



8th International Conference on **HIV TREATMENT AND PREVENTION ADHERENCE**

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for Medicine

Call Me Maybe?

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

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BC Centre for Disease Control, University of British Columbia

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)
 - Bristol-Myers-Squibb
 - 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?

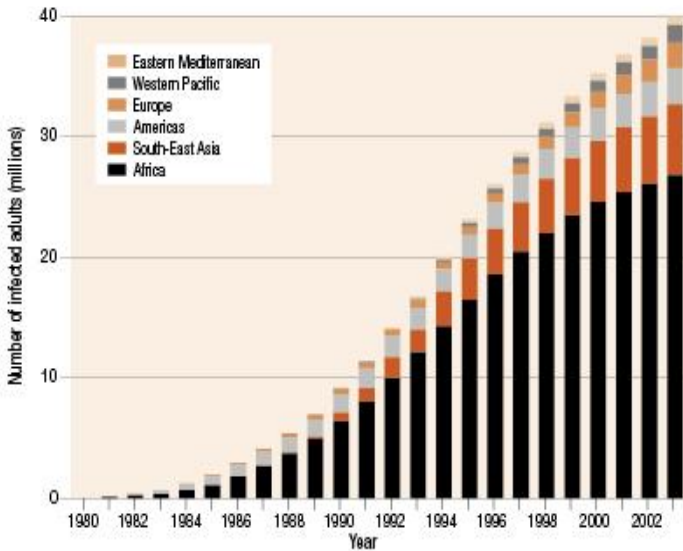


Pandemics

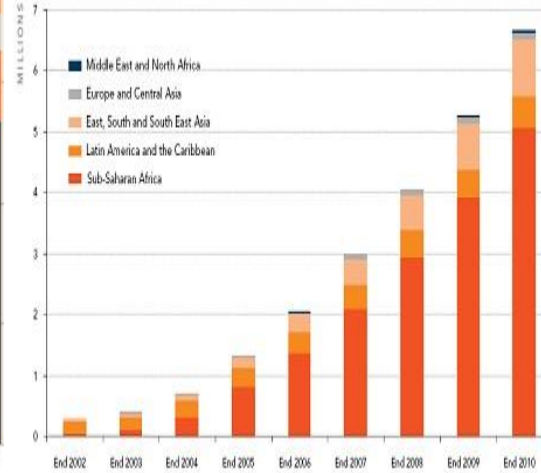
Problem: People living with HIV

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



Sources: World Bank; ITU

*OECD members



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

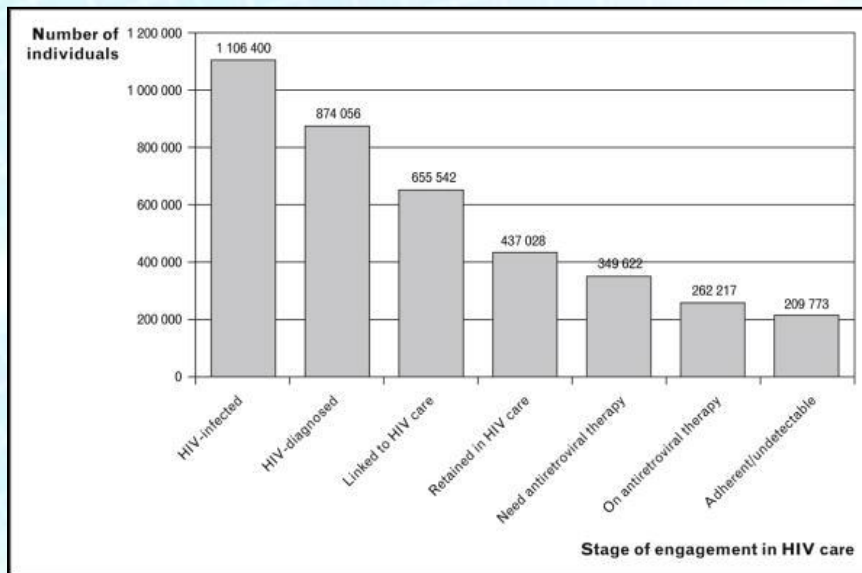


FIGURE 3 . Estimated spectrum of engagement in the HIV Care Cascade in the USA. From [43[black small square][black small square]].

