Testing and Linkage to Care as Gateways (or Closed Doors) to Successful HIV Control

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Testing and Linkage

• How are we doing?
• What are promising approaches?
• Opportunities and Challenges
• Way forward
HIV Care Continuum

- **Test**
  - HIV Positive

- **Engage, Counsel, Monitor, and Support**
  - HIV Care (PRE-ART)

- **Retain, Counsel, Monitor, and Support**
  - ART

- **Adherence and Viral Suppression**

McNairy et al, AIDS 2012
Awareness of HIV Positive Status -- Kenya (15-64 yrs)

For 2007:
- 84% Unaware of HIV Infection
- 56% never tested for HIV
- 16% reported HIV positive
- 28% reported HIV negative

For 2012:
- 53% Unaware of HIV Infection
- 16% never received test result
- 37% reported HIV negative
- 47% reported HIV positive
SHIMS PVL Cohort

Total # potentially eligible household members: 24,484* (Dec ‘10- June ‘11)

- No contact: 3,812* (15%)
- Refused: 2,493* (10%)
- Participated: 18,179* (74%)

- HIV+: 5,802* (32%)
- HIV-Neg: 12,370* (68%)

*unweighted

Justman et al, CROI 2013
Mean Population VL and Components

![Bar chart showing mean HIV-RNA copies/ml for Total, Unaware, and Aware categories.](chart.png)
Mean Population VL and Components

Mean HIV-RNA copies/ml

Total and components

Aware and components

- Total
- Unaware
- Aware
- On ART
- No ART
Patient Enrolment into HIV Care and Treatment within 90 Days of HIV Diagnosis in Eight Rwandan Health Facilities: A Review of Facility-Based Registers

- 8 health clinics
- 492 patients testing HIV+ from March-May 2009
- Testing sites: ANC, VCT, TB, OPD
- Median age 29 years, median CD4+ 387 cells/μL

Kaygamba et al Plos One, May 2012
## Linkage to HIV Care and ART by HIV Testing Service Type: Central Mozambique
A Retrospective Cohort Study

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Venue</th>
<th>N (%)</th>
<th>RR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART clinic enrollment ≤ 30 d of testing HIV +</td>
<td>VCT</td>
<td>16,232 (68)</td>
<td>Ref</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PMTCT</td>
<td>5657 (58)</td>
<td>0.84 (0.72 to 1.02)</td>
<td>0.08</td>
</tr>
<tr>
<td>CD4 Testing ≤ 30 d of enrollment</td>
<td>VCT</td>
<td>10,773 (45)</td>
<td>Ref</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PMTCT</td>
<td>2935 (30)</td>
<td>0.79 (0.66 to 0.94)</td>
<td>0.01</td>
</tr>
<tr>
<td>ART initiation ≤ 90 d of first CD4 test (if eligible)</td>
<td>VCT</td>
<td>2562 (11)</td>
<td>Ref</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PMTCT</td>
<td>321 (3)</td>
<td>0.51 (0.41 to 0.64)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

- No significant difference in HIV care enrollment between PMTCT and VCT
- Poor linkages between HIV testing and care hamper efforts to improve coverage for HIV care and treatment services.
- Increased loss to follow-up among women diagnosed in PMTCT relative to VCT

