Engagement is Key to Effectiveness of Individualized Texting for Adherence Building (iTAB) Among HIV+ Methamphetamine Users


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Background

- Methamphetamine (METH) use strongly associated with continued incidence of HIV/AIDS in the U.S.
- METH use associated with \( \downarrow \) antiretroviral therapy (ART) adherence
- Texting to improve ART adherence in HIV+ substance using cohorts feasible
- Meta-analysis \( \rightarrow \) text messaging yielded higher ART adherence than control conditions
  - Studies with larger effects on adherence: 1) Sent less than daily messages, 2) Supported bidirectional communication*, 3) Had personalized content*, 4) Were matched to participants’ dosing schedule*

CDC HIV/AIDS Fact sheet, 2007; Blackstone et al., 2013; Moore et al., 2012; Finitis, Pellowski, & Johnson, PLoS One, 2014; Moore et al., ART, 2013 Ingersoll et al., J Sub Abuse Tx, 2014
Objective

- To compare a brief psychoeducation plus adherence text messaging intervention (iTAB) to psychoeducation without adherence text messaging (CTRL) for the improvement of objectively measured medication adherence among HIV+/METH+ persons
iTAB-M Study Methods

- 6-week trial Randomized Controlled Trial; March ‘12 to April ‘14
- 2:1 assignment to iTAB-M (n=50) or CTRL (n=25)
- Inclusion criteria:
  - HIV-infected individuals
  - 18 years or older
  - METH use within 45 days of enrollment and diagnosed with lifetime METH dependence or abuse
  - Current ART rx
- Retention good iTAB=88% (n=44), CTRL=96% (n=24)
- Issues with MEMS, so showing per-protocol analysis
  - iTAB-M (n=35) vs. CTRL (n=19)
  - Outcome: MEMS ARV adherence ±2-hour dosing window; MEMS ARV adherence
Individualized Texting for Adherence Building (iTAB) intervention

- **Both–iTAB/active control (CTRL):**
  - Adherence psychoeducation
  - Sentinel ARV for MEMS
  - Daily mood text message
  - Daily METH text message

- **iTAB:**
  - Daily interactive ART texts:
    - Preferred dosing time, name, choice of personalized reminder stems, description of pill
  - If 3 doses missed = emergency text; 5 doses missed = RA call
Example Thematic Reminder Stems

» Social Support/responsibility to others
  • People care about u. Pls take ur...

» Self-Esteem
  • U are special. Pls take ur...

» Dangers of Non-adherence
  • Not taking ur meds could make u resistant. Take ur...

» Harm Reduction
  • You can have fun and take ur meds. Time 4 ur...

» Time/focus
  • It’s pill time! Take ur...

» Spirituality
  • God grant me the serenity to do this. It’s time 4 ur...

» Celebration of Health
  • 2 help keep u feeling good, remember 2 take ur...

» Disease control
  • Ur health is impt, remember 2 take ur meds. Take ur...

Montoya et al., AIDS Care, 2014
### Demographic Characteristics

<table>
<thead>
<tr>
<th></th>
<th>iTAB (n=35)</th>
<th>CTRL (n=19)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>45.4 (8.3)</td>
<td>46.8 (8.7)</td>
<td>.55</td>
</tr>
<tr>
<td>Education, mean (SD)</td>
<td>13.3 (3.0)</td>
<td>13.8 (2.6)</td>
<td>.53</td>
</tr>
<tr>
<td>Male, # (%)</td>
<td>33 (94.2%)</td>
<td>19 (100.0%)</td>
<td>.29</td>
</tr>
<tr>
<td>Gay/bisexual, # (%)</td>
<td>32 (91.4%)</td>
<td>15 (78.9%)</td>
<td>.19</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td>.01</td>
</tr>
<tr>
<td>Non-Hispanic white, # (%)</td>
<td>21 (60.0%)</td>
<td>4 (21.1%)</td>
<td></td>
</tr>
<tr>
<td>Black, # (%)</td>
<td>9 (25.7%)</td>
<td>7 (36.8%)</td>
<td></td>
</tr>
<tr>
<td>Other, # (%)</td>
<td>5 (14.3%)</td>
<td>8 (42.1%)</td>
<td></td>
</tr>
<tr>
<td>Employed, # (%)</td>
<td>13 (37.1%)</td>
<td>2 (10.5%)</td>
<td>.04</td>
</tr>
</tbody>
</table>
# Psychiatric & Substance Use Characteristics