Mobile phones vs. Health

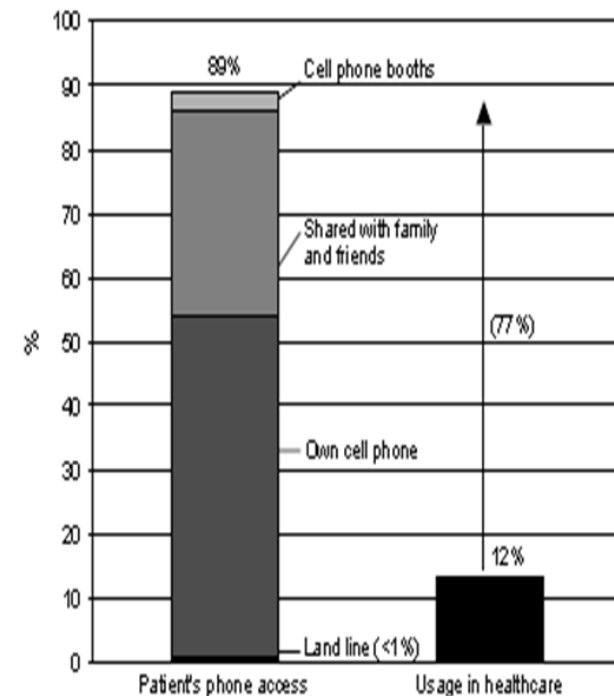
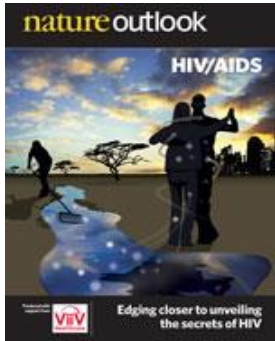


Fig. 1. The gap between general phone access and phone usage in healthcare by patients attending the Nairobi clinics.

Lester et al. AIDS Vol 20, 17 Nov, 2006

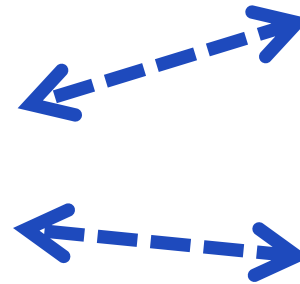


WeTel SMS: “Mambo?”



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.



UNIVERSITY OF MANITOBA

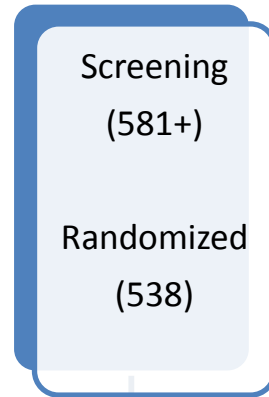


WelTel Kenya1: RCT



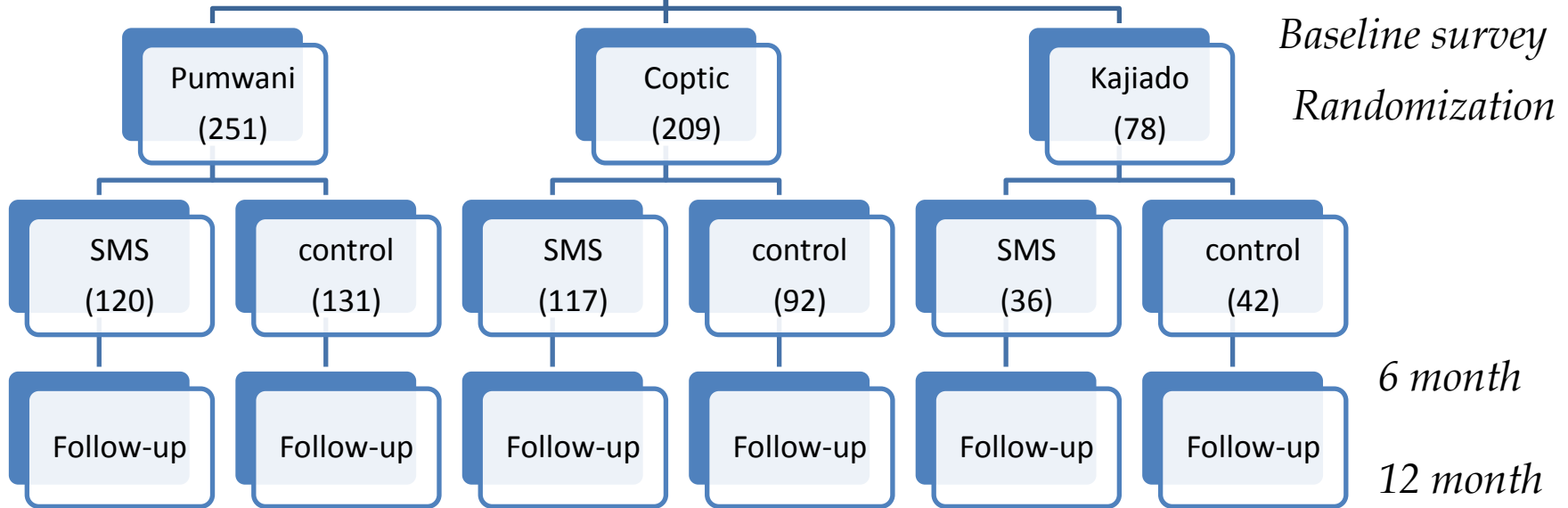
Exclusion (44)

