mHealth to Revolutionize Information Retrieval in Low and Middle Income Countries

Introduction and Proposed Solutions Using Botswana as Reference Point

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• Partnership between University of Pennsylvania, Botswana Ministry of Health, and University of Botswana (UB)

• **Health Informatics Capacity Building Program**
  - Curriculum development
  - Workshops
  - National conference
  - mHealth (advisors and research partners)
    - Telemedicine using mobile phones
    - mLearning with UB School of Medicine
    - mHealth Innovation Competition
    - 9+ Others
Agenda

• Information Retrieval (IR) in Low and Middle Income Countries (LMICs)
• Mobile Tech Revolution and mHealth in LMICs
• Botswana Background
• mHealth Solution #1: USSD for Treatment Guidelines
• mHealth Solution #2: Smart Devices for all types of IR content
• Conclusion
IR and LMICs

- Information Retrieval in digital era

- Digital IR helps medical professionals to avoid medical errors and provide care in a more effective, efficient manner

- IR challenges unique to LMICs
  - Analog health records, data, resources
  - Growing Digital Divide
    - Access to technology
    - Power outages
    - Weak/unreliable Internet

- “Leap Frog” Technology...
Mobile Technology Revolution
% of world's population covered by mobile signal:

2003: 61%
2009: 90%


The World in 2010: ICT Facts and Figures, Published October 1, 2010

... high-speed mobile internet signal (>3G):

2017: 85%

% of mobile devices owned by citizens in developing countries:

2000: 25% of 700 million
2009: 75% of 4 BILLION
2011: 76% of 6 BILLION

Early Promise of mHealth in LMICs

Proliferation of mHealth initiatives...
• Education and awareness
• Diagnostic and treatment support*
• Communication and training for healthcare workers*
• Helpline
• Disease and epidemic outbreak tracking
• Remote monitoring
• Remote data collection
Botswana Background

- Challenging landline IT infrastructure and high mobile tech penetration
- Ranks 2nd in HIV prevalence and 4th in TB prevalence in the world
- Severe shortage of healthcare workers
- Need for standardization of care

mHealth Solution #1: USSD for Treatment Guidelines

- Treatment Guidelines
  - Secondary knowledge-based scientific research
  - Integral resource for providing and standardizing care, and measuring quality
- Pneumonia is the second-leading cause of death for HIV patients
- Pneumonia Treatment Guideline implementation
  - limited to one-time lectures and provisions of hard copies of the guidelines
  - Guidelines are locked in rooms in health facilities and rarely referenced by clinicians
mHealth Solution #1: USSD for Treatment Guidelines

- USSD: Unstructured Supplementary Service Data
  - Constant connection with a database
  - 182 character limit
  - 90 second limit
  - Free for user
- Available on ALL mobile phones
Information

Please make your program selection.

1. Pneumonia

Reply  Exit

Enter response

OK  181  En
Is the patient being treated as:

1. Outpatient

Possible PCP?
CD4: unknown or
It 200CXR normal or diffuse infiltrates. One
mHealth Solution #1: USSD for Treatment Guidelines

• Advantages
  o Available on all mobile phones
  o Free for user
  o Quick, simple, easy

• Disadvantages
  o IR content limitations
    ▪ 182 characters
    ▪ 90 seconds
    ▪ No multimedia
mHealth Solution #2: Smart Devices for all IR content

University of Botswana
School of Medicine
mLearning Initiative

Based on a fundamental theorem....
If easily provides:

- Access to University Library Resources
- Access to International Research
- Local Treatment Guidelines
- Drug and Dosage References
- Ability to communicate with peers and mentors
- Countless more medical knowledge resources...
mLearning Fundamental Theorem

Then...
mLearning Fundamental Theorem

IF...

AND...

THEN...

UB School of Medicine Community

Penn University of Pennsylvania
mLearning Partners

University of Botswana School of Medicine (UBSOM)
University of Botswana Library

Orange Botswana

ManGoes Mobile

Botswana-UPenn Partnership
## mLearning Project Growth

<table>
<thead>
<tr>
<th>Year</th>
<th>Users</th>
<th>Locations</th>
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<tbody>
<tr>
<td>2010</td>
<td>7</td>
<td>Gaborone</td>
</tr>
<tr>
<td>2011</td>
<td>28</td>
<td>Gabs, Maun, Mahalapye</td>
</tr>
<tr>
<td>2012</td>
<td>36*</td>
<td>Gabs, Maun, Mahalapye</td>
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<tr>
<td>2012-13</td>
<td>170*</td>
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<tr>
<td>2013</td>
<td>235*</td>
<td>Gabs, Maun, Mahalapye, Lobatse</td>
</tr>
</tbody>
</table>

* 7” Android Tablets
Pilot User Testimonials

"These phones are like lifelines for us"

- Family Medicine Resident in Mahalapye

“The internet supply in Maun is very dry... it can go for weeks without working... to have that substitute of information at hand... at all times, is very welcome.”

- Family Medicine Resident in Maun
mLearning Tablet Setup
mLearning Tablet Trainings
mLearning Tablet Trainings
Conclusion

- Tip of iceberg for mHealth and IR
- Customization and local ownership and drive are key to sustainability
- Information - **not technology** - is at the heart of a successful Health Informatics solution
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