3) What successful characteristics ensure sustainability of a program?

The evaluated existing programs ranged in varying forms of technology: radio and print, visual media, and mobile systems.

Evaluation: A project based on visual media and supported by printed resources demonstrates the greatest feasibility to spread education on child nutrition in developing countries. Visual media and printed materials can be distributed most efficiently based on resource availability and flexibility in content translation for various languages and cultures. Mobile-based education may prove more difficult to establish due to increased time and resources needed to integrate a complex system, nonetheless it has the most capacity for large-scale efforts. Mobile technology has great potential to bridge the gap in remote health services, and visual media can be an appropriate and attainable first step moving forward.

Going Forward: In order to truly evaluate and create a successful program, a pilot study to assess the strengths and weaknesses of a small-scale technological intervention in a resource-limited area would be essential. Ultimately, a further developed project could stand as a fundamental model to be replicated in developing regions around the world.

Abstract #: *2.009_TEC*

The role of integration in achieving an AIDS-free generation: Best practices from a comprehensive review of the peer-reviewed and gray literature

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Background: The global health community has recently turned its attention toward integration of health programs as an innovation to optimize resources and achieve greater impact. However, knowledge of the impact of and best practices for such integrated programming is limited. To fill these gaps, we conducted a scan of the peer-reviewed and gray literature of programs integrating HIV services with family planning (FP), maternal and child health (MCH), malaria, nutrition, tuberculosis (TB), and/or water, sanitation, and hygiene services.

Methods: We searched three databases for evaluations of HIV-integrated programs in lower- and middle-income countries published since 2010: (1) PubMed for systematic reviews and meta-analyses, (2) USAID Development Experience Clearinghouse for project evaluations, and (3) Google Scholar for highly cited articles.

Findings: We reviewed 291 peer-reviewed articles and 68 program evaluations. From the peer-reviewed literature, we identified several approaches with demonstrated impact on HIV and other health outcomes, including: opt-out, provider-initiated testing and counseling (PITC) for HIV within FP and MCH services; administration of malaria prophylactic treatment in co-endemic areas and prioritization of pregnant women; integration of ART directly into antenatal clinics; vitamin A or beta-carotene supplementation for pregnant women and children with HIV; PITC, care, and preventive therapy for TB within HIV settings as well as PITC of HIV at TB clinics; and supporting exclusive breastfeeding. The program evaluations, while lacking implementation details, revealed several lessons and recurring themes including: the need for long-term funding cycles and a focus on health systems strengthening to guarantee successful integration results; the importance of investing in robust study designs and M&E systems to attribute effects; and the use of wrap-around services to enhance retention in care. Commonly used integrated approaches included services coordination at the facility level, community mobilization, behavior change communication, social marketing, public-private partnerships, and male involvement.

Interpretation: It is time to integrate services intelligently by taking evidence-based interventions with demonstrated impact on HIV and other health services to scale; failure to do so denies the synergies of integrated programming. Donors and programs should invest in impact evaluations and documentation of implementation details to facilitate replication and adaptation of innovative integrated approaches.

Abstract #: *2.010_TEC*

Innovating health systems monitoring and evaluation in low- and middle-income countries: Lessons for knowledge translation

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Background: To achieve sustainable and resilient health systems, examining existing health systems performance built upon the best available evidence and a strong information system is vital. However, many low- and middle-income countries still lack the needed capacity to develop a responsive and robust monitoring and evaluation mechanism. To address this, this study investigates on available assessment technologies and innovations, data visualization tools, and other monitoring and evaluation mechanisms that countries can use despite limited resources. This study provides baseline information on these assessment and visualization technologies and innovations that are targeted for LMICs.

Methods: Online databases from 2000 to present were searched systematically for innovative monitoring and evaluation mechanisms. Published studies, reports, including grey literature relevant on the topic were identified through a systematic search using the following strategies: first, to identify peer-reviewed publications, online databases such as PubMed, EMBASE, PsycInfo and the WHO GIFT and IRIS tools were searched, including their reference lists using designated MeSH terms. Second, select government and non-government organizations and research institutions were contacted to collect further information. For each technology and innovation applied for monitoring and evaluation and knowledge translation, we parsed the assessment and visualization tools to identify similarities between them, which we catalogued into a framework comprising the assessment domains and visualization requirements.

