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Background: Despite progress made in halting the global HIV epidemic, new infections among injection drug users (IDU) in Eastern Europe and Central Asia are increasing, and accounted for 10% of all new HIV infections globally in 2010. With 1.8 million IDUs, the Russian Federation (RF) alone contributed to 70% of these infections. Despite ample evidence on effectiveness of needle exchange programs (NEP), the RF is not actively promoting their development. Our project aims to assess the potential health and cost benefits of scaling-up of NEPs in the RF using our advanced modeling tool.

Structure/Method/Design: Using standard systematic review methods, we searched and screened studies assessing the direct and indirect effect of NEP on HIV-related outcomes globally. We extracted outcome data from eligible studies, transformed them to standard metric of relative risk reduction (RRR), and calculated summary measures using the random-effects meta-regression model. We developed and calibrated a Markov–state mathematical model to capture the dynamics of the HIV epidemic in the RF and transformed it into our user-friendly, interactive, web-based tool entitled “Global Health Decisions Policy Explorer.”

Results (Scientific Abstract)/Collaborative Partners (Programmatic Abstract): Our meta-analysis revealed that NEP attendance is associated with a 57% (52% to 62%) reduction in needle sharing in IDUs. Using this and other data in our model, we estimate that increasing the coverage of NEPs from 6% to 10% of IDUs in the RF will prevent 11,830 HIV infections and 3369 AIDS-related deaths over the next 20 years for approximately \$39 million. Scale-up of programs to reach 25% or 50% of IDUs would avert 70,000 or 164,000 infections, respectively, and 20,000 and 46,000 deaths when compared with the baseline scenario for the cost of \$233 million and \$557 million.

Summary/Conclusion: Resource allocation and governance needs to rely on sound evidence that is easy to use. Our project suggests that large gains in HIV prevention can be made in the Russian Federation through scale-up of NEPs.

Designing an Institute for Health and Technology: The Amsterdam Living Lab

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Background: In April 2013 the city of Amsterdam launched the Amsterdam Metropolitan Solutions design contest, soliciting designs for a new technical institute that would help Amsterdam to attract and retain international talent in applied technology, contribute to innovation while complementing existing strategic initiatives, develop and market metropolitan solutions to create economic value and improve the quality of living and working in Amsterdam, have a positive impact economically, and ensure sustainable connections regionally and globally. In return, the city offered the unique setting of a “Living Lab,” access to its sociodemographic and economic data, linkage to its international networks, and support in acquiring grants and investments.

Structure/Method/Design: The Amsterdam Institute for Global Health and Development (AIGHD), in collaboration with the Duke Global Health Institute (DGHI) and their respective consortium

partners (academia, private sector, investors, media, and civil society organizations), proposed establishing the Amsterdam Institute for Health and Technology (AIHT). AIHT is to be a world-class open innovation programme promoting healthy living and improved health services for urban populations globally. As a leading node in a global knowledge network, AIHT will identify, pilot, apply, and evaluate cutting-edge health technologies from around the world. These comprise health informatics, digital/mobile health, devices, point-of-care diagnostics, robotics, and domotics, including innovations with high-potential health impact in resource-constrained settings. Harnessing strategic links with academic, business, and other partners locally and globally, AIHT will facilitate the adoption of novel proven health technologies into urban health ecosystems to improve health and enhance the delivery of affordable, quality care.

Results (Scientific Abstract)/Collaborative Partners (Programmatic Abstract): The AIHT proposal is anchored in a threefold mission of education and training, scientific discovery and technical innovation, and knowledge translation and valorisation. AIHT was awarded second place in a field of 13 international consortia. Its strong points include its emphasis on creating a health-related Living Lab across Amsterdam based on Learning Health System principles, proposed MedTech incubator/science park facilities, focus on actual demand for solutions, and the quality and depth of its proposed education and training programmes. Negotiations are close to completion for the initial 3 years of funding.

Summary/Conclusion: In the face of rising health care costs across the globe, urbanisation influencing health worldwide, and the ageing of urban populations, applied innovative technology could offer solutions that would reduce costs while improving quality of life and health. AIHT aims to be a globally recognized knowledge node of technological innovation and its application to wellness promotion, disease prevention, and the delivery of efficient, quality health care services in Amsterdam and worldwide.

Understanding the emerging role of ultrasound in Colombian emergency medicine residency training

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Background: Emergency medicine (EM) is emerging as a specialty in Colombia with five residency programs and a growing presence throughout the country. Many residency programs and emergency departments are beginning to incorporate point-of-care (POC) ultrasound into their education and there is interest nationally in integrating POC ultrasound into a standardized emergency medicine residency curriculum. The objective of the study was to conduct a nationwide survey of Colombian EM residents to gain a better understanding of the current state of POC ultrasound use within EM residencies and to examine specific barriers preventing its expansion.

Structure/Method/Design: We conducted a mixed-methodology survey of all available current EM residents in the five EM residencies in Colombia (three in Bogota and two in Medellin). A quantitative needs-assessment survey was used, which assessed previous ultrasound experience, current use of various applications, desire for

further training, and perceived barriers to expanded use. In addition, eight focus group discussions (FGDs) were conducted with both current EM residents and various faculty members to gather additional qualitative insight into current practice patterns and perceived barriers.