<table>
<thead>
<tr>
<th></th>
<th>iTAB (n=35)</th>
<th>CTRL (n=19)</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td><strong>Psychiatric</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beck Depression Inventory&lt;sup&gt;a&lt;/sup&gt;</td>
<td>14.4 (10.2)</td>
<td>12.1 (9.1)</td>
<td>.41</td>
</tr>
<tr>
<td>Current Major Depressive Disorder&lt;sup&gt;c&lt;/sup&gt;</td>
<td>8 (22.9%)</td>
<td>0 (0.0%)</td>
<td>.04</td>
</tr>
<tr>
<td>Lifetime Major Depressive Disorder&lt;sup&gt;c&lt;/sup&gt;</td>
<td>22 (62.9%)</td>
<td>11 (57.9%)</td>
<td>.72</td>
</tr>
<tr>
<td><strong>Methamphetamine (METH) Use</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days since last use&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.5 [2.0, 21.0]</td>
<td>7 [1.5, 17.5]</td>
<td>.99</td>
</tr>
<tr>
<td>Age of 1&lt;sup&gt;st&lt;/sup&gt; use (years)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>22.5 (11.4)</td>
<td>20.0 (13.2)</td>
<td>.51</td>
</tr>
<tr>
<td>Lifetime quantity used (grams)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>661 [71, 3764]</td>
<td>239 [43, 2233]</td>
<td>.38</td>
</tr>
<tr>
<td>Previous treatment for METH use&lt;sup&gt;c&lt;/sup&gt;</td>
<td>26 (74.3%)</td>
<td>14 (73.7%)</td>
<td>.96</td>
</tr>
</tbody>
</table>

<sup>a</sup> = mean (SD); <sup>b</sup> = median [IQR]; <sup>c</sup> = # (%)
# HIV Disease Characteristics

<table>
<thead>
<tr>
<th>HIV Disease Characteristics</th>
<th>iTAB (n=35)</th>
<th>CTRL (n=19)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of HIV disease (years) a</td>
<td>13.4 (8.0)</td>
<td>11.2 (8.2)</td>
<td>.42</td>
</tr>
<tr>
<td>Proportion with undetectable HIV RNA plasma c</td>
<td>26 (81.3%)</td>
<td>10 (71.4%)</td>
<td>.46</td>
</tr>
<tr>
<td>CD4 count within past year a</td>
<td>603 (364)</td>
<td>438 (292)</td>
<td>.14</td>
</tr>
<tr>
<td>Proportion with AIDS diagnosis c</td>
<td>19 (57.6%)</td>
<td>11 (57.9%)</td>
<td>.70</td>
</tr>
<tr>
<td>Antiretroviral Treatment (ART)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years on current regimen b</td>
<td>2.1 [1.0, 4.3]</td>
<td>1.6 [0.9, 3.7]</td>
<td>.58</td>
</tr>
<tr>
<td>Years of exposure to any regimen b</td>
<td>4.9 [2.3, 11.2]</td>
<td>8.8 [4.4, 14.5]</td>
<td>.46</td>
</tr>
<tr>
<td>Proportion on once-daily regimen c</td>
<td>33 (94.3%)</td>
<td>17 (89.5%)</td>
<td>.52</td>
</tr>
</tbody>
</table>

a = mean (SD); b = median [IQR]; c = # (%)
Engagement: Responsiveness to ART Prompts

iTAB only:
ART Prompts (N=1163)

- Took: 70.2%
- No response: 22.7%
- Snooze: 5.2%
- Didn’t take: 1.9%
Engagement: Responsiveness to Mood & METH Prompts

iTAB + CTRL: Mood Prompts (N=1610)
- Not at all depressed: 52.4%
- A little depressed: 18.2%
- Moderately depressed: 16.5%
- Very depressed: 3.5%
- Extremely depressed: 2.7%
- No response: 6.7%

iTAB + CTRL: METH Prompts (N=1605)
- Didn’t use: 60.1%
- Used: 20.0%
- No response: 19.9%
MEMS ARV Adherence

% Doses Taken

iTAB: 76.2
CTRL: 81.8

$t = -0.85, \ p = 0.40, \ Cohen's \ d = -0.24$
MEMS ARV Adherence in Dosing Window