Gerdts et al. JAIDS 2014
Mean CD4+ Cell Count Over Time in Developed Countries

N = 44 studies

Lesko et al Clin Infec Dis 2013
Barriers to Testing and Linkage of HIV+

- Unaware of risk of HIV
- Disenfranchised and stigmatized population
- Fear of discrimination and stigma
- Unaware of benefits of knowledge of status
- Limited or difficult access to testing and care
- Provider bias or practices
- Unwelcoming services
**Table 2. Areas for intervention.**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Predictor of attrition</th>
<th>Barrier to care</th>
<th>Number of papers cited in</th>
<th>Referenced in</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECONOMICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport costs</td>
<td>YES</td>
<td>YES</td>
<td>13</td>
<td>18,27,29,32–35,37–39,41,43,44</td>
</tr>
<tr>
<td>Distance</td>
<td>YES</td>
<td>YES</td>
<td>9</td>
<td>17–19,21,33,36,39,43,51</td>
</tr>
<tr>
<td>Employed patients that are unable to take time off work for clinic visits</td>
<td>YES</td>
<td>YES</td>
<td>6</td>
<td>18,19,39,41,44,46</td>
</tr>
<tr>
<td>Food shortage</td>
<td>YES</td>
<td>YES</td>
<td>5</td>
<td>33,36,38,40,42</td>
</tr>
<tr>
<td>Patient-related time constraints</td>
<td>YES</td>
<td>YES</td>
<td>2</td>
<td>18,39</td>
</tr>
<tr>
<td><strong>PSYCHO-SOCIAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stigma and fear of disclosure</td>
<td>YES</td>
<td>YES</td>
<td>14</td>
<td>11,19,27,31,32,35,36,38–43,45</td>
</tr>
<tr>
<td>Fear of drug toxicities</td>
<td>YES</td>
<td>YES</td>
<td>7</td>
<td>19,27,32,36,40,42,43</td>
</tr>
<tr>
<td>Perceived good health</td>
<td>YES</td>
<td>YES</td>
<td>5</td>
<td>11,14,32,43,51</td>
</tr>
<tr>
<td><strong>HEALTH SYSTEMS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long clinic waiting times</td>
<td>YES</td>
<td>YES</td>
<td>7</td>
<td>31–36,39</td>
</tr>
<tr>
<td>Poor service received from HCWs</td>
<td>YES</td>
<td>YES</td>
<td>5</td>
<td>31,32,35,38,39</td>
</tr>
<tr>
<td>Shortage of HCWs(^a)</td>
<td>YES</td>
<td>YES</td>
<td>4</td>
<td>21,33,36,45</td>
</tr>
<tr>
<td>Inconvenient clinic hours</td>
<td>YES</td>
<td>YES</td>
<td>2</td>
<td>32,39</td>
</tr>
<tr>
<td><strong>MEDICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced immunodeficiency</td>
<td>YES</td>
<td>YES</td>
<td>5</td>
<td>10,13,22,24,27</td>
</tr>
<tr>
<td>On TB(^b) therapy/co-infected with TB</td>
<td>YES</td>
<td>YES</td>
<td>4</td>
<td>13,37,41,45</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>YES</td>
<td>YES</td>
<td>2</td>
<td>12,23</td>
</tr>
<tr>
<td>Severe malnutrition</td>
<td>YES</td>
<td>YES</td>
<td>2</td>
<td>13,28</td>
</tr>
<tr>
<td><strong>OTHER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male gender</td>
<td>YES</td>
<td>YES</td>
<td>7</td>
<td>20–22,25–27,49</td>
</tr>
<tr>
<td>Younger age</td>
<td>YES</td>
<td>YES</td>
<td>6</td>
<td>13,23,25,26,47,49</td>
</tr>
<tr>
<td>Low levels of education</td>
<td>YES</td>
<td>YES</td>
<td>2</td>
<td>12,28</td>
</tr>
</tbody>
</table>

\(^a\)healthcare workers.  
\(^b\)tuberculosis.

**Most common factors:** 1) transport costs, 2) stigma/disclosure, 3) clinic factors
Types of Interventions

- Biomedical
- Structural
- Behavioral
Strategies to Increase HIV Testing

• Home Based Testing and Counseling (HBTC)
• Community Based Testing and Counseling (CBTC)
• Self-Testing
• Provider Initiated Testing and Counseling (PITC)
• PITC for specific populations: PMTCT, TB
• Couples counseling and testing
• Tailored testing interventions for key and vulnerable populations
• Voluntary Counseling and Testing (VCT)
Uptake of Community HIV Testing and Counseling

Pooled percentage accepting testing

<table>
<thead>
<tr>
<th></th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td>12,052</td>
</tr>
<tr>
<td>Self</td>
<td>1,839</td>
</tr>
<tr>
<td>Mobile</td>
<td>79,475</td>
</tr>
<tr>
<td>Door-to-door</td>
<td>555,267</td>
</tr>
<tr>
<td>Workplace</td>
<td>62,406</td>
</tr>
<tr>
<td>School</td>
<td>2,593</td>
</tr>
</tbody>
</table>

Suthar et al. PLoS 2013
Strategies to Increase Testing - HBTC

- Trained counselors conducted home visits and offered HIV testing
- Persons $\geq 13$ years
- Children at risk
- More than 154,000 tested
  - 22% adolescents (13-18 years)
  - 19% younger adults (19-24 years)
  - 59% $\geq 25$ years
- High acceptance
  - Less likely to test if previously tested
  - More likely to be HIV+ if previously tested and agree to re-test
- HIV +ve referred to care

Wachira et al. JAIDS 2014
Provider Initiated Testing and Counseling (PITC)

- RCT conducted at Mulago Hospital in Uganda
- 500 consent ing patients were randomized to inpatient HTC (intervention arm) or outpatient HCT 1 week post-discharge (control arm)
- HCT was received by 98.8% (n=248) in the intervention arm compared to 68.7% (n=171) control arm.
HIV Self-Testing

- Individuals offered oral self-testing
- 260 of 283 opted for self-testing
- Accuracy 99.2%
- 98.5% rated test “not hard at all”
  - 10% minor procedural errors
  - 10% required extra help

Choko et al. PLOS Med 2011
Strategies to Improve Linkage

- Co-location of services
- Decentralization of services
- Use of Peer Support/PLWH patient navigators
  - Craw et. al. BMC Health Services Research 2010
  - Hatcher et. al. AIDS Behav. 2012
- Referral after Home HTC
  - van Rooyen et. al. JAIDS 2013
- Point of Care CD4 Cell Count Testing
  - Wynberg et. al. JIAS, 2014
Strategies to strengthen linkage to care – PLWH Navigators

Following the HBTC campaign, PLWH navigators attempted to conduct home visits to offer support for enrolling into HIV care.