Inadequate phone access
Refused/Unable



Inclusion

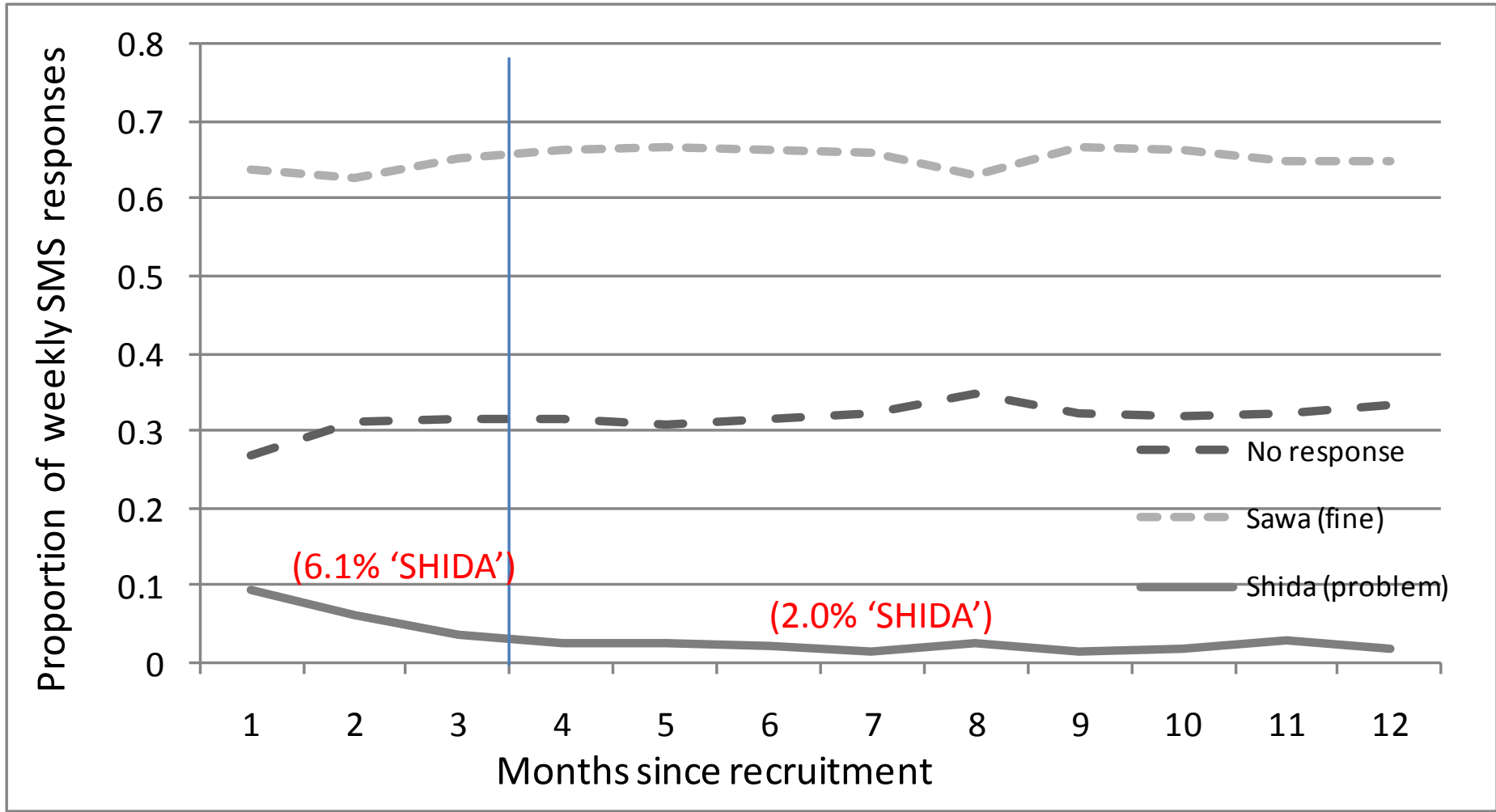
Adults (≥ 18 years) starting ART
Adequate phone access (owned/shared)
Informed consent



