Dynamic Interventions: Opportunities and Challenges

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Optimizing Obesity Treatment: 1 Static and 2 Dynamic Examples

1. **MOST**: Multiphase Optimization Strategy

2. **SMART**: Sequential Multiple Assignment Randomized Trial

3. **JITAI**: Just in Time Adaptive Intervention
Opt-In Study

**Optimization of Remotely Delivered Intensive Lifestyle Treatment for Obesity**

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NIDDK R01 DK097364
Opt-IN MOST Design - Optimize Components for Best Average Fixed Treatment

- **Decision point - outset** (choose components for fixed intervention)
- **Intervention options - components**
- **Tailoring variable**
  - Weight loss
  - Cost
  - [Reach]
- **Decision rule - optimize for specific constraints**
  - Max weight loss for $500
  - [Max enrollment]

**Component** | **Rank Cost** | **Rank Engagement**
---|---|---
Texting | 1 | 2
PCP updates | 2 | 5
Buddy training | 3 | 3
Coaching | 4 | 4
Meal replacement | 5 | 1
SMART Weight Loss Management – Optimize Best Treatment Sequence and Tactic for Addressing Nonresponse

- **Decision Points:**
  - Outset - Best first line treatment
  - 2 weeks, 1 month - Optimal tactic to address treatment nonresponse

- **Intervention Options:**
  - Components: Text, Coaching, Meal replacement

- **Tailoring variable**
  - Weight loss

- **Decision rule - Adaptive:** do one thing if responds, another if not
- **Once optimized, decision rule/algorithm remains the same**
  - If response, continue
  - If nonresponse – continue (More) or Augment
JITAI – Optimize intervention to particular person and their changing needs over time

- Decision points - continuous patient data; intervene any time
- Intervention options -
  - Digital, mobile - text, coach call, call or be called by buddy - (MR “piggybank”)
- Tailoring variables - Many continuously available
  - Objective sensor data on energy absorption, physical activity, sleep, stress, social activity
- Decision rules - Dynamic - push, pull, learn not fixed and only push out. Pull in and do machine learning about person’s response over time (follow text suggestion? Take call from coach or friend?)
  - Can take contextual information into account - cues, access, others in room
Dynamic Intervention Opportunities

- Continuous data - learn more comprehensively and faster;
  - develop better treatment algorithms
  - Different information channels - EMA, physiological, environmental cues, location

- Intervene in real time, when needed, just in time

- Personalized treatment algorithms!

- Understand/develop theory of how mediating pathways change over time
Dynamic Intervention Challenges

- Too much information!!
  - How to capture, visualize, and make the data deluge actionable?

- Lack of dynamic behavioral science theory that goes beyond snapshots

- Team science interdisciplinary challenges: what’s a measure?

- Systems integration with EHR, health care work flow
Thank you!
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