Implementation Science in Kenya........
and opportunities for Partnerships

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Director, Division of Strategic Health Information & Research, Ministry of Health, Kenya

Centre for Interdisciplinary Research on AIDS, Yale University, April 24, 2017
Research Interests
• **Aim 1**: Evaluate seek test treat retain – ‘Testing & Linkage to Care for IDUs’ (TLC-IDU Kenya) – using a stepped wedge cluster-randomized design.

• **Aim 2**: Conduct mathematical modeling to estimate community viral load in IDU injecting and sexual networks, and to assess potential population-level impact of the TLC-IDU

• **Aim 3**: Assess the incremental cost-effectiveness ratio of the TLC-IDU model, using a national payer perspective.
Other Selected Research Interests

High-yield HIV Testing, Facilitated Linkage to Care, and Prevention for Female Youth in Kenya
Agot, Kawango  Inwani, Irene  Kurth, Ann Elizabeth
Yale University, New Haven, CT, United States

Systems analysis and improvement approach to optimize the pediatric HIV diagnosis and care cascade (SAIA-PEDS)
Sherr, Kenneth
University of Washington, Seattle, WA, United States

Assisted Partner Notification to Augment HIV Treatment and Prevention in Kenya
Farquhar, Carey
University of Washington, Seattle, WA, United States
Assisted partner services for HIV in Kenya: a cluster randomised controlled trial

Peter Cherutich, Matthew R Golden, Beatrice Wamuti, Barbra A Richardson, Kristjana H Ásbjörnsdóttir, Felix A Otieno, Ann Ng’ang’a, Peter Maingi Mutiti, Paul Macharia, Betsy Sambai, Matt Dunbar, David Bukusi, Carey Farquhar, for the aPS Study Group

Summary

Background Assisted partner services for index patients with HIV infections involves elicitation of information about partners and contacting them to ensure that they test for HIV and link to care. Assisted partner services are not widely available in Africa. We aimed to establish whether or not assisted partner services increase HIV testing, diagnoses, and linkage to care among sex partners of people with HIV infections in Kenya.

Methods In this cluster randomised controlled trial, we recruited non-pregnant adults aged at least 18 years with a recent seroconversion to participate. A semi-randomised allocation approach was used with a 1:1 allocation ratio to intervention or control in 24 clusters. The study took place in 2014-2016.
Policy Initiatives

• Scale up of HIV testing through various approaches
  – Introduction of HIV self-testing into national guidelines

• Catalyzed the discussions on Pre-exposure prophylaxis for HIV prevention
  – Now leading the research and impact evaluation thematic group

• Large scale implementation of male circumcision

• Re-engineer HIV prevention in Kenya
  – Prevention revolution

• Now leading discussions on unique personal identifiers as part of health informatics
Kenya’s HIV epidemic

Adults aged 15 to 49 prevalence rate 5.9% [4.9% - 7.0%]

Progress

- New HIV infections among children
  - 2007: 23,000
  - 2013: 12,940
  - 44% reduction in new HIV infections

- New HIV infections among adults
  - 2007: 95,000
  - 2013: 88,620
  - 7% reduction in new HIV infections

ART Coverage of eligible adults

- 2008
  - (At CD4 200): 66%
  - (At CD4 350): 62.1%

- 2013
  - (At CD4 350): 79.9%
  - (At CD4 500): 77.2%

- 2014
  - (At CD4 500): 64%
  - (At CD4 500): 61%

Geographical Heterogeneity

10/47 counties > 60% of prevalent HIV

Sources: UNAIDS 2015 estimates; Kenya Ministry of Health.
HIV Care Cascade—the trouble with first 90

Stable HIV Incidence after a rapid decline
Dissecting the Know-Do Gap
“PUBLICATION PATHWAY”  
Balas & Boren, 2000

Original Research

Implementation

It takes

17 years
to turn

14 percent

of original research to the benefit of patient care

CLOSE THE GAP

Science

Implementation Science Publication Trends, 2000-2017

- Number of articles indexed by PubMed


- 2000: 0
- 2001: 4
- 2002: 3
- 2003: 19
- 2004: 11
- 2005: 23
- 2006: 47
- 2007: 58
- 2008: 88
- 2009: 148
- 2010: 217
- 2011: 336
- 2012: *114

* through March 2017
Case Study on Male Circumcision
Summary of randomized, controlled trials on adult male circumcision