Powered to show 10% improvement in adherence

SMS n=273
Control n=265

Health worker efficiency (WeTel Kenya1).



n=11,983 SMS logs

– <http://www.scientificamerican.com/podcast/episode.cf?m?id=text-message-outreach-improves-hiv-10-11-10>

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



Richard T Lester, Paul Ritvo, Edward J Mills, Antony Kariri, Sarah Karanja, Michael H Chung, William Jack, James Habyarimana, Mohsen Sadatsafavi, Mehdi Najafzadeh, Carlo A Marra, Benson Estambale, Elizabeth Ngugi, T Blake Ball, Lehana Thabane, Lawrence J Gelman, Joshua Kimani, Marta Acka

Summary

Background Mobile phone services. However, data are limited. We aimed to start antiretroviral

Methods WelTel Kenya1 (ART) in three number generating groups in the intervention group 48 h. Randomisation, however, study participant adherence (>95% of participants) viral RNA load suppression trial is registered with

Findings Between May 2009 or to standard care (n = 132) compared with 132 of suppressed viral loads (RR for virologic failure 95% adherence was ni

Interpretation Patients who received SMS support had significantly improved ART adherence and rates of viral suppression compared with the control individuals. Mobile phones might be effective tools to improve patient outcome 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)

Psychology, York University, York, ON, Canada (P Ritvo PhD); Faculty of Health Sciences, University of Ottawa, Ottawa, ON, Canada (E Mills PhD); Department of Global Health,

Nov 27, 2010

It works!



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AFRICA

the good news



THE NEW YORKER

Ten Biggest Positive Africa Stories of 2011

- Lancet podcast
 - http://download.thelancet.com/flatcontentassets/audio/lancet/2010/9755_27november.mp3
- Scientific American podcast (1min)
 - <http://www.scientificamerican.com/podcast/episode.cfm?id=text-message-outreach-improves-hiv-10-11-10>
- CBC News The National (3min)
<http://www.youtube.com/watch?v=UOiVKxM4wIE>
- The Economist:
 - <http://www.economist.com/node/17465455>

The
Economist

Wireless health care

M-powered

The convergence of mobile telephony and health care is under way



BC Centre for Disease Control
An agency of the Provincial Health Services Authority



World Health
Organization



a place of mind

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.

	English	Swahili
Short reminder	This is your reminder.	Hili ni kumbukumbu lako.
Long reminder	This is your reminder. Be strong and courageous, we care about you.	Hili ni kumbukumbu lako. Uwe na ujasiri, tunakujali.

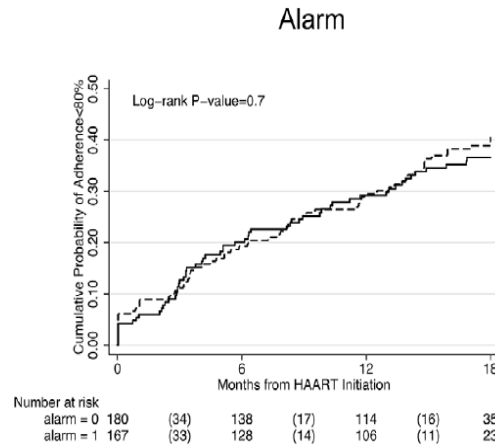
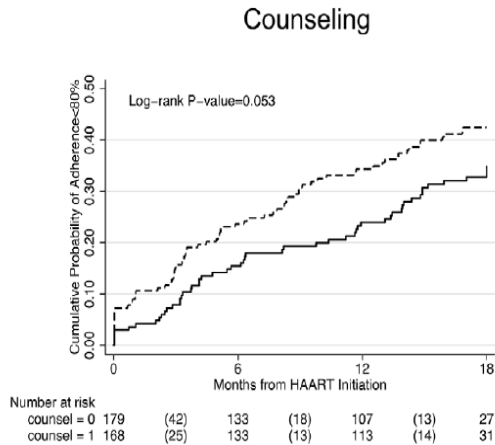
Table 3. Proportion of at least 90% adherence according to intervention type by intention-to-treat and missing equals failure analysis.

