Impact of Text-Messaging (SMS) Programs for Improving Antiretroviral Adherence in Kenya

Anik Patel\textsuperscript{1}, Richard Lester\textsuperscript{1}, Scott Braithwaite\textsuperscript{2}, Jason Kessler\textsuperscript{2}  
Kim Nucifora\textsuperscript{2}, Mia van der Kop\textsuperscript{1,3}, Carlo Marra\textsuperscript{1}  
\textsuperscript{1} University of British Columbia, Canada  \textsuperscript{2} New York University, USA  \textsuperscript{3} Karolinska Institutet, Sweden
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HIV treatment and care issues

- ≥ 90% of doses of ART supports optimum viral suppression and health outcomes
- Studies suggest adherence remains sub-optimal in many areas of Africa
- 62% retention rate at 24 months after ART initiation

Simoni et al. *Current Infectious Disease Reports* 2008
UNAIDS 2012
Kaiser Family Foundation
Care with mobile phones (mhealth)

mHealth 'could save a million African lives by 2017'

*http://www.scidev.net
(citing a Price Waterhouse Coopers Report)
mHealth adherence evidence

Horvath T et al. Mobile phone text messaging for promoting adherence to antiretroviral therapy in patients with HIV infection. *Cochrane Database Systematic Review*. 2012

Pooled adherence effect of weekly SMS compared to standard care:
Economic evaluation

• No cost-effectiveness analysis of adherence improving interventions
• Aim is to maximize health per dollar spent under conditions of budget constraint
• **Objective: evaluate cost-effectiveness and mortality benefits of SMS over standard care in Kenya**

*Bärnighausen et al. *Lancet Infectious Disease* 2011*
HIV Decision Analytic Model

- Model of HIV natural progression
- Validated and previously published model
- Calculates lifetime HIV costs and quality adjusted life years (QALYs)

\[
ICER = \frac{\text{lifetime costs with intervention}}{\text{QALY with intervention}} - \frac{\text{lifetime costs with standard care}}{\text{QALY with standard care}}
\]

* Braithwaite et al. *AIDS* 2014
Keebler et al. *Lancet Global Health* 2014
Adherence Model Depiction

Sub-optimal Adherence <90% doses

Intervention

Highly adherent ≥90% doses
Adherence Model Depiction

Viral Replication

Sub-optimal Adherence <90% doses

Intervention

Highly adherent ≥90% doses
Adherence Model Depiction

Sub-optimal Adherence <90% doses → Intervention → Highly adherent ≥90% doses

Viral Replication

Drug Resistance
## Key Input Parameters

<table>
<thead>
<tr>
<th>Adherence Inputs</th>
<th>Base</th>
<th>Range tested</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-intervention proportion highly adherent</td>
<td>40%</td>
<td>30% to 90%</td>
<td>Trial Data</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intervention Inputs</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adherence &lt; 90% (Relative Risk)</td>
<td>0.78</td>
<td>0.63 to 0.96</td>
<td>Cochrane Review</td>
</tr>
<tr>
<td>Annual intervention Cost (USD per person)</td>
<td>$15</td>
<td>$10 to $20</td>
<td>Unpublished trial data</td>
</tr>
<tr>
<td>Retained in care (Relative Risk)</td>
<td>1.69</td>
<td>1 to 3.23</td>
<td>Lester Trial</td>
</tr>
</tbody>
</table>

* Horvath T et al. *Cochrane Database Systematic Review* 2012
  Lester et al. *Lancet* 2010
  Pop-eleches and Thirumurthy *AIDS* 2011
Estimated adherence related mortality in Kenya

- 550,000 people on ART in Kenya in 2012
- Estimated 715,000 life years lost due to suboptimal adherence
- Estimated 27,500 deaths over five years
5 year mortality reduction (%) by SMS over standard care

![Graph showing mortality reduction by SMS intervention over standard care. The graph illustrates the mortality reduction (%) by SMS compared to standard care for different adherence levels of patients. The x-axis represents the pre-intervention proportion of highly adherent patients, ranging from 30% to 90%. The y-axis shows the mortality reduction percentage, ranging from 0% to 12%. There are two lines on the graph: one for the intervention with adherence effect alone and another for the intervention with adherence and retention effect. The_base_case_line is indicated by a dotted line at 40% adherence. The graph demonstrates a significant reduction in mortality with higher adherence levels.]
Cost-effectiveness of SMS over standard care

Incremental cost per QALY gained

Pre-intervention proportion of highly adherent patients

Intervention with adherence effect alone
Intervention with adherence and retention effect
WHO Cost-effectiveness threshold

Base case
Limitations

• Simplifying assumptions

• Limited comparison programs

• Model variable uncertainty due to limited data
Conclusion

• Proven SMS interventions are cost-effective
• Retention and adherence interplay
• Cost-effectiveness should be considered along with effectiveness
• Adherence increasingly important with expanded ART availability
Thank you

Questions or correspondence:

anikpatel10@gmail.com