Development of a Computer-Based Tailored Information Application to Improve HIV-Related Treatment Adherence

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Medication adherence in HIV

- Adherence needed to suppress viral replication = 80-95%
- Typical adherence = 60-70%
- Viral suppression → decreased risk of infecting others
- Viral suppression → better clinical outcomes
Health literacy

- Knowledge, abilities, and skills required to attain a desired state of health
- Related to multiple clinical variables
  - Disease control (diabetes)
  - Hospitalization (Medicare data)
  - Death (Medicare data)
  - Medication adherence (HIV)
IMB Model

- **Information:** How meds work, how to cope with side effects
- **Motivation:** Social support, depression, stigma, side effects
- **Behavioral Skills:** How to remember to take medications, cope with obstacles
Goal

- Improve patients’ health literacy as a way to improve their medication adherence

- How to improve health literacy?
  - Target elements of the IMB model

- Availability and clinician time?
  - A touch screen computer delivered tailored information intervention
Tailored Information & Interactivity

- Personalization
- Individualized feedback
- Enhanced perceived relevance
- Increased impact on patient behavior
- Interaction via teaching and questions
- Reviews as needed provided by the computer program
Development

- Content review
  - Patient information, popular books
- Multidisciplinary team
  - Medicine
  - Psychology
  - Pharmacy
  - Nursing
  - Social Work
- Usability and content testing with users
The intervention

Here's an overview of the program:

The Basics
- Red and white blood cells
- The immune system

HIV
- The virus and how it affects your body
- What happens when you get HIV?

Medicines
- How medicines work
- Ways to remember to take your medicines

Go Back  Continue
A Flash animation provides a preliminary overview of the virus life cycle.
The animation emphasizes specific stages in the viral life cycle.
These stages are later reviewed in discussion of how medications work.
• A key aspect of the intervention is interactivity
• Participant learning is assessed with questions
• If needed, program content is automatically retaught
The key to staying well if you have HIV is to get the treatment you need.

The doctor can tell you what medicines you need by finding out two things:

1. **The doctor needs to know how many CD4 or T cells you have.**

2. **He or she needs to know how much virus is in your blood.**

You need a blood test to find out these things.
How You Feel

Sometimes people feel very bad about having HIV. They think that they got it because they were bad. They feel guilty. If you feel this way, it may make you feel like you shouldn't get treatment.

If you feel this way, talk to someone. Someone at the clinic, or a friend may help you feel better. *Talking about how you feel can help you feel better.*
You have to be very good at taking your medicine if you want to stay healthy. Studies show that people who take their medicine almost all of the time are more likely to have undetectable viral loads. **When the viral load is very low, most people feel good and can get on with their lives.**

You can only miss one or two doses, just like on this calendar.
MEMS

- **Medication Event Monitoring System**

- **Adherence indices**
  - Taken (e.g., 30 pills in 30 days)
  - Correct (e.g., 1 pill/24 hours)
  - Scheduled (e.g., +/- 2 hours)
Design

- Three visits:
  - 1: Baseline
  - 2: Intervention, 30 days later
  - 3: Post intervention, 30 days after intervention

- Enrolled = 124; completed = 118
- 29% women and 71% men
- 64% black and 36% white
- 37% 11th grade education or less
- 36% High school or GED
## Sample (n = 124)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in Years</td>
<td>47.10</td>
<td>8.69</td>
</tr>
<tr>
<td>CD4</td>
<td>501.03</td>
<td>289.29</td>
</tr>
<tr>
<td>HIV Meds Doses/Day</td>
<td>2.83</td>
<td>1.50</td>
</tr>
<tr>
<td>Other Meds Doses/Day</td>
<td>2.60</td>
<td>2.54</td>
</tr>
<tr>
<td>All Meds Doses/Day</td>
<td>5.43</td>
<td>3.32</td>
</tr>
<tr>
<td>Years Since Diagnosis</td>
<td>15.64</td>
<td>7.92</td>
</tr>
<tr>
<td>Years of Treatment</td>
<td>11.70</td>
<td>7.24</td>
</tr>
</tbody>
</table>
User ratings of the Intervention

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>The program taught me new information</td>
<td>5.45</td>
<td>1.114</td>
</tr>
<tr>
<td>The program helped me understand why taking my medicines is important</td>
<td>5.58</td>
<td>1.082</td>
</tr>
<tr>
<td>The program helped me know what to do about side effects</td>
<td>5.28</td>
<td>1.298</td>
</tr>
<tr>
<td>The program helped me work better with my doctor</td>
<td>5.22</td>
<td>1.306</td>
</tr>
<tr>
<td>My interaction with the computer program has been clear and understandable.</td>
<td>5.62</td>
<td>.711</td>
</tr>
<tr>
<td>Overall, the computer program is easy to use.</td>
<td>5.67</td>
<td>.712</td>
</tr>
<tr>
<td>I had fun using the program</td>
<td>5.51</td>
<td>.789</td>
</tr>
<tr>
<td>If it were available, I would use the program to learn about another health problem</td>
<td>5.49</td>
<td>.789</td>
</tr>
</tbody>
</table>

Rating scale was 0 (“strongly disagree”) to 6 (“strongly agree”).
LifeWindows IMB Scale: Information

**Information**
- Repeated Measures ANCOVA
- $F = 7.141, p = 0.001$
IMB Scale: Motivation

Motivation
- Repeated Measures ANCOVA
- $F = 0.83, p = 0.44$
IMB Scale: Behavioral Skills

- **Behavioral Skills**
  - Repeated measures ANCOVA
  - $F = 5.10, p = 0.007$
Depression and Self Efficacy

- Significant increase in self-efficacy
  - General health self-efficacy scale
  - E.g., “I am in control of my healthcare”
  - $t = 2.72, p = 0.008$

- Small but nonsignificant decrease in depression
  - Center for Epidemiological Studies – Depression Scale (CES-D)
  - Decrease in mean ~ 2 on CES-D total
  - $t = 1.48, p = 0.14$
Results: Adherence

- Poisson GEE model

- Results for complete sample
  - No change (mean adherence at 83%)
  - MEMS Percent Correct

- Baseline adherence < 85% (n = 35)
  - Chi-square ($df = 1$) = 13.34, $p < 0.001$
  - 59.8% vs. 66.9%
Limitations

- No comparison group
- Small sample
- Many participants with high levels of adherence
- Medium effect sizes suggest need for multiple interventions for optimal adherence
Conclusions

- The computer-based intervention is usable and acceptable to persons treated for HIV infection
  - Positive ratings on multiple dimensions
  - Usable, helpful, fun
  - Spontaneous positive comments
    - “I never understood this before”
    - “No one ever explained this to me before”
Conclusions

- Participation in the intervention is associated with improved
  - Information
  - Behavioral skills
  - Adherence in those with less than 85% baseline adherence
  - Health-related self-efficacy
  - Possibly depression
Future development

- Elements of motivation
  - Depression
  - Stigma
- Cultural and linguistic adaptation
- Transition to mobile application
- Combine with interventions to maintain gains over time
Support:

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