	Time (weeks)	
		8
	<u>SMS reminders/motivation (one way):</u>	
Surv	*Weekly (short) messages 32% improvement in 90% adherence (MEMS) over 1y	92)
C		03)*
D		27)
V		24)
SI		
Lc		
Subj	*9% decrease in treatment interruptions	97)
D		07)
V		85)
D	*No adherence improvement with daily, longer reminders	08)
V		19)
A:		
P-va		
*P <		

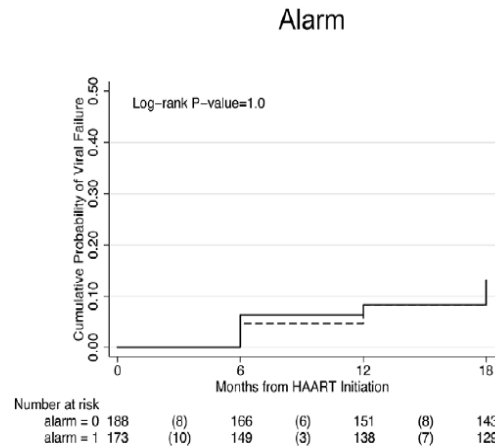
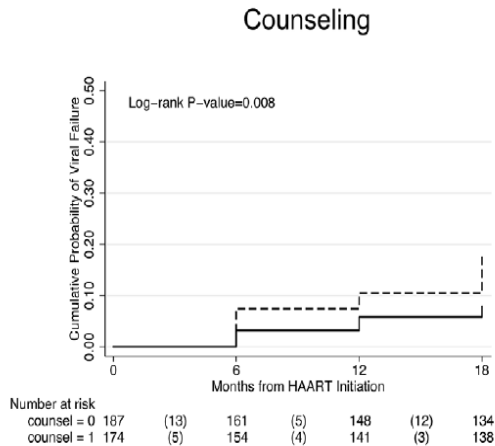
(VL not available.)

Reminders or Support?

A Adherence



B Viral Failure



- Targeted adherence counselling
 - persistent effect on adherence and viral suppression
- A medication reminder alarm device
 - no effect on adherence or viral suppression

The Cameroon Mobile Phone SMS (CAMPS) Trial: A Randomized Trial of Text Messaging versus Usual Care for Adherence to Antiretroviral Therapy

Lawrence Mbuagbaw^{1,2*}, Lehana Thabane^{2,3}, Pierre Ongolo-Zogo¹, Richard T. Lester^{4,5}, Edward J. Mills⁶, Marek Smieja^{2,7}, Lisa Dolovich⁸, Charles Kouanfack⁹

Dec 6, 2012. Funded in part by the CIHR Canadian HIV Trials Network (CTN)

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).

