Call Me Maybe?

Text Messaging to Strengthen ART Adherence and Retention in Care in Global Settings

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WelTel
Disclosures

Grant support
- PEPFAR/CDC
- NIMH
- CIHR
- Grand Challenges Canada
- BC Lung Association
- BCCDC Foundation
- BCCDC Communal Fund
- CDC Foundation
- Canadian Clinical Trials Network
- IDRC

Industry
- WelTel (non-profit)
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  - Grand Challenges Canada
  - CDC Foundation
- Meetings & Presentations
  - BMS
  - Abbott
  - Nova Clinical
  - Others? (meeting sponsors)
  - World Health Organization
  - mHealth Alliance
  - Mac-AIDS Fund
Cell Phones – what are they for?
Pandemics

Problem: People living with HIV
Response: People on ART
People with mobile phones

Access to antiretroviral treatment, by region, 2002 - 2010

Where to look for growth
Mobile-phone subscriptions, bn

Developing countries
Developed countries*

Sources: World Bank; ITU
*OECD members

The Economist
mHealth

• Wikipedia: a term used for the practice of medical and public health, supported by mobile devices.

• NIH: the delivery of healthcare services via mobile communication devices

• emerged as a sub-segment of eHealth, the use of information and communication technology (ICT), such as computers, mobile phones, communications satellite, patient monitors, etc, for health services and information.
But… Can cell phones improve HIV care & treatment outcomes?

HIV Treatment Cascade

Mobile phones vs. Health

FIGURE 3. Estimated spectrum of engagement in the HIV Care Cascade in the USA. From [43].

Lester et al. AIDS Vol 20, 17 Nov, 2006
WelTel SMS: “Mambo?”

Developing solutions
There is more to combating HIV in the developing world than providing affordable drugs. T. V. Padma looks at the innovative new strategies being employed.

Mobilizing cell phones to improve antiretroviral adherence and follow-up in Kenya: a randomized controlled trial in progress
WelTel Kenya1: RCT

Exclusion (44)
Inadequate phone access
Refused/Unable

Inclusion
Adults (≥ 18 years) starting ART
Adequate phone access (owned/shared)
Informed consent

Baseline survey
Randomization

6 month
12 month

Powered to show 10% improvement in adherence

SMS n=273
Control n=265
Health worker efficiency (WelTel Kenya1).

Proportion of weekly SMS responses

Months since recruitment

- No response
- Sawa (fine)
- Shida (problem)

(6.1% ‘SHIDA’)
(2.0% ‘SHIDA’)

n=11,983 SMS logs

Effects of a mobile phone short message service on antiretroviral treatment adherence in Kenya (WelTel Kenya1): a randomised trial

Robert Carter, Francesca Aiassa, Kesting Bekele, Antone Andrianjaha, Serkis Komba, Aleck H Chang, White Lin, Jane Hailu, Mucumbia Sondi, Milan Negash, Cari A Mara, David Estrin, Elizabeth Njogu, Tiana Ber, Ethiera Taskova, Lawrence G Corbin, Julien de Kerchove, Mark Ader

Summary

Background Mobile SMS services. However, data are limited. We aimed to start antiretroviral treatment adherence.

Methods: WelTel HIV therapy (ART) in 343 patients with WHO stage 3 or 4 disease. Randomisation was performed in the intervention group. The control group received standard treatment. Participants were randomised to receive either a mobile phone based SMS intervention or a control intervention (usual care). The primary endpoint was 95% adherence at 1 year.

Results: The intervention group had significantly higher adherence compared with the control group (95% vs 80%, p < 0.001). The intervention group also had significantly higher adherence compared with the control group (95% vs 80%, p < 0.001). The NNT was 9 and 11, respectively.

Interpretation: Participants who received SMS support had significantly improved ART adherence and rates of viral suppression compared with the control group. Mobile phones might be a useful tool to improve patient adherence in resource-limited settings.

Funding: US President's Emergency Plan for AIDS Relief.

WelTel weekly SMS check-ins (two way):

*24% improvement in achieving 95% adherence over 1y

*19% improvement in achieving viral suppression at 1y

(NNT = 9 & 11)
It works!
Ten Biggest Positive Africa Stories of 2011

- Lancet podcast

- Scientific American podcast (1min)

- CBC News The National (3min)
  - [http://www.youtube.com/watch?v=UOiVKxM4wIc](http://www.youtube.com/watch?v=UOiVKxM4wIc)

- The Economist:
  - [http://www.economist.com/node/17465455](http://www.economist.com/node/17465455)

**Wireless health care**

- **M-powered**
  - The convergence of mobile telephony and health care is under way
What works, what doesn’t?
Where?
Why?
For who?
How much?
Other RCTs?
Western Kenya RCT: One-way SMS ‘reminders’
CAPS STUDY Pop-Eleches, Thirumurthy et al. AIDS, 2011

Table 1. Content of short and long short message service reminders.