<table>
<thead>
<tr>
<th></th>
<th>South Africa</th>
<th>Kenya</th>
<th>Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technique</td>
<td>Forceps guided</td>
<td>Forceps guided</td>
<td>Sleeve</td>
</tr>
<tr>
<td>Operative setting</td>
<td>Local general practitioner office</td>
<td>Study clinic</td>
<td>Hospital</td>
</tr>
<tr>
<td>Cautery</td>
<td>No</td>
<td>No</td>
<td>Yes (bipolar)</td>
</tr>
<tr>
<td>No.</td>
<td>3,128</td>
<td>2,784</td>
<td>4,996</td>
</tr>
<tr>
<td>No. intervention/control</td>
<td>1,546/1,582</td>
<td>1,391/1,393</td>
<td>2,474/2,522</td>
</tr>
<tr>
<td>Age range</td>
<td>18–24</td>
<td>18–24</td>
<td>15–49</td>
</tr>
<tr>
<td>Median age</td>
<td>21</td>
<td>20</td>
<td>Not available</td>
</tr>
<tr>
<td>% Married</td>
<td>1.80</td>
<td>7</td>
<td>47</td>
</tr>
<tr>
<td>Randomized if HIV pos</td>
<td>Yes*</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Planned mos followup</td>
<td>21</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>% Completion of followup</td>
<td>63</td>
<td>87</td>
<td>73</td>
</tr>
<tr>
<td>% Adverse events (immediate)</td>
<td>3.8</td>
<td>1.7</td>
<td>7.6</td>
</tr>
<tr>
<td>% Total seroconversions in followup</td>
<td>2.2</td>
<td>3.1</td>
<td>1.3</td>
</tr>
<tr>
<td>No. seroconversions (intervention/control)</td>
<td>20/49</td>
<td>22/47</td>
<td>20/47</td>
</tr>
<tr>
<td>Adjusted incidence rate ratio (95% CI)</td>
<td>0.39 (0.23–0.66)</td>
<td>0.41 (0.28–0.78)</td>
<td>0.49 (0.29–0.81)</td>
</tr>
</tbody>
</table>

* Not included in final analysis.

Figure 1. Timeline and key milestones of the voluntary medical male circumcision program in 14 priority countries. 6 million circumcisions listed in 2013 is an estimate by PEPFAR and the Bill & Melinda Gates Foundation. RCTs, randomized controlled trials; TWG, technical working group; TAG, technical advisory group; MOVE, Models for Optimizing the Volume and Efficiency of MC services. doi:10.1371/journal.pmed.1001641.g001

Figure 3. Scale-up of voluntary medical male circumcision program and coverage in 14 priority countries, 2008–2012. Totals reflect progress through 2012. Percentage figures represent the achieved proportion of the target of 80% coverage among males ages 15–49, but totals include circumcisions done for all age groups, regardless of the age-range target. Data obtained from WHO 2012 VMMC report [38]. doi:10.1371/journal.pmed.1001641.g003
### Table 4. Country progress with scaling-up VMMC programs in focal countries (December 2010).

<table>
<thead>
<tr>
<th>Country</th>
<th>Key Elements of VMMC Program Scale-Up</th>
<th>Total Scale-Up Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Situational Analysis Completed* (Full orSelective)</td>
<td>Leadership: Prominent National Champion Engaged</td>
</tr>
<tr>
<td>Botswana</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Kenya</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Lesotho</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Malawi</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Mozambique</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Namibia</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Rwanda</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>South Africa</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Swaziland</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Tanzania</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Uganda</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Zambia</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Score range is 0 (lowest) to 3 (highest).
*The grading is based on the date of publication or official launch of these documents.
doi:10.1371/journal.pmed.1001133.t004

HIV Infections Averted by 2025 if 80% coverage in 5 years

Five countries, ~80% potential global impact of MC

Note: Assumes each country achieves 80% MC prevalence target by 2015. Kenya infections averted only applies to Nyanza province. MC targets have been revised for select countries since original WHO goals were set, changing total MC target to ~22 M.