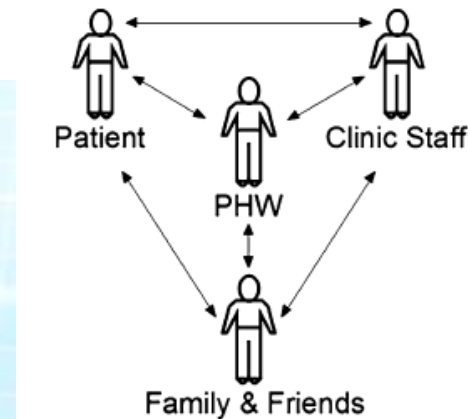
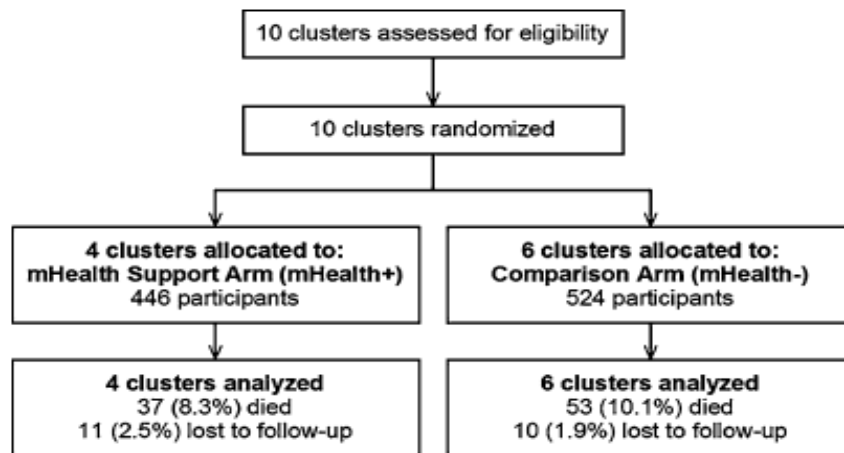
Question	Count (%)*
How would you rate the text message?	
Excellent	12 (11.8)
Very good	30 (29.7)
Good	21 (20.8)
Average	17 (16.8)
Bad	5 (4.9)
Very bad	16 (15.8)
Did it help you remember to take your medication?	
Yes	92 (91.1)
No	9 (8.9)
Do you want to continue receiving text messages?	
Yes	66 (65.3)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

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.



Impact of a mHealth Intervention for Peer Health Workers on AIDS Care in Rural Uganda: A Mixed Methods Evaluation of a Cluster-Randomized Trial

Larry W. Chang · Joseph Kagaayi · Hannah Arem · Gertrude Nakigozi ·
Victor Ssempijja · David Serwadda · Thomas C. Quinn ·
Ronald H. Gray · Robert C. Bollinger · Steven J. Reynolds



- 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



THE COCHRANE
COLLABORATION®

Horvath T, Azman H, Kennedy GE, Rutherford GW

243 references ID'd to Nov 2011:

