MHEALTH FOR MEDICATION ADHERENCE FOR CHRONIC DISEASE: THE CASE OF HIV+

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The importance of medication adherence for HIV+

- Antiretroviral therapy (ART) has led to HIV/AIDS being a chronic condition
- High levels of ART translates into sustained HIV suppression, reduced risk of drug resistance, improved overall health, quality of life, and survival rate among HIV+ patients
- Poor adherence leads to negative health outcomes for patients and increases risk of transition to partners
- *ART adherence is key for reducing patient morbidity and mortality, and for reducing health care utilization and costs*
Barriers to medication adherence

- **Age-related**: Increased allostatic load leads to decrements in memory & cognitive processes
- **Disease-related**: HIV prematurely ages immune system, accelerating cognitive decline
- **Medication-related**: Side effects
- **Psychosocial-related**:
  - Depression
  - Stress burden
  - Poor social support
  - Lack of medication self-efficacy
- **Additional barriers for health disparity populations**:
  - Physical, knowledge, infrastructure, economic, and cultural
Mhealth medication adherence interventions for HIV and other chronic diseases

- SMS: medication reminders, educational, and motivational texts
- Live telephone consults with care providers
- Mixed study results (increased adherence ~ 65% of studies)
- Most not evaluated in RCT
- Most do not include process data to assess fidelity in study implementation
- Most intervention designs do not rely on behavioral change theories
- Methodological and clinical heterogeneity preclude meta-analysis
Theoretical approaches to behavioral change

- Social cognitive theory
- Health beliefs model
- Stress and coping
Formative research to generate text messages

- Multi-cultural team with expertise in health psychology, HIV clinical care, health communications, and minority aging drafted motivational and educational text messages
- Health education messages focused on maintaining healthy lifestyle
- Motivational messages focused on promoting self empowerment and optimistic outlook
- Focus group of HIV+ African Americans 50+ convened for feedback on draft messages
- Messages were finalized by team based on focus group feedback
Examples of text messages

**Motivational Messages**
- You have what it takes to keep up with your meds
- Your meds give you life and hope. Stay on them.
- Stay healthy; Live longer; Live stronger.

**Health Education Messages**
- Up with fiber; down with cholesterol.
- Laughter is a natural painkiller.
- Oatmeal is a healthy was to start the day
## Backend Management System

### ART4Me Interface

<table>
<thead>
<tr>
<th>Message ID</th>
<th>Message Category</th>
<th>Message Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>M124</td>
<td>Educational</td>
<td>Exercise helps keep your mood up and your weight down.</td>
</tr>
<tr>
<td>M109</td>
<td>Educational</td>
<td>Fresh fruit is delicious and loaded with vitamins.</td>
</tr>
<tr>
<td>M116</td>
<td>Motivational</td>
<td>If a med is making you feel sick, talk to your doctor.</td>
</tr>
<tr>
<td>M117</td>
<td>Motivational</td>
<td>If you skip one pill, things can change quickly.</td>
</tr>
<tr>
<td>M123</td>
<td>Educational</td>
<td>Laughter is a natural painkiller.</td>
</tr>
<tr>
<td>M113</td>
<td>Motivational</td>
<td>Love yourself--Take your meds.</td>
</tr>
<tr>
<td>M130</td>
<td>Educational</td>
<td>Low-fat milk is a good source of calcium.</td>
</tr>
</tbody>
</table>

The interface includes options to add, edit, delete, and manage active and inactive messages.

Notifications button is also present at the bottom of the interface.
Pilot study

- 8 wk pre-post test (n=21 HIV+, African American adults aged 50+)
- Daily SMS pill reminders and bi-weekly educational and motivational messages
- Delivered through standard mobile phone or an Android mobile app
- Theory based hypotheses: Participants who receive daily text messages targeting neurocognitive and affective factors for two months will have improved ART adherence (primary); increased treatment self-efficacy and positive affect (secondary)

Outcome: perfect ART adherence improved from 38% to 86%
Focus group recommendations for future RCT

- Opt-in text messages to support smoking cessation
- More visual texts to reinforce adherence
- Option of real-time, live care provider support
Implications for mhealth medication adherence interventions for HIV and other chronic diseases

Design Implications:

- Importance of theory based, RCT research with process data
- Need to engage patients to change *and* sustain health behaviors
- Model should be patient centered, focusing on patients’ needs and preferences, to motivate them to participate in their own care
- More than one strategy may be needed

Provider Implications:

- Need to examine the value of linking providers and patients
- Need for reimbursement mechanisms to spread successful applications throughout the system to both providers and patients

*Mhealth offers the promise of a cost-effective intervention that has the potential to be both spread and sustained.*
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