Real-time adherence monitoring with follow-up improves adherence compared to electronic monitoring alone: quasi-experimental analysis

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Declarations

• Funding:
  – NIH
  – Bill and Melinda Gates Foundation
  – USAID

• Consultation:
  – NIH
  – WHO
  – IAVI
  – FHI 360
  – Natera (stock)
Electronic adherence monitoring

• Standard (e.g., MEMS) and real-time (e.g., Wisepill) devices
• Provide an objective day-to-day assessment of adherence (i.e., levels and patterns)
• Allow for differentiated interventions
Sustained adherence interruptions are associated with viral rebound

- Viremia can be detected in real-time
- Impact of real-time follow-up on adherence is unclear

(Sabin, JAIDS, 2015; Orrell, JAIDS, 2015; Haberer, AIDS, 2016)

(Haberer et al, AIDS, 2015)
UARTO

- Longitudinal observational cohort study (Uganda AIDS Rural Treatment Outcomes) among HIV-infected adults at ART initiation
- Enrollment 2005-2012
- Quarterly follow-up
  - Socio-demographic data
  - ART regimen
  - HIV RNA
Adherence monitoring in UARTO

<table>
<thead>
<tr>
<th>MEMS</th>
<th>Wisepill + follow-up</th>
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<td>• 2005-2012</td>
<td>• 2011-2015</td>
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<td>• Observational measure</td>
<td>• Observational measure</td>
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<td>• Sustained (48+ hr) adherence interruptions</td>
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<td>triggered home visits</td>
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<td>– Brief interviews</td>
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<td>– Phlebotomy for viral load assessment</td>
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Analysis

• Comparison of adherence for participants who had 6 months each of monitoring with MEMS and Wisepill + follow-up with \( \leq 1 \) day in between

• Regression modeling with fixed effects and robust standard errors
  – Comparison of participant characteristics
  – Comparison of weekly averages and 48+ hour interruptions in adherence
Analysis

• Ordinary least squares regression modeling
  – To project estimated MEMS adherence if the participant had not switched to Wisepill + follow-up, and to compare that with the observed Wisepill adherence
  – To compare adherence for participants during Wisepill + follow-up with and without prior MEMS monitoring
Participant characteristics

• 112 participants had 6 months each of monitoring with MEMS and Wisepill + follow-up
  – Median age: 36 years
  – Female: 68%
  – Pre-ART CD4 count: 141 cells/ml

• All characteristics were similar in the two monitoring periods
  – ART regimen
  – Education
  – Wealth
  – Distance to clinic
  – Social support
    - Food insecurity
    - Viral suppression
    - Depression
    - Alcohol use
Comparison of adherence

• Immediately after participants switched from MEMS to Wisepill + follow-up
  – Mean adherence increased: 84% to 93% (p<0.001)
  – Mean 48+ hour interruptions decreased: 1.1 to 0.3 (p<0.001)
• The difference in adherence was sustained over 6 months
Wisepill adherence not influenced by prior MEMS monitoring

- 112 participants have monitoring with both MEMS and Wisepill + follow-up
- 255 participants had Wisepill + follow-up only
- No difference was seen in mean adherence between the two groups (p=0.35)
  - Both MEMS and Wisepill + follow-up: 93%
  - Wisepill + follow-up only: 92%
Mean adherence (%) vs. Weeks relative to the switch between MEMS and Wisepill monitoring.

- Blue line: Participants with Wisepill monitoring only
- Red line: Participants with adherence monitoring by MEMS and Wisepill
- Green line: Projected MEMS adherence
Additional findings

• Difference maintained in an analysis stratified by time on ART

• No difference in viral suppression
  – MEMS: 6%
  – Wisepill: 7%
Limitations

• Quasi-experimental design: Outcome measurement differs in the two periods compared
• Not a comparison of MEMS versus Wisepill monitoring
• Cannot distinguish between Hawthorne effect and effect of follow-up
Conclusions

• In this quasi-experimental analysis, real-time adherence monitoring linked to home visits for sustained interruptions was associated with increased adherence.

• Randomized trials of participants initiating ART with long-term follow-up are needed to assess the impact of real-time adherence monitoring interventions on virologic outcomes.

• Costing studies are also needed.
Acknowledgements

- Study participants
- Study staff
- Funding: R01MH054907
Thank you!

Questions?

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