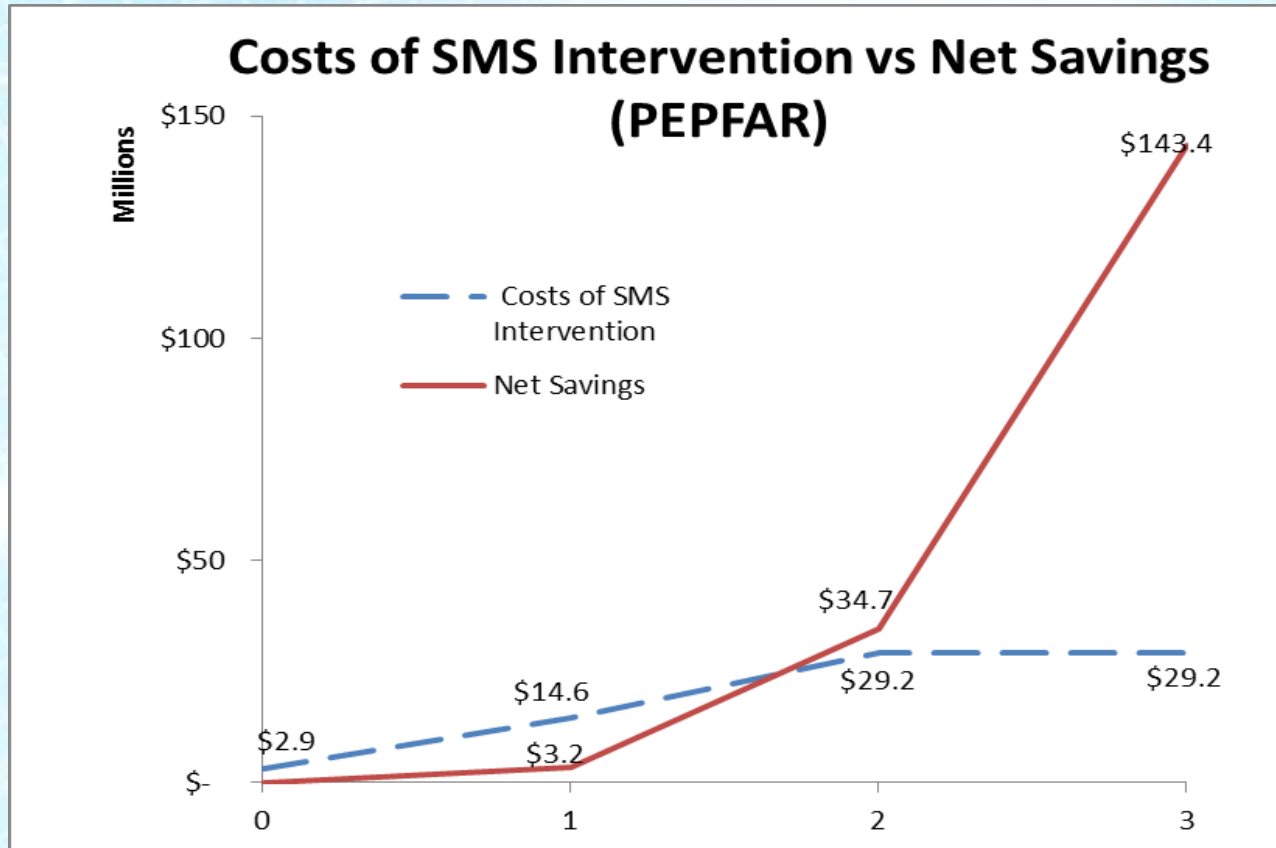
Authors' conclusions

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.



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Improving adherence is cost-effective



*Bella Hwang –
mHealth Summit
2011*

WelTel:
PEPFAR
(2.485M people
NNT = 11)

=
+230,000
suppressed



What's pending?

