


## Computing and Global Health Lecture 6 Patient Support

Winter 2015  
Richard Anderson

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## Today's topics



- Trevor Perrier, SMS
- Phone messaging
- Messaging technologies
- Example Projects
- Messaging studies
- Adherence
- Health information systems

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## Readings and Assignments

- SMS For Life
- WeTel Study
- Iron Tablet Adherence Study
- Homework 6
  - Design an SMS syntax for cold chain reporting

| Date         | Topic                 |
|--------------|-----------------------|
| Jan 7, 2015  | Overview              |
| Jan 14, 2015 | Surveillance          |
| Jan 21, 2015 | Tracking              |
| Jan 28, 2015 | Medical records       |
| Feb 4, 2015  | Logistics             |
| Feb 11, 2015 | Patient support       |
| Feb 18, 2015 | Treatment support     |
| Feb 25, 2015 | Health worker support |
| Mar 4, 2015  | Behavior change       |
| Mar 11, 2015 | Finance               |

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## Organization

- Patient support
- Treatment support
- Worker support
- Behavior Change Communication

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## Patient Support

- Messaging
  - Spam
  - Reminders
  - Interaction
  - Adherence messaging
- Adherence (other than messaging)
- Information services

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## Phone Messaging

- Different types of messaging
  - What is the intended behavior to be influenced
  - What is the theory of behavior change
- Health knowledge
- Promotion of a specific activity
- Reminder of action
- Interaction with health system

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## Adherence



- Medication
  - HIV ART
  - Tuberculosis
  - Diabetes
  - Iron Pills
- Lifestyle
  - Diet
  - (Not) smoking

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## Obstacles to Adherence

- Why do people stop taking medication?

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## Reminders



- Appointment reminders
  - ANC visits
  - TB Testing
- Immunization reminders
- Long term birth control

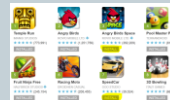
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## Technology

- SMS, Voice, SmartPhone Apps, Social Media



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## Personal mobile phones

- Mobile phones have tremendous reach, but
  - Vast variety in different situations
  - Rapid change



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## Mobile Phone Issues

- Handsets
  - Generally available, prestige good
- Airtime
  - Prepaid. Costs vary dramatically
- Signal
  - Widely available, spotty coverage, no coverage
- Electrical power
  - Depends on the electrical grid
- Simcards
- Monopolies

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## Mobile Phones and Gender

- Phone ownership models
  - Shared across household (less common)
  - Household phone
  - Individual phones
- Common practices
  - Men have better phones than women
  - Children have access to mothers phone



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## SMS

- Available on almost all mobile phones
- Restricted message length
- Highly variable cost
  - Although essentially no cost for carrier
- Highly variable usage
  - Different populations and countries
- Gateway Issues
- SPAM!

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## Voice

- Universal on phones
- IVR – Interactive Voice Response
- Automated calls with recorded messages
- Callbacks triggered by missed call



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## Smartphone Apps and Social Media

- Applicability depends on demographics
- Rapid change
- For global health, often an emphasis in reaching late adopters



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## Example projects

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## Walter Curioso

- Early work in SMS reminders in Latin America
  - Voxiva
- Messages aimed at high risk populations to influence behavior
- Many issues around confidentiality and privacy



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## Text4Baby / MAMA

### How it Works

1. Text BABY (or BEBE for Spanish) to 511411.
2. When prompted, enter your due date and zip code.
3. That's it! Now tell your friends and family!



Free t4b msg: Morning sickness may be caused by a change in your hormones. Try eating crackers or dry cereal. Eat small meals often. Don't go without eating.

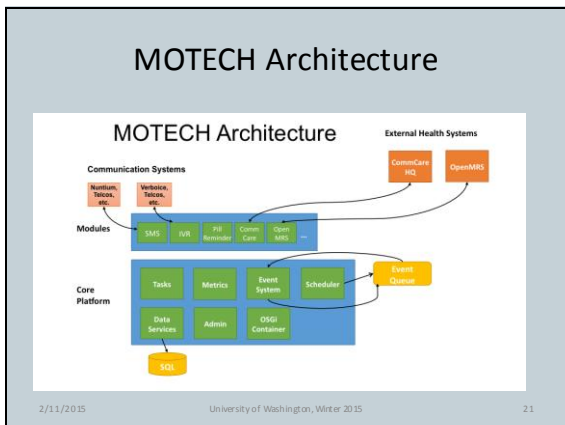


The power of health in every mama's hand

## Mobile Technology for Community Health (MOTECH)


- Platform developed by Grameen Foundation with support from BMGF
  - Motechsuite.org
- Evolving platform
- Significant deployment through BMGF grantees in Bihar
- Initial work in Ghana



## Motech Ghana

- Initial deployment in Northern Ghana
- Early version of Motech developed to support deployment
- Maternal messaging and phones for nurses



MOBILE TECHNOLOGY FOR COMMUNITY HEALTH IN GHANA

WHAT IT IS AND WHAT GRAMEEN FOUNDATION HAS LEARNED SO FAR  
March 2013

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## Lessons learned

- Phones for nurses
  - Phone management and logistics
  - Nurses did not feel the phones helped them in reporting
- Messaging
  - Voice, not SMS
  - Tremendous challenges in localization
    - Expense for translation
  - Cost and sustainability challenges
  - Significant formative work in identifying needs

