E-Health and Insomnia: An Internet Solution to a Health Workforce Nightmare

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Insomniacs are considered "an epidemic of silent sufferers" who often go undiagnosed even when seeking medical assistance.
Alison
34 y/o, single, female
Teacher

Complaint: difficulty falling asleep
SOL: goes to bed, 10:30PM; falls asleep, 1:00AM

Concentration/fatigue difficulties
Anxiety about going to sleep

TST = sleeps 5.5 hours
TIB = 7.5 hours

SE (TST/TIB*100) = 73.3%
Insomnia is complex due to the variety of ways in which it can manifest. There are four main types of insomnia:

<table>
<thead>
<tr>
<th>SLEEP PROBLEM</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>SLEEP ONSET</td>
<td>Unable to fall asleep 30 minutes after turning the lights out once in bed</td>
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<td>SLEEP MAINTENANCE</td>
<td>Frequent and/or extended nighttime awakenings which total more than 30 minutes of wakefulness</td>
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<td>TERMINAL EARLY AWAKENING</td>
<td>Waking in the morning with less than 6½ hours of sleep</td>
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<tr>
<td>MIXED SLEEP PROBLEMS</td>
<td>Combination of difficulties initiating and sustaining sleep, in which sleep efficiency, sleep time divided by time spent in bed, is less than 85%</td>
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</table>
Typical definition of insomnia:

1. Subjective complaints of poor sleep;
2. Difficulties initiating and/or maintaining sleep (sleep onset latency and/or wake after sleep onset is greater than 30 minutes; sleep efficiency < 85%);
3. Sleep difficulties => 3 nights/week;
4. Sleep difficulties persisting > 6 months;
5. Subjective report of at least one daytime sequela due to poor sleep: Fatigue, performance impairment, or mood disturbance;
6. Sleep disturbance/daytime sequelae cause significant impairment in social or occupational functioning or marked distress.
Most frequent health complaint after pain.

- 30%-48% of the adult population report insomnia symptoms
- 10% to 15% suffer from chronic insomnia
- Almost everybody experiences insomnia at some level at some point in life
- Women are twice as likely as men to have an insomnia diagnosis, and prevalence generally increases with age

Ohayon MM. Epidemiology of insomnia: what we know and what we still need to learn. Sleep Med Rev. 2002;6:97-111.
- Estimated annual cost for the treatment of insomnia is $10.9B.
- Insomnia is correlated with increased absenteeism, reduced work capacity, performance errors, and increased risk of accidents at work.
- Costs of reduced productivity due to insomnia is $41 billion. Individuals experiencing insomnia are absent from work 2.8 days more per month, costing $4800/year.
- Significant psychological ramifications, including depression and anxiety, are also strong correlates of insomnia.
- Individuals with insomnia report significantly more health problems then those without sleep difficulties.
- Driving-related accidents are one of the most serious consequences to insomnia.
Most common treatment for insomnia is pharmacotherapy.

15% of people are using prescription or OTC sleep medicines at least a few times each month.

Sedatives and antidepressants are the most commonly prescribed sleeping medications.

Found to be an effective, short-term treatment to acute insomnia when compared to placebo-controlled groups.

Tend to treat symptoms rather than underlying issues.
INSOMNIA 

Sleep Medication 

Tolerance 

Resume use of medication 

Dependence 

Withdrawal: Rebound insomnia 

Increase sleep medication 

Attempt to stop medication 

Tolerance: Decreased effectiveness
IF ONLY THERE WAS SOME EFFECTIVE WAY TO TREAT INSOMNIA WITHOUT THE USE OF MEDICATION.
Overview

Insomnia defined; Insomnia types; Insomnia prevalence; Risk factors; Insomnia impact (daytime fatigue, psychological well-being, physical health, economic cost); Setting tx goals; Treatment overview; Treatment appropriateness; Treatment effectiveness.

Sleep Behavior I

Explanation of poor sleep habits; Situational/chronic sleep difficulties; Cycle of chronic insomnia; Introduction of sleep restriction; Explanation of sleep efficiency (SE); Instruction on adjustments to sleep window based on SE.

Sleep Behavior II

Introduction of stimulus control: Going to bed only when sleepy, Leaving bed if unable to sleep, Maintaining regular morning rising time, Using bed only for sleep, No napping.

Sleep Thoughts

Faulty thinking; Relationship between thinking patterns and emotions; Contribution of thought patterns to sleeplessness; Cognitive restructuring; Keeping realistic expectations; Revising misconceptions about insomnia; Eliminating catastrophizing; Reducing sleep emphasis; Developing tolerance for sleep loss effects; Dealing with setbacks.

Sleep Education

Sleep hygiene guidelines; Avoidance of stimulants; Diet; Environment; Exercise.

Relapse Prevention

Identifying high-risk situations; Relapse prevention techniques; Further consolidation of therapeutic gains; Review of sleep behavior techniques; Sleep medication; Maintaining sleep program techniques, including restricted sleep window.
Sleep Restriction:
Method for consolidating sleep and improving sleep efficiency

Sleep Efficiency:

\[
\text{Total Sleep Time (TST)} \div \text{Total Time In Bed (TIB)} \times 100 = \text{Sleep Efficiency (SE)}
\]
There are three main steps to sleep restriction:

a. Collect information by filling out Sleep Diaries
b. Set a Sleep Window based on this information
c. Set an Arising Time
STIMULUS CONTROL RULES

1. Go to bed only when sleepy
2. If you cannot sleep, get out of bed
3. Maintain a regular arising time
4. Do not nap
5. Reserve your bed for sleep only
6. Unwind before bedtime
7. Use a pre-sleep routine before bed
Cognitive Therapy:
A psychotherapeutic method designed to change a person's beliefs, expectations, appraisals, and attributions.

