Cost-Benefit and Cost-Utility Analyses in a Randomized Clinical Trial for Psychological versus Medical Treatments for Depression

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Objectives

- Define randomized clinical trial (RCT)
- Provide benefits and limitations of using a cost-inclusive evaluation as part of an RCTs
- Explain design methods used when adding cost-inclusive evaluation to already established RCTs
  - Provide real-world example: Cost benefit and cost utility analysis of CBT vs. LT for SAD
What is a randomized clinical trial?

Benefits of Randomized Clinical Trials

- Random Selection
- Random Assignment
- Biases
- Confounding Variables
Limitations of Randomized Clinical Trials

- Ideal Situation = Real World?
- Utilization of outside data sources or remote data
- Relationship with parent study staff
- Staff Support
- Available Funding
RCT Overview

- Data from RCT at UVM (Grant # R01Mh078982)
  - PI: Kelly Rohan, PhD
  - 5 year trial
  - N = 177 (CBT-SAD, N = 88; LT, N = 89)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yr1 (Pilot)</th>
<th>Yr2</th>
<th>Yr3</th>
<th>Yr4</th>
<th>Yr5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBT-SAD</td>
<td>12</td>
<td>14</td>
<td>15</td>
<td>25</td>
<td>22</td>
</tr>
<tr>
<td>LT</td>
<td>12</td>
<td>10</td>
<td>18</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>24</td>
<td>33</td>
<td>50</td>
<td>46</td>
</tr>
</tbody>
</table>
Treatments

**Light Therapy for SAD**
- 30 minutes each morning
  - then, individually tailored

**CBT-SAD**
- Group Format Rohan (2009)
  - 2x wk sessions (12 total)
Study Aim

- Differences in CBT vs LT for SAD over 2 winters:
  - Costs
  - Benefits
  - Effectiveness
Measures

- BDI-II
- SIGH-SAD
- Patient Daily Diaries
- Cost Questionnaire
Treatment Cost Estimation
Patient Costs

- Patient Cost
  - Treatment engagement
  - Productivity
  - Transportation
Treatment Cost Estimation

Patient perspective

- Intended Treatment
  - Treatment as prescribed
- As Treated
  - Individual differences in treatment engagement
- Opportunity Cost
  - $0/minute for patient time in front of light box
- Follow-up Treatment
- Cumulative Costs
Treatment Cost Estimation

Provider Costs

- Health services
  - converted into CPT codes x Medicaid rate
- Cost of space
  - Average rental price per sq ft
- Overhead costs
  - median hourly income of an office manager
Treatment Benefit Estimation

- Hospital services and associated costs
  - Median cost for hospital visit paid by Medicaid
- Emergency room service use
  - # of visits x median emergency room charge
- Doctor’s office visits
  - Patient self-report and converted to CPT codes x visit paid by Medicaid
- Monetary benefits of CBT-SAD and LT
  - total cost of health services\(_{before\ tx}\) – total costs of health services\(_{after\ tx}\)
Cost Utility Estimation

- BDI-II scores converted into QALYs
  (Freed et al., 2007)

### Health Utility to QALY Time-weighting Schedule

<table>
<thead>
<tr>
<th>Timeframe</th>
<th># of months</th>
<th>Data used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early January to mid-February</td>
<td>1.5</td>
<td>Pretreatment (Pre)</td>
</tr>
<tr>
<td>Mid-February to mid-May</td>
<td>3</td>
<td>Posttreatment (Post)</td>
</tr>
<tr>
<td>Mid-May to end of September</td>
<td>4.5</td>
<td>Spontaneous remission (Sprsum)</td>
</tr>
<tr>
<td>October through December</td>
<td>3</td>
<td>1-year (next winter) follow-up (Yr1)</td>
</tr>
<tr>
<td>January to December</td>
<td>12</td>
<td>2-year (second winter) follow-up (Yr2)</td>
</tr>
</tbody>
</table>

\[
(\text{Pre} \times 1.5) + (\text{Post} \times 3) + (0.9 \times \text{Sprsum} \times 4.5) + (\text{Yr1} \times 3) + (\text{Yr2} \times 12)
\]

\[
\frac{\text{Pre} \times 1.5 + \text{Post} \times 3 + (0.9 \times \text{Sprsum} \times 4.5) + \text{Yr1} \times 3 + \text{Yr2} \times 12}{24 \text{ months}} = \text{QALY}
\]
## Treatment Costs Per Patient

**Provider perspective**

<table>
<thead>
<tr>
<th>Resource type</th>
<th>Resource amount</th>
<th>Cost per unit</th>
<th>Total cost (resource amount x cost per unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CBT</td>
<td>LT</td>
<td>CBT</td>
</tr>
<tr>
<td>Psychiatrist time</td>
<td>0</td>
<td>1.5</td>
<td>$68.06</td>
</tr>
<tr>
<td>Therapist time</td>
<td>4.5</td>
<td>0</td>
<td>$34.34</td>
</tr>
<tr>
<td>Supervisor time</td>
<td>1.5</td>
<td>0.5</td>
<td>$34.34</td>
</tr>
<tr>
<td>Manuals/homework</td>
<td>60</td>
<td>18</td>
<td>$0.10</td>
</tr>
<tr>
<td>Space (sq. ft)</td>
<td>180</td>
<td>0</td>
<td>$0.05</td>
</tr>
<tr>
<td>Office management</td>
<td>0.5</td>
<td>0</td>
<td>$18.19</td>
</tr>
<tr>
<td>Total Cost</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CBT-SAD Cost Less Cumulatively from the Patient Perspective

- Intended Treatment
  - CBT-SAD < LT
- As Treated
  - CBT-SAD < LT
- Opportunity Cost
  - CBT-SAD > LT
Cost of Health Services

US Dollars

Pretreatment

Second winter followup

Time

CBT-SAD

LT
Median Quality of Life Years Gained

First-winter follow-up  Second-winter follow-up

CBT-SAD  LT
Cost/QALYG

As Treated Cost/QALYG

Opportunity Cost/QALYG

$0
$3,000
$6,000
$9,000
$12,000

$0
$1,500
$3,000
$4,500
$6,000

Cost/QALYG

First Winter  Second-Winter

Cost/QALYG

First Winter  Second-Winter

CBT-SAD
LT

CBT-SAD
LT
Limitations

- Estimated costs based on specific region in US
- Treatment cost according to current market data
- Service use outcomes based on self-report and service cost based on CPT codes converted to Medicaid rates
- Index treatment and follow-up treatment were different lengths of time
- Limited data on activities engaged in while undergoing light therapy
- QALYs over a 1 and 2 year period not lifetime
Future Research/Lessons Learned

- Gain access to patient medical records
- Have equal lengths of time re: index treatment and follow-up
- Gather data over an even longer period of time for accurate QALYs and long-term effects of CBT-SAD
References

Questions & Comments