<table>
<thead>
<tr>
<th></th>
<th>English</th>
<th>Swahili</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short reminder</td>
<td>This is your reminder.</td>
<td>Hili ni kumbukumbu lako.</td>
</tr>
<tr>
<td>Long reminder</td>
<td>This is your reminder. Be strong and courageous, we care about you.</td>
<td>Hili ni kumbukumbu lako. Uwe na ujasiri, tunakujali.</td>
</tr>
</tbody>
</table>

Table 3. Proportion of at least 90% adherence according to intervention type by intention-to-treat and missing equals failure analysis.

**SMS reminders/motivation (one way):**

*Weekly (short) messages 32% improvement in 90% adherence (MEMS) over 1y*

*9% decrease in treatment interruptions*

*No adherence improvement with daily, longer reminders*

(VL not available.)
Reminders or Support?

A Adherence

• Targeted adherence counselling
  • persistent effect on adherence and viral suppression

• A medication reminder alarm device
  • no effect on adherence or viral suppression

B Viral Failure


http://www.thelancet.com/journals/laninf/article/PIIS1473-3099(11)70354-1/fulltext
Example of text message sent:

‘You are important to your family. Please remember to take your medication. You can call us at this number: +237 xxxx.’

Derived from Health Believe Model and focused group discussions.

Table 4. Satisfaction with the text message among the participants who received text messages (n = 101).

<table>
<thead>
<tr>
<th>Question</th>
<th>Count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How would you rate the text message?</td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>12 (11.8)</td>
</tr>
<tr>
<td>Very good</td>
<td>30 (29.7)</td>
</tr>
<tr>
<td>Good</td>
<td>21 (20.8)</td>
</tr>
<tr>
<td>Average</td>
<td>17 (16.8)</td>
</tr>
<tr>
<td>Bad</td>
<td>5 (4.9)</td>
</tr>
<tr>
<td>Very bad</td>
<td>16 (15.8)</td>
</tr>
<tr>
<td>Did it help you remember to take your medication?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>92 (91.1)</td>
</tr>
<tr>
<td>No</td>
<td>9 (8.9)</td>
</tr>
<tr>
<td>Do you want to continue receiving text messages?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>66 (65.3)</td>
</tr>
<tr>
<td>No</td>
<td>35 (34.7)</td>
</tr>
<tr>
<td>Would you recommend it to a friend?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>82 (81.2)</td>
</tr>
<tr>
<td>No</td>
<td>19 (18.8)</td>
</tr>
</tbody>
</table>

Conclusions/Significance: Standardized motivational mobile phone text messages did not significantly improve adherence to ART in this study. Other types of messaging or longer term studies are recommended.
970 patients cared for by the PHWs followed for 26 months
Broad support for the mHealth intervention among patients, clinic staff, and PHWs
No significant differences in patients’ risk of virologic failure.
Qualitative improvements in patient care and logistics
Authors’ conclusions

There is high-quality evidence from the two RCTs that mobile phone text-messaging at weekly intervals is efficacious in enhancing adherence to ART, compared to standard care. There is high quality evidence from one trial that weekly mobile phone text-messaging is efficacious in improving HIV viral load suppression. Policy-makers should consider funding programs proposing to provide weekly mobile phone text-messaging as a means for promoting adherence to antiretroviral therapy. Clinics and hospitals should consider implementing such programs. There is a need for large RCTs of this intervention in adolescent populations, as well as in high-income countries.
Improving adherence is cost-effective

**Costs of SMS Intervention vs Net Savings (PEPFAR)**

- Costs of SMS Intervention
- Net Savings

![Graph showing the costs of SMS intervention and net savings for PEPFAR.](chart)

- Costs:
  - $2.9
  - $14.6
  - $3.2
  - $29.2
- Net Savings:
  - $143.4

**WelTel:**
PEPFAR
(2.485M people NNT = 11)

= +230,000 suppressed

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*Source: 8th International Conference on HIV Treatment and Prevention Adherence*

*Textual content:*

What’s pending?

“mobile phone HIV” publications

number (Pubmed)

<table>
<thead>
<tr>
<th>Year</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tbody>
<tr>
<td></td>
<td>2</td>
<td>13</td>
<td>35</td>
<td>50</td>
</tr>
</tbody>
</table>
Does SMS direct monitoring improve adherence?

Challenges in Using Mobile Phones for Collection of Antiretroviral Therapy Adherence Data in a Resource-Limited Setting

 SMS and IVR Adherence Real Time Monitoring in Uganda

Jessica E. Haberer¹, ², ³, Julius Kiwanuka⁴, Denis Nansera⁴, Ira B. Wilson⁵ and David R. Bangsberg², ³, ⁶

• (1) Department of General Internal Medicine, Massachusetts General Hospital, Boston, MA, USA (2) Harvard Initiative for Global Health, Mbarara University of Science and Technology, Kampala, Uganda, online: 8 June 2010

High acceptability for cell phone text messages to improve communication of laboratory results with HIV-infected patients in rural Uganda: a crosssectional survey study.