Results (Scientific Abstract)/Collaborative Partners (Programmatic Abstract): Eighty clinicians completed the survey, 69 of whom were EM residents and are included in the analysis. The response rate for our study among all current EM residents in Colombia at the time of administration was 85%. Fifty-two percent of resident respondents had previously used an ultrasound machine during their training; however, of these, 58% indicated that they had performed <10 scans and only 17% reported >40 scans. The most frequently used applications indicated by respondents were trauma, obstetrics, vascular access, and echocardiography. Only a quarter indicated that they had ever received any formal ultrasound training, but all indicated interest in learning more. Significant barriers to ultrasound training included lack of trained faculty teachers (indicated by 78% of respondents), absence of ultrasound machines (57%), and limited time (41%). In FGDs, additional barriers identified were inter-specialty conflicts over the control and charging of ultrasonography, both institutionally and nationally, as well as program-specific curricula decisions regarding the importance of POC US within EM practice. **Summary/Conclusion:** While currently limited, EM residents in Colombia have a strong interest in integrating POC ultrasound into their practice and training. The many current barriers to its expanding use reflect both traditional barriers such as a lack of equipment seen in many lower income developing nations as well as inter-specialty conflicts typical of more high- and middle-income developed countries. Further collaboration is underway to overcome these barriers and further integrate POC ultrasound as a standard of care into Colombian EM residency training.

The role of mobile health technologies in improving community health seeking practices in rural Uganda

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Background: Recent studies have shown that mobile health (mHealth) technologies have become increasingly integrated into health care delivery systems. Systematic reviews of previous studies on mHealth in developing countries have demonstrated that mobile technologies may be a useful platform to deliver messages not only to track health behavior change, but also to improve behavior change communication. The objective of this study is to identify how current mHealth programs are being utilized in rural clinics and what improvements can be made to connect the community health care infrastructure via mHealth in order to augment health care delivery. **Structure/Method/Design:** Key informant interviews and focus groups were conducted over a 3-week period in seven villages surrounding Engeye Health Clinic in Ddegeya, Uganda. Local stakeholders included, Volunteer Health Team personnel (VHTs), health care providers, and local leaders. Focus groups incorporated a Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis strategy with VHTs. Questions were grouped into categories of VHT job description, perceptions and challenges as a VHT, interactions with Engeye Health Clinic and attitudes regarding the government-sponsored mHealth program, “mTrac.” Translation was provided from local trained interpreters. Qualitative analysis through iterative-grounded theory was used to code and develop themes.

Results (Scientific Abstract)/Collaborative Partners (Programmatic Abstract): Seven focus groups were conducted, with a total of 19 key informants participating in interviews. Key findings from data demonstrate that VHTs function primarily as “front-line” community health workers in remote, low-resource communities. They provide access to medications and referrals to government health care facilities. They also operate as the ground-level surveillance team for the national health system, sending weekly mTrac text message reports to the Ministry of Health. VHTs are a main source of health education to the community. Challenges include a need and demand for more VHT training, inadequate assistance from the local government, maintaining medication availability, lack of consistent electricity for mHealth reporting, and transportation restrictions. These results indicate critical gaps in the local health care infrastructure that need to be addressed in order to establish more efficient delivery of health care services.

Summary/Conclusion: Ensuring flow of accurate and timely health information, education, and supplies encompass the primary challenges faced by VHTs and the health system. Engeye may serve as a linchpin in connecting mTrac and other government health programs to the provision of health care at the community level. Through proximity and the services that Engeye already offers, the clinic may strengthen the roles that VHTs have in empowering the communities to take charge of their health and well-being. Further work is needed to assess how this can be accomplished.

iNurse: Intelligent, low-cost pediatric vital signs monitoring system

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Background: Within the developing world, hospitals and clinics operate with low resources, lack of health infrastructure, and an insufficient number of physicians and nurses—particularly in pediatric wards. As a result, health staff are chronically overwhelmed, and unable to adequately monitor infant patients due to high patient-to-nurse ratio common in such low-resource settings. With no effective vital signs monitoring system, poor health outcomes are rampant, since these medical staff are unable to be alerted during acute infant distress and cannot track pediatric health outcomes over time.

The iNurse is a medical device that addresses this critical health care need by providing continuous, low-cost, and intelligent vital signs monitoring for neonates. Specifically, this system allows for the short- and long-term tracking of infant heart rate, respiratory rate, and body temperature, coupled with an alerting system to notify medical staff of distress and a feedback mechanism to wake neonates from apneic episodes. All vital signs data is transmitted wirelessly to an Android tablet computer, allowing for the tracking of up to 30 patients from a single “central hub.”

Structure/Method/Design: This iNurse consists of a dual belt system, and employs two embedded stretch sensors in parallel that capture respiratory expansion and contraction in both the infant chest and abdomen. The lower belt also contains an embedded surface thermistor to provide accurate abdominal skin temperature measurements. Both belts contain electrocardiogram (EKG) probes in a standard three-lead configuration, from which heart rate data is extracted. At scale, we project the iNurse to have a manufacturing cost of under USD 75.