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 **In**tensive Lifestyle Treatment for Obesity

Principal Investigators

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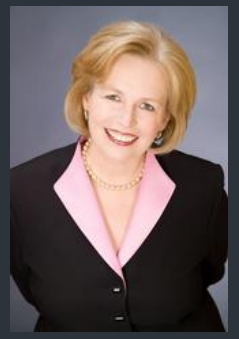

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Opt-IN MOST Design – Optimize Components for Best Average Fixed Treatment

- 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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