For Insomnia:
Seek to change sleep expectations, perceived causes and consequences of insomnia, and beliefs about sleep-promoting practices.
GOOD SLEEP HYGIENE

- LIMIT ALCOHOL
- LIMIT NICOTINE
- LIMIT CAFFEINE
- LIMIT NOISE
- MANAGE ROOM TEMP
- MANAGE BODY TEMP
- MANAGE DIET
- MANAGE EXERCISE
- IMPROVE BED COMFORT
- LIGHT LIMIT
- IMPROVE AIR QUALITY
Outcome Studies

- Meta-analyses have confirmed the reliability and durability of cognitive and behavioral techniques in treating insomnia.

- 70%-80% of insomnia patients benefited from psychological interventions.

- CBT is one of the most effective treatments for insomnia.

- Comparing CBT and pharmacological treatments has shown that CBT lead to better long-term clinical gains and was rated as "more effective and satisfying."
CBT indicates cognitive-behavior therapy; PCT, pharmacotherapy (Temazepam)

Adopted from Morin et al., 1999. Shows how four treatments impacted the average time participants were awake in the middle of the night. 78 adults, 55+, with primary insomnia.
Minutes awake in the middle of the night

CBT indicates cognitive-behavior therapy; NT is no treatment; CBT+Z is CBT + zolpidem

Adopted from Morin et al., 2009. Shows how four treatments impacted the average time participants were awake in the middle of the night. 160 adults with chronic insomnia.
There is an obvious and growing need for insomnia treatment.

There are approximately 1,100 accredited sleep centers in US.

However:
1. There are only ~115 specialists certified in Beh Sleep Med.
2. Most accredited sleep centers do not have clinicians who specialize in psychologically-based insomnia treatment.
3. There are limited formal training opportunities.
4. Insurance companies do not typically provide coverage for behavioral treatment for insomnia, making it unlikely that CBT for insomnia could become part of standard practice.

It is expected that the demand for experts in treatment of insomnia will continue to grow.
People using the Internet, in 2007-08, in Australia:
- 67% of households had home Internet access.
- 75% of households had access to a computer.
- 52% of households had broadband.

Using Internet to search for health and medical information:
- 113 million US adults have searched for health related info online
- Mental health is one of the most frequently searched topics on the web

Australian Bureau of Statistics: 8146.0 - Household Use of Information Technology, Australia, 2007-08
INTERNET INTERVENTIONS:

- behavioral treatments
- highly structured
- semi-self guided
- based on effective face-to-face treatment
- personalized and tailored to user
- interactive
- makes extensive use of graphics, animations, audio, and possibly video; and
- provides follow-up and feedback
INTERNET INTERVENTIONS IN THE LIT

- Review
  Ritterband et al., 2003

- Cochrane Review
  Murray, Burns, See, Lai, & Nazareth, 2005

- Hands On Help
  Marks et al., 2007

- Physical Activity
  van den Berg, Schoones, & Vliet Vlieland, 2007

- Obesity
  Saperstein, Atkinson, & Gold, 2007

- Depression and Anxiety
  Griffiths & Christensen, 2007

- Pediatrics
  Stinson, Wilson, Gill, Yamada, & Holt, 2009

- Alcohol and Tobacco Use
  Bewick et al., 2008

- Traumatic Stress
  Benight, Ruzek, & Waldrep, 2008

- Cardiac Disease
  Kuhl, Sears, & Conti, 2006

- Meta-Analyses
  Barak, Hen, Boniel-Nissim, & Shapira, 2008
  Spek et al., 2007
  Wantland, Portillo, Holzemer, Laughter, & McGhee, 2004
Potential benefits of Internet interventions:

- Reduced inconvenience of scheduling appointments, missing work/school, traveling to/from clinician's office
- Improved convenience in receiving treatment in own home
- Lack of skilled professionals in close proximity no longer a problem
- Patients may be more willing to seek treatment for problems in which they might otherwise be reluctant to receive help
- Educational and treatment information can be disseminated quickly
- Promote greater depth of knowledge/understanding because information can be presented in rich detail
- Total time of treatment may be reduced
- May improve patient compliance
- Treatment efficacy could be enhanced
- Financial costs of treatment may be reduced
SHUTiT

Sleep Healthy Using the Internet:
A web program to help you sleep better.

Username: 
Password: 

ENTER

Need Invite? Problems FAQ Learn About Program Contact Us Links
127 Potential Participants Assessed for Eligibility

45 Randomized

82 Excluded
- 58 Did Not Meet Inclusion Criteria
- 17 Non-responsive
- 5 Refused to Participate
- 2 No-Shows

22 Randomized to Receive SHUTi Intervention
- 1 Lost to Follow-up (Did not return for post-assessment visit)
- 22 Included in Analysis

23 Randomized to Receive Wait-List Control
- 1 Became Ineligible During Study
- 22 Included in Analysis

0 Lost to Follow-up
Descriptives:
77% Female
~45 years old
16.59 years of education
Very comfortable with the Internet
Sleep difficulties for >10 years
Sleep problems >5 nights/week
Insomnia Severity Index

F(1,42) = 29.64, p < .001

Score

<table>
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<tr>
<th></th>
<th>SHUTi</th>
<th>WL</th>
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<tbody>
<tr>
<td>