implementation training was conducted for each HCF.

**Outcomes & Evaluation:** A total of 254 HCF staff were trained on basic computer use, EMR and minimal maintenance. The majority (94%) of HCF staff had never used an EMR. Only 1 HCF lacked telecommunications coverage; 10 (43.5%) HCFs met criteria for  $\geq 180$  minutes of daily power supply- only 2 (20%) were PHCs. At the end of the pilot, 17 (73.9%) HCFs switched to EMR, but for data reporting only. These HCFs reported elimination of missing/incomplete client records, and also met HIS reporting standards for timeliness and completeness. EMR implementation in this resource-limited setting was successful in terms of data storage/reporting. Challenges included inconsistent internet coverage, HCF staff resistance (citing increased workload and turf intrusion), distrust of technology and concerns about impersonal provider-client interactions.

**Going Forward:** Inconsistent internet/power supply were major implementation barriers, in addition to HCF staff resistance, stemming largely from low IT capacity and EMR inexperience. Scale-up phase adjustments include facility-organized stepdown trainings and provision.

**Funding:** US Government PEPFAR grant to Institute of Human Virology-Nigeria.

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### The diaspora health network: A new mechanism of mobilizing foreign US-based health professionals for international health

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**Program/Project Purpose:** It is estimated that 265,000 physicians of foreign origin are practicing in the US, 129,000 of whom come from low and low-middle income countries. Much of the focus on physician migration has been on the impact of their absence on the health systems of their home countries. However, emerging research suggests that an important subset of immigrant health professionals contribute or desire to contribute to building and strengthening home country health systems. While information on priorities and relevant volunteer opportunities could facilitate targeting of efforts, there is no single space where immigrant health professionals can be mobilized and provided with said content.

**Structure/Method/Design:** The Diaspora Health Network was founded by students and faculty at the Johns Hopkins Bloomberg School of Public Health (JHSPH) to provide an online resource for health professionals seeking to effect positive change in the health systems of their home countries. An interactive online portal was built with country-specific "engagement gateways" which included health data, up-to-date commentary, and volunteer opportunities from a pilot set of 5 countries. The portal also features a series of case examples of diaspora-led sustainable health interventions, a blog, and a forum to support community building amongst diaspora. Opportunities where diaspora can make significant contributions are being actively sourced from global health organizations and partners and vetted for capacity and potential for long-term impact. Online and in-person marketing approaches are being employed to reach unengaged health professionals.

**Outcomes & Evaluation:** Initial outreach collaborations have been planned or carried out successfully with US medical associations, diaspora associations (such as the Association of Nigerian Physicians in the Americas), USMLE test prep companies, and JHSPH. Country pages for Nigeria, Mexico, Zimbabwe, India, and Nepal have been created and are being circulated. Programs have been implemented to locate and vet opportunities in partnership with international health organizations and grassroots movements alike.

**Going Forward:** Continued intensive outreach will be carried out for both health professionals and trainees, while opportunities will continue to be added to the site. High-impact practical content is being written and collated to create a "manual of engagement" for diaspora to ensure that their contributions encourage sustainability and are of high quality. Finally, in-person gatherings are planned to provide more opportunities for networking and international health practice preparation.

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### Using low cost android tablets and instructional videos to teach clinical skills to medical students in Kenya

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