16.1% to 46.7% within target ethnic group
Early on: Communicating about partial protection
Different service delivery channels

- Partnering with health facilities
- Using nurses to perform surgery
- Mass Campaigns
Mass Campaigns-2010/2011

- 36,077 MCs (120% achievement)
- 28,445 (79%) in 7 of the 11 target districts:
  - Average 10 (8-12) MCs/team/day
  - 56% tested for HIV during RRI
  - Men ≥15 year – 55%
  - Seven day follow up - 23%
  - Overall AE - 1.9% (1.83% = mod, 0.05% = severe)
    - For 6,595 returning for F/up: 8.4% AEs (8.2% mod, 0.2% severe)
  - Deferred or opted out - 694 (256 and 438 respectively)
Geospatial Focus

Number of MCs required (‘000s)

Top 7 VMMC priority counties

Derived from KAIS, 2012 and WHO Modeling EPP,
Surgical Efficiency

- Models for Optimizing Volume and Efficiency (MOVE)
  - use of task-shifting,
  - task-sharing,
  - pre-bundled kits with disposable supplies,
  - rotation among surgical beds, electrocautery,
  - and forceps-guided surgical method

<table>
<thead>
<tr>
<th>No. of MMCs performed</th>
<th>Mean duration, min (SD)</th>
<th>Clinic system</th>
<th>Active system</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>≤ 20 MMCs (ref)</td>
<td>24.0 (9.6)</td>
<td>1069</td>
<td>3.4</td>
</tr>
<tr>
<td>21–100 MMCs</td>
<td>18.3 (6.4)</td>
<td>1385</td>
<td>2.7</td>
</tr>
<tr>
<td>101–200 MMCs</td>
<td>17.6 (6.1)</td>
<td>813</td>
<td>1.1</td>
</tr>
<tr>
<td>201–302 MMCs</td>
<td>15.5 (5.5)</td>
<td>438</td>
<td>0.7</td>
</tr>
</tbody>
</table>

CI, confidence interval; MMC, medical male circumcision; OR, odds ratio; SD, standard deviation.
Key Lessons Learnt

• Deep commitment for impact-driven approach to scale up
  – Significant population coverage
  – High intensity-3-5 years

• Social change necessary for uptake
  – Community ownership
  – Meaningful engagement with political, cultural and social leaders

• Government leadership, coordination and strong partnerships
  – Technical and programmatic support from government
  – Passionate researchers, NGO’s
  – Timely funding-PEPFAR, Bill & Melinda Gates Foundation
Case Study on HIV Prevention Revolution
All Regions, all Epidemics are not born equal

Example of map created using DHS data

Method: Ordinary Kriging

HIV prevalence

0 %

30 %

0 500 1,000 2,000 Kilometers

Model statistics confirm suitability of method for modelling HIV prevalence
65% of new infections occur in nine of the 47 Counties

21% of new adult HIV infections occur among young women aged 15-24 every year

- 2.5% Health Facility Related
- 3.8% Injecting Drug Use (IDU)
- 15.2% MSM and Prison
- 14.1% Sex workers and Clients
- 20.3% Casual heterosexual sex
- 44.1% Heterosexual sex within union

Modes of Transmission 2008

<table>
<thead>
<tr>
<th>County</th>
<th>New Infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homa Bay</td>
<td>15,003</td>
</tr>
<tr>
<td>Kisumu</td>
<td>12,645</td>
</tr>
<tr>
<td>Siaya</td>
<td>12,059</td>
</tr>
<tr>
<td>Migori</td>
<td>8,292</td>
</tr>
<tr>
<td>Kisii</td>
<td>5,976</td>
</tr>
<tr>
<td>Nakuru</td>
<td>4,326</td>
</tr>
<tr>
<td>Turkana</td>
<td>3,141</td>
</tr>
<tr>
<td>Nyamira</td>
<td>2,507</td>
</tr>
<tr>
<td>Bomet</td>
<td>1,965</td>
</tr>
</tbody>
</table>
Need to do more and do it better!

[Graph showing trends over time with different intervention scenarios.]
Estimated Health Production Functions (HPFs) for each county in Kenya.

The HPF defines the expansion pathway for services that maximizes the health generated (articulated as ‘Infections Averted’) for input cost. (a) HPFS for each county are plotted. Across counties, the shape and scale of the HPFs vary substantially due to difference in underlying epidemiological and demographic conditions. (b) The plot shows the relative priority of each form of intervention in each county (vertical scale) for each county (horizontal scale). Blue colour indicates that the strategy comes early in the optimal expansion pathway for that county; red colour indicates that the strategy is introduced only at the end of the optimal expansion pathway. There is broad consistency in the expansion pathways across the counties although there are key different in the relative priority of more expensive interventions for lower risk groups. (Key: M-Men, W-Women, SW-Sex Workers; BC- Behaviour Change, ART- Early ART (>350 cells per microlitre), MC – Male Circumcision and Pr –PrEP)
Optimizing allocations funds between counties for maximum prevention impact.