Thematic analysis was conducted to determine opportunities and challenges for implementation in resource-limited settings.

Findings: We identified 8 tools and innovations that can be used for health systems monitoring and evaluation, including 3 data visualization tools that can be used for knowledge translation. These sample cases were compiled and described and results of analysis of challenges and opportunities for implementation were summarized. We identified specific requirements for successful utilization of such tools and how its use can be maximized for policymaking.

Interpretation: Different organizations use a large number of assessment tools, but its success for implementation in resource-limited settings have yet to be tested. This study outlines these challenges, as well as the opportunities, that need to be either addressed or tapped by organizations aiming to improve health systems performance and provide better knowledge translation.

Funding: None.

Abstract #: *2.011_TEC*

Digital surveillance of prescription drug abuse: An accessible methodology for collecting and analyzing twitter NUPM data

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Background: Youth and adolescent non-medical use of prescription medications (NUPM) has become a national epidemic. However, little is known about the association between promotion of NUPM behavior and access via the popular social media microblogging site Twitter, which is currently used by 1/3rd of all teens.

Objective: In order to better assess NUPM behavior online, this study conducts surveillance and analysis of Twitter data to characterize the frequency of NUPM-relevant tweets and also identifies illegal access to drugs of abuse via online pharmacies.

Methods: Tweets were collected over a two-week period from April 1−14, 2015 by applying NUPM keyword filters for both generic/chemical and "street" names associated with drugs of abuse using the Twitter public streaming API. Tweets were then analyzed for relevance to NUPM and whether they promoted illegal online access to prescription drugs using a protocol of content coding and supervised machine learning.

Findings: A total of 2,417,662 tweets were collected and analyzed for this study. Tweets filtered for generic drugs names comprised 232,108 tweets (including 22,174 unique associated URLs) and 2,185,554 tweets (376,304 unique URLs) filtered for street names. Applying an iterative process of manual content coding and supervised machine learning, 81.7% of the generic and 12.3% of the street NUPM data sets were predicted as having content relevant to NUPM respectively. By examining hyperlinks associated with NUPM relevant content for the generic Twitter data set, we discovered that 85.5% of the tweets with URLs included a hyperlink to an online marketing affiliate that directly linked to an illicit online pharmacy advertising sale of Valium without a prescription.

Interpretation: This study examines the association between Twitter content, NUPM behavior promotion, and online access to drugs using a broad set of prescription drug keywords. Initial results are concerning, as our study found over 45,000 tweets that directly promoted NUPM by providing a URL that actively marketed illegal online sale to a prescription drug of abuse. Additional research is needed to further establish the link between Twitter content and NUPM, as well as to help inform future technology-based tools, online health promotion, and public policy to combat NUPM online.

Abstract #: *2.012_TEC*

Blended learning in a low-resource environment

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Background: The global burden of surgical disease is a well documented but often under prioritized global health initiative. Deaths due to anesthesia remain a significant contributor to perioperative mortality in developing countries. Most of these deaths are consider avoidable and many anesthesia providers suffer from a lack of training and educational resources.

Blended learning, an old educational concept that has gained recent attention in medical curriculum, combines online learning outside of the lecture hall with an in-class activity. This "flipped classroom" approach allows the student to learn at his or her own pace using the video-based resources, and then reinforces that knowledge in the classroom through interactions with teachers and peers.

This study aims to evaluate the usefulness of a blended learning course in a low-resource setting.

Methods: Through a NIH-funded Medical Education Partnership Initiative grant that partners Stanford University with the University of Zimbabwe College of Health Sciences (UZCHS) to promote medical training and research in developing countries, the anesthesia departments formed a collaboration to increase educational resources for the anesthesia trainees. A needs assessment determined the UZCHS registrars (residents) desired video lectures. A blended learning lecture series was created utilizing video lectures and classroom learning activities for four topics covering anesthetic emergencies. Anonymous knowledge tests and five-point Likert scale surveys evaluating clinical preparedness were distributed to the UZCHS registrars before and after the educational invention. The surveys also evaluated the clinical relevance, usefulness, and adaptability of the learning modules.