% Doses Taken in 2-hr dosing window

iTAB: 53.2
CTRL: 53.7

t = -0.05, p = 0.96, Cohen’s d = -0.02
Group x Level of Engagement

Model
$R^2 = 0.23$
$F = 6.13, \ p < 0.01$
iTAB only: MEMS ARV adherence by responsiveness to prompts

- **ART prompts**: \( r = 0.76 \), \( p < 0.001 \)
- **Mood prompts**: \( r = 0.48 \), \( p = 0.003 \)
- **METH prompts**: \( r = 0.49 \), \( p = 0.003 \)
<table>
<thead>
<tr>
<th>Group</th>
<th>VL Available</th>
<th>Baseline VL</th>
<th>6-Week VL</th>
<th>Δ Log VL</th>
</tr>
</thead>
<tbody>
<tr>
<td>iTAB</td>
<td>34</td>
<td>28 UD</td>
<td>1 D</td>
<td>27 UD</td>
</tr>
<tr>
<td></td>
<td>1 D</td>
<td>1 UD</td>
<td>5 D</td>
<td>1 UD</td>
</tr>
<tr>
<td></td>
<td>1 UD</td>
<td>10 UD</td>
<td>1 D</td>
<td>1 UD</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>3 D</td>
<td>0.26</td>
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<tr>
<td></td>
<td></td>
<td>-1.44</td>
<td>0.03</td>
<td>-0.46</td>
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<tr>
<td></td>
<td></td>
<td>-1.19</td>
<td>0.29</td>
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<tr>
<td></td>
<td></td>
<td>-0.83</td>
<td>0.40</td>
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<tr>
<td></td>
<td></td>
<td>-0.74</td>
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<tr>
<td></td>
<td></td>
<td>0.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTRL</td>
<td>15</td>
<td>11 UD</td>
<td>4 D</td>
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D = Detectable VL
UD = Undetectable VL
**Conclusions & Future Directions**

**Conclusions**

- Improving ART adherence among current METH users difficult; additional components likely needed
- iTAB improves engagement as compared to CTRL; higher engagement associated with ART adherence among HIV-infected METH users
- High engagement with text possible proxy for those who are effectively adhering to ART (assessment v. information)
- Viral Load direction in iTAB Promising

**Food for Thought/Future Directions**

- Optimize engagement—how? Variability in messaging? In-person? Sooner?
- Message content: choice vs. theory-based vs. triggered
- What is best role for texts? Assessment? Intervention? Both?
- Willingness to disclose ART non-adherence vs. substance use
Acknowledgments

- **Participants**

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  - Allison Flick
  - Fred Raab
  - Mark Sullivan
Enrollment

Assessed for eligibility (n=371)

Randomized 2:1
(n=75) +
(n=5 pilots)

Excluded (n=291)
◆ Not meeting inclusion criteria (n=204)
◆ Declined to participate (n=3)
◆ Other (e.g., unable to contact) (n=84)

Allocation

Allocated to iTAB (n=50)
◆ Lost to follow-up (n=3)
◆ Discontinued (n=3)

Allocated to CTRL (n=25)
◆ Lost to follow-up (n=1)

Follow-up

Intention to treat (n=43)
◆ Lost MEMS (n=1)
Per protocol (n=35)

Analysis

Intention to treat (n=23)
◆ Lost MEMS (n=1)
Per protocol (n=19)
≥80% ARV Adherent

Proportion Adherent

\[ X^2 = 2.5, \ p = 0.11 \]

51.4% for iTAB
73.7% for CTRL
≥80% ARV Adherent in Dosing Window

Proportion Adherent

<table>
<thead>
<tr>
<th>iTAB</th>
<th>CTRL</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.7%</td>
<td>31.6%</td>
</tr>
</tbody>
</table>

$X^2 = 0.21, \ p = 0.65$
Multivariable logistic regression model predicting ≥80% ART adherent in Dosing Window:

\[ X^2 (3, N = 54) = 12.7, p = 0.005 \]

<table>
<thead>
<tr>
<th>Term</th>
<th>( X^2 )</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention arm [ref: CTRL]</td>
<td>1.81</td>
<td>.18</td>
</tr>
<tr>
<td>Level of engagement</td>
<td>0.29</td>
<td>.59</td>
</tr>
<tr>
<td>Intervention arm * level of engagement</td>
<td>5.13</td>
<td>.02</td>
</tr>
</tbody>
</table>
Group x Level of Engagement

Model
$R^2 = 0.12$
$F = 3.95, \ p = 0.01$