Budget = \( X \)

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In each panel, a comparison is made of the configuration of intervention across the country, either when ignoring data on epidemic heterogeneities (upper part) or when using that data (lower part). Each box indicates whether the intervention (vertical axis) in that county (horizontal axis) is used: green for not used and yellow for used. Without using the data on epidemic heterogeneities, interventions are deployed uniformly across counties, whereas when using that information, intervention effort is redirected to other interventions in particular counties.
2.0 HIV Prevention Revolution Road Map

This Road Map addresses the gaps in the current HIV response and seeks to catalyze HIV prevention in Kenya. It is neither a formal guideline or standard operating procedure for service delivery nor is it intended to replace existing programming guidelines. Rather, the Road Map, based on current knowledge of effective interventions and expected funding for the response, aims to dramatically strengthen HIV prevention, with the ultimate goal of reducing new HIV infections to zero by 2030.

Overall Goal: Countdown to Zero New HIV infections by 2030

- 50% Reduction of new HIV infections occurring in Kenya by 2015
- 75% Reduction of new HIV infections occurring in Kenya by 2020
- 100% Elimination of new HIV infections occurring in Kenya by 2030
## Proposed Strategic Shifts

1. From intervention-driven to population-driven
2. From heavily biomedical-dependent to a combination-prevention package; biomedical, behavioural and structural interventions
3. From health sector-driven to an approach that makes HIV prevention everyone’s business
4. From a national approach to geographical (County clusters) approach

### Re-thinking HIV Prevention

<table>
<thead>
<tr>
<th>From National to County clusters approach</th>
<th>High, Medium, Low incidence cluster</th>
<th>Timely data on granularity of epidemics</th>
<th>Timely incidence surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td>From intervention driven to population-driven interventions</td>
<td>Age and sex disaggregation</td>
<td>Key populations</td>
<td>Bridging populations</td>
</tr>
<tr>
<td>From heavily biomedical-dependent to a mix combination of behavioural and structural</td>
<td>Combination prevention mix package by cluster and populations</td>
<td>Faster integration of research findings into policy &amp; practices</td>
<td>Unified and coordinated Research and Development for HIV prevention</td>
</tr>
<tr>
<td>Making HIV prevention everyone’s business</td>
<td>Leverage political leadership</td>
<td>Leverage social movements</td>
<td>Legal and structural reforms</td>
</tr>
</tbody>
</table>
Novel Surveillance Systems

- Focused investments in surveys, survey cycles, and institutional capacity
  - AIDS Indicator Surveys that define areas of high and low prevalence
    - Powered to give incidence estimates through incidence assays
    - Viral load on all positives and known positives not retested
  - Oversampling in the tails – high prevalence areas and some very low prevalence areas

- Significant investments in technology
  - Geographic information systems
    - Embedded in health information systems

- Need for viral load monitoring as an outcome of both treatment and prevention

- Case based surveillance
Incidence based clustering of regions
A new Research Agenda!

- Coordinated and synergetic R&D agenda
- Participatory agenda setting
- Unified R&D hub for information and knowledge management

Prioritise R&D for New and cost effective Prevention Tools

- Unified advocacy, policy and stakeholder engagement
- in synch with epidemic realities and right-based

Develop timely policy and guidelines

- Access policies
- Safeguarding IP
- Manufacturing plans

Increase national funding for R&D and set national R&D priorities

Expedite Demonstration and Delivery of newly found efficacious interventions

- Country own and led R&D
- Long-term commitment of partners and governments
- Capacity building for local scientist
Figure 5. Enabling factors and levers to achieve scale and impact for the voluntary medical male circumcision program. Strong enabling factors of leadership, policy, and financing are needed to accelerate and maximize the impact of scale-up of the VMMC program. The levers for scale—government management capacity, use of data for decision-making, and technologies—are needed to match supply and demand. doi:10.1371/journal.pmed.1001641.g005

Opportunities for collaboration

• Enhance the existing research partnership between Kenyan institutions and Yale University
  – Universities-Increase emphasis on non-communicable diseases, neglected tropical diseases and health informatics
  – Maximize opportunities for closing the 90:90:90 gap for HIV
  – Expand CIRA’s network to Kenya
  – Joint grant applications
  – Enhance research infrastructure

• Explore newer possibilities
  – MoH- Structured Implementation Science mentorship
  – Universities-Capacity building on Implementation Science, Big data analytics, artificial intelligence, precision medicine
Acknowledgements

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  – Ann Kurth