Of 483 persons consenting to follow-up, 305 (63.2%) enrolled in HIV care within 3 months of an HIV diagnosis.
## Point of Care CD4+ Cell Count

<table>
<thead>
<tr>
<th>Location</th>
<th>Outcome Linkage</th>
<th>Standard CD4 Count</th>
<th>POC CD4 Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. South Africa</td>
<td>Attendance for further care after HIV test</td>
<td>33%</td>
<td>43%</td>
</tr>
<tr>
<td>2. South Africa</td>
<td>Initiation of ART within 16 weeks of HIV test for those with CD4 &lt; 250 at diagnosis</td>
<td>62%</td>
<td>75%</td>
</tr>
<tr>
<td>3. South Africa (Mobile VCT)</td>
<td>Self-reported attendance at referral site w/in 8 weeks of HIV test for those reached by phone</td>
<td>42%</td>
<td>61%</td>
</tr>
<tr>
<td>4. Mozambique</td>
<td>Enrollment in HIV care after HIV test</td>
<td>63%</td>
<td>89%</td>
</tr>
</tbody>
</table>

Slide from Rosen et al. CROI 2011 Presentation
“From HIV Testing to ART Initiation: the missing Link”

1. Faal et al IAS 2010
2. Larson et al 2011
3. Larson et al 2011
4. Jani et al IAS 2010
HIV Care Continuum

Test

HIV Positive

Link

Engage, Counsel, Monitor, and Support

HIV Care (PRE-ART)

Retain, Counsel, Monitor, and Support

ART

Adherence and Viral Suppression

McNairy et al, AIDS 2012
HPTN 065 (TLC-Plus)

Test

HIV Positive

Link

HIV Care (PRE-ART)

ART Eligible

ART

Adherence and Viral Suppression

Financial incentives

Provider training

Financial incentives

Community Mobilization

Facility testing

McNairy & El-Sadr, AIDS 2012
HPTN 071 (PopART)

Test

HIV Positive

Link

HIV Care (PRE-ART)

ART Eligible

ART

Viral Suppression

CHIPs for Linkage

CHIPs for retention And adherence

Household testing

21 communities
Population: 1.2 million

McNairy & El-Sadr, AIDS 2012
The Science of Implementation and Scale-Up
HIV Testing

HIV Care Enrollment (Initiation if eligible)

End of Study

Time

0

2 weeks

3 mo

6 mo

9 mo

12 mo

INTERVENTION

1. POC CD4

X

4. Care Bag, Education

X

2. Accelerated ART initiation

X

3. SMS Reminders

X

X

X

X

X

X

5. Financial Incentives

X

X

X

Outcomes

Primary

1) Retention at 12 months from testing

2a) Linkage at 3 months

2b) Retention from enrollment at 6 months
Way Forward
Tip of the Iceberg
Maseru District, Lesotho
Infected Individuals per 100 m²
15-49 years old

~46,000 HIV-infected individuals

Maseru District, Lesotho
HIV Prevalence: 15 to 49 years old

The HIV care continuum: no partial credit given

Margaret L. McNairy\textsuperscript{a,b,c} and Wafaa M. El-Sadr\textsuperscript{a,b}
Side Door
Finding PLWH in the Community

Hallett et al. JAIDS 2013
Paradigm Shift: Focus on the HIV Prevention Continuum

- **TEST**
  - Positive
  - +
  - Engage, Counsel, Monitor and Support
  - HIV CARE (Pre-ART)
  - Retain, Counsel, Monitor, and Support
  - Adherence and Viral Suppression

- Negative
  - -
  - Engage, Counsel, Monitor and Support
  - Counsel, Intervene, Monitor, and Support
  - Support Adherence, Monitor, Repeat HIV Testing

McNair, Clin Inf Dis 2014
Opportunities and Challenges

• Testing is the foundation for all HIV-related programming
  – Multiple approaches available
  – Need to use combined approaches
  – Adapt to specific populations
  – Focus on HIV negatives and positives
  – Develop new metrics
  – Aim for high coverage

• Linkage is critical missing link in the chain
  – Promising approaches
  – Co-location of testing and care services
  – Navigation
  – Decentralization of services
  – Welcoming, patient friendly care

• Many unanswered questions necessitate continued innovation and research
Thank you

Access  Acceptability  Quality  Coverage  Effectiveness

Access: key
Acceptability: hands
Quality: star
Coverage: people
Effectiveness: globe