• Siedner MJ, Haberer JE, Bwana MB, Ware NC, Bangsberg DR.
WelTel Retain: Engaging Pre-ART Care

- Loss to follow-up between diagnosis and starting ART is high
- Does SMS support improve early stage retention in care?
- Kibera Community Health Centre (AMREF Kenya)
- RCT target n=686
- Outcomes
  - 1st year retention
  - Mixed methods
  - Cost effectiveness

ClinicalTrials.gov NCT01630304
NIMH R01MH097558-01
The effect of weekly short message service communication on patient retention in care in the first year after HIV diagnosis: study protocol for a randomised controlled trial (WelTel Retain)

out soon
iText: SMS-based outreach for PrEP adherence

• Adherence is critical for PrEP efficacy\(^1\)\(^-\)\(^4\)

• Building on the Weltel model for ART in HIV-positives\(^5\), an SMS-based outreach program (iText) was developed to support PrEP adherence in HIV-negatives
  – Weekly SMS or email check-in
  – Choice of 3 messages (PrEP-specific or general check-in)
    • How is PrEP going?
    • How are you doing?
    • Are you OK?
  – Customized timing of message delivery

• Pilot study among 56 HIV-negative MSM taking PrEP in iPrEx Open Label Extension suggest feasibility and acceptability of iText (Liu et al, Abstract 165)

• Efficacy of iText in improving PrEP adherence in real-world settings will be evaluated in an upcoming RCT (EPIC)

\(^1\)Grant NEJM 2010; \(^2\)Anderson Sci Trans Med 2012; \(^3\)van Damme NEJM 2012; \(^4\)Marrazzo CROI 2013, \(^5\)Lester Lancet 2010
Our Grand Challenge

A non-profit organization to assist implementing the WelTel model globally (WelTel International mHealth Society).

Your health, in your hands

No patients found. Try the search on the Patients page if you are looking for a patient whose study may not have begun.

WelTel International mHealth Society and Vertical Labs
Theoretical Frameworks

Theory of Reasoned Action
- Subjective norms associated with behavior
- Attitudes toward behavior
- Intention to engage in behavior
- Actual behavior

Technology Acceptance Model
- Perceived usefulness
- Perceived ease of use
- Technology adoption

Kirsten Smillie Poster #239
“I've learned to take my meds every day in the last six months...I wasn't taking them daily, or I wasn't actually taking them at all...And it's a lot to do with being able to talk about it, through the texting...they let me know that it would be you know, the symptoms would go away, or they, just to hang in there and, keep on trying, and take them so that, you know, there's just somebody else there for me... In writing that you see it, and, and it feels a hell of a lot better to know that.”
– Participant #15, Low CD4, previous non-adherent

“often just knowing that we have supports that are there or knowing that we have the backup or the ability to make contact relieves so much anxiety.”
– Participant #24, Remote
Summary of RCT Evidence on mHealth Interventions to improve ART outcomes

- Adherence monitoring by SMS? **UNKNOWN**
  - not yet known if effective for adherence promotion
  - Challenging to implement, cost, compliance, stigma?
- **Targeted adherence counselling?** **YES, but by cellphone UNKNOWN**
  - improves adherence and viral suppression (1yr)
- **Texting with Village Health Workers?** **NO (but quality?)**
- **Digital alarm reminders?** **NO**
  - No improvement on adherence or VL (1yr)
- **One way cell phone SMS ‘reminders’?** **SOMETIMES**
  - Weekly, not daily. Short>long?
- **Two-way cell phone weekly SMS ‘check-ins’ (access to HCW)?** **YES**
  - Improves adherence and viral suppression (1yr)

Level of Evidence: Grade A (weekly SMS)
Support (access to care) > Reminders?
An adherence benefit of dose-time reminder alarms has been reported (64, 65). Strategies using cellular technology (short message service communication) have demonstrated improvement in adherence and HIV-1 RNA. Methods ranged from texting dosing reminders with or without requesting a response (66–68) to texting weekly check-ins from the clinic with telephone follow-up for those requesting it (69). One study found better ART adherence was achieved with use of texting with expected reply (interactive) than simple 1-way reminders (66).
My take home messages

• Keep it simple
  – *Every extra step (complexity) loses someone*

• Keep it low cost
  – *Resource limited settings, vulnerable groups*

• Conduct controlled studies (or follow the evidence)
  – *What really works, and what doesn’t?*

• Seize the opportunity
  – *mHealth is a gift*
Can mobile technologies “Do it”?
Thank you!

The future is now.

Frank Plummer
Blake Ball
Joshua Kimani
KACP staff
Pumwani patients
Michael Chung
Coptic Hospital
Kenya MoH
Kajiado HS
NASCOP
Mia van der Kopp
Kirsten Smillie
Natasha van Borek
Melanie Murray
Oak Tree staff
BCCDC staff
WelTel Kenya1
study team
Coinvestigators
Many more!

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