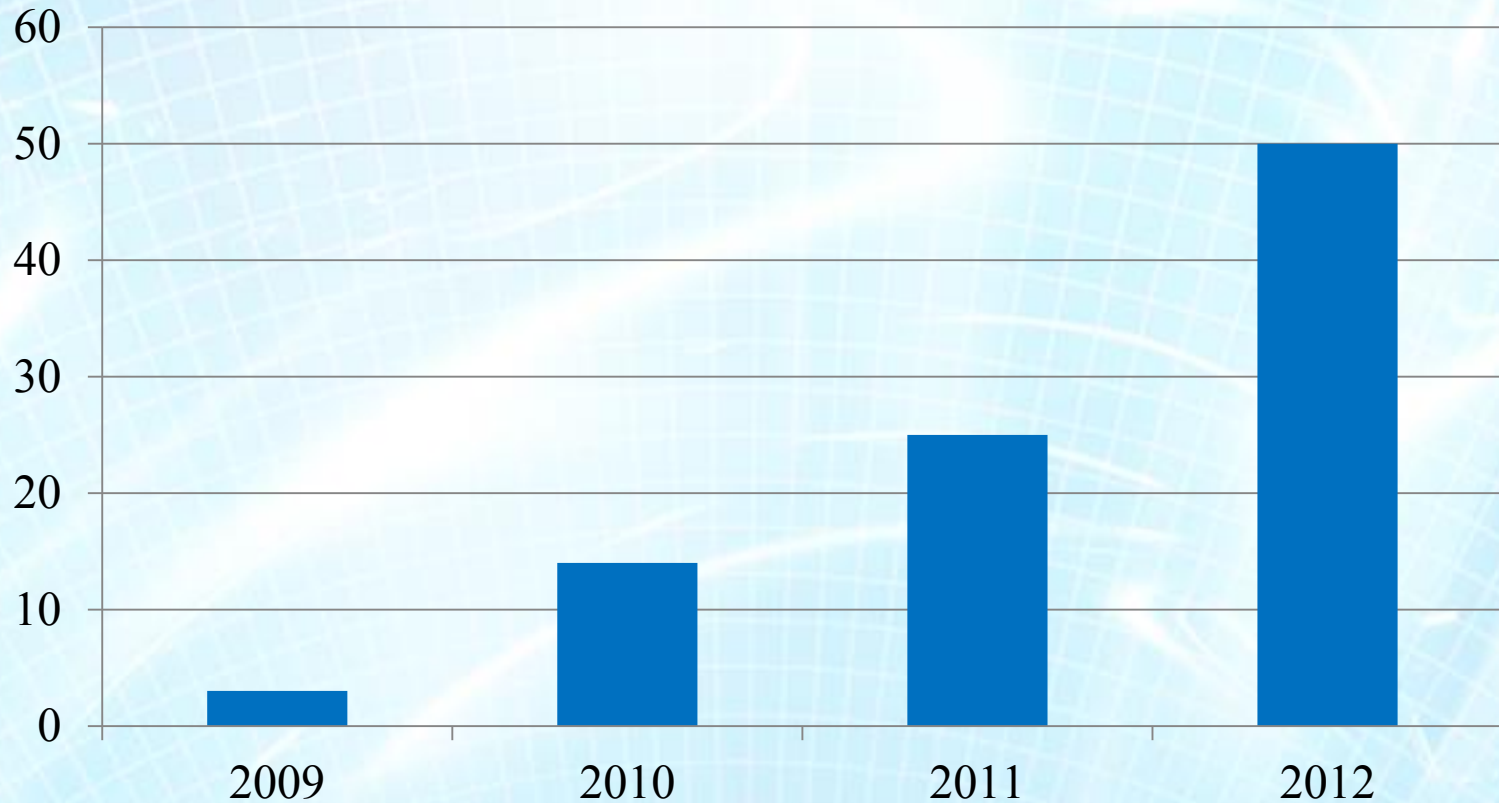


CREDIT: <http://www.armybase.us/2009/04/air-force-yields-in-f-22-fighter-dispute/>



“mobile phone HIV” publications

number (Pubmed)



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. Haberer^{1, 2, 3}, Julius Kiwanuka⁴, Denis Nansera⁴, Ira B. Wilson⁵ and David R. Bangsberg^{2, 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.

- [BMC Med Inform Decis Mak.](#) 2012 Jun 21;12(1):56. [Epub ahead of print]
- [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 (WeTel Retain)

out soon



iText: SMS-based outreach for PrEP adherence

- Adherence is critical for PrEP efficacy¹⁻⁴
- Building on the WelTel model for ART in HIV-positives⁵, 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)





Our Grand Challenge

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

welTel.verticallabs.ca/welTel

WELTEL Your health, in your hands

June 21, 2012 15:

Login Successful

Overview To Do Patients Templates Dictionary Users Roles Clinics Logou

Pending Unknown OK Not OK Late Find Patient

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

System



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



Qualitative

WelTel BC1: Participant interviews



“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?

Guidelines for Improving Entry Into and Retention in Care and Antiretroviral Adherence for Persons With HIV: Evidence-Based Recommendations From an International Association of Physicians in AIDS Care Panel

Melanie A. Thompson, MD; Michael J. Mugavero, MD, MHSc; K. Rivet Amico, PhD; Victoria A. Cargill, MD, MSCE; Larry W. Chang, MD, MPH; Robert Gross, MD, MSCE; Catherine Orrell, MBChB, MSc, MMed; Frederick L. Altice, MD; David R. Bangsberg, MD, MPH; John G. Bartlett, MD; Curt G. Beckwith, MD; Nadia Dowshen, MD; Christopher M. Gordon, PhD; Tim Horn, MS; Princy Kumar, MD; James D. Scott, PharmD, MEd; Michael J. Stirratt, PhD; Robert H. Remien, PhD; Jane M. Simoni, PhD; and Jean B. Nachega, MD, PhD, MPH

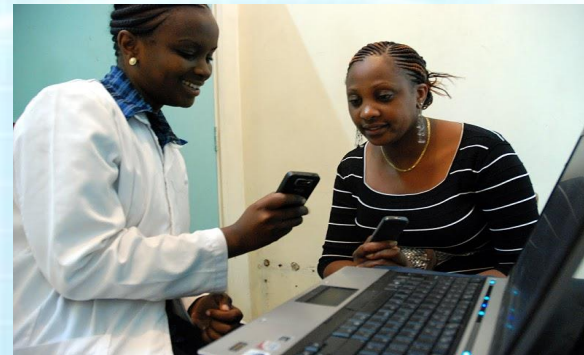
An adherence benefit of dose-time reminder alarms has been reported (64, 65). Strategies using cellular technology (short message service communication) have demonstrated improvement in adherence and HIV-1 RNA. Methods ranged from texting dosing reminders with or without requesting a response (66–68) 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!

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!



The future is now.



Partnerships & Support



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Grands Défis Canada™

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Province-wide solutions.
Better health.



the CTN
CIHR Canadian
HIV Trials Network

le Réseau
Réseau canadien
pour les essais VIH des IRSC



CIHR IRSC
Canadian Institutes of Health Research
Instituts de recherche en santé du Canada



University of California
San Francisco



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