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## Evaluation Studies

- Very different approaches to evaluation based on discipline
- Medical evaluation
  - Define intervention
  - Construct study design
  - Enroll study subjects in different arms
  - Conduct study without further intervention
- Computer Science
  - Develop technology with initial field tests
  - Deploy technology in field with iterative adjustments
  - Analysis of multiple sources of ad hoc data from deployment
  - Promote large scale deployment or use

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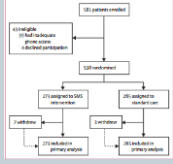
## WelTel Study



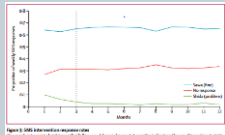
- HIV Patients on ART
- Simple intervention
  - Send patients a weekly SMS: Mambo
  - Patients respond: Sawa / Shida
- Measured outcomes
  - Self reported adherence
  - Viral suppression

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## WelTel Study




|                             | WTS group (n=507) | Control group (n=510) | WTS/ART (n=507)  | p-value |
|-----------------------------|-------------------|-----------------------|------------------|---------|
| <b>Primary outcomes</b>     |                   |                       |                  |         |
| Self-reported adherence (%) | 102 (20%)         | 137 (27%)             | 0.01 (0.00-0.04) | 0.006   |
| “Yes” responses             | 102 (20%)         | 137 (27%)             | 0.01 (0.00-0.04) | 0.004   |
| Complete viral suppression  | 102 (20%)         | 137 (27%)             | 1.00 (0.94-1.00) | 0.94    |
| Self-reported adherence     | 102 (20%)         | 137 (27%)             | 0.01 (0.00-0.04) | 0.004   |
| “Yes” responses             | 102 (20%)         | 137 (27%)             | 0.01 (0.00-0.04) | 0.004   |
| <b>Secondary outcomes</b>   |                   |                       |                  |         |
| Total adherence (mean)      | 131 (26%)         | 81 (16%)              | 1.34 (0.81-1.88) | 0.01    |
| Loss to follow-up           | 27 (5%)           | 27 (5%)               | 1.00 (0.81-1.23) | 0.994   |
| Mortality                   | 35 (7%)           | 30 (6%)               | 1.27 (0.71-2.28) | 0.42    |
| Withdrawal                  | 7 (1%)            | 3 (1%)                | 2.00 (0.94-4.25) | 0.14    |
| Transferred                 | 4 (1%)            | 1 (0%)                | 0.33 (0.01-0.65) | 0.02    |



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## Adherence to Iron Pills



- Evaluate if voice messaging improves adherence to taking pills
- Study goal – evaluate mHealth intervention with measurable health outcome
  - Anemia is highly prevalent for low income women in India
  - Simple treatment – iron pills
  - Measurable results – Hemoglobin test

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## Sian Hospital Study

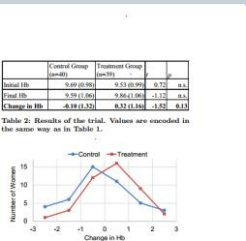
- High anemia rates, low utilization of iron pills
  - Pills available for free, but 70% of women fail to take them
    - Forgetfulness, dislike of pills
- Intervention
  - Recorded voice calls from doctor
  - Three messages per week in local language
  - Positive, affective messages

Hello, this is Dr Niranjan Pai. We met in Sian Hospital. Your backache may increase. Don't worry, take rest. Take the prescribed pills regularly as they are important for you and your child's health. I will call you again in a couple of days. Thank you

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## Results

|              | Control Group (n=50) | Treatment Group (n=50) | p-value   |
|--------------|----------------------|------------------------|-----------|
| Initial Hb   | 9.89 (0.50)          | 9.53 (0.59)            | 0.72 n.s. |
| Final Hb     | 9.09 (1.00)          | 9.84 (1.04)            | 1.32 n.s. |
| Change in Hb | -0.80 (1.02)         | 0.31 (1.04)            | 1.82 n.s. |

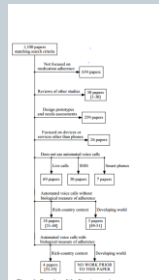


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## How to do a literature review

- Determine if there has been prior work on an assessment of voice based adherence support in developing countries

On PubMed and IEEE Xplore, we included all studies that contained both an adherence keyword and a phonekeyword in the title or abstract, with at least one of the keywords appearing in the title. For adherence keywords, we used "adherence", "adhere", "adhered", "compliance", "comply", and "complied". For phonekeywords, we used "phone", "phones", "telephone", "telephones", "interactive voice", "voice response", "automated calls", and "automated voice".



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## Adherence

- Direct Observation Therapy



## TB Drug Distribution

- Fingerprint scanning in drug distribution



## SMS Reporting

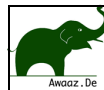
- Send confirmation code associated with each pill



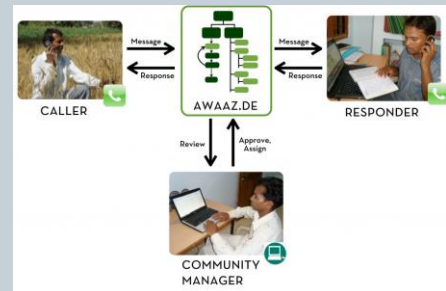
## Pill box notifications



## Health Information

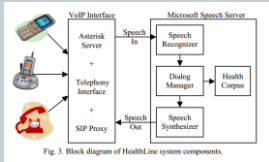


## Awaaz De



## Health Line, Pakistan

- Voice based health information system
- Target low-literate users



- Speech recognition research challenges

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## Next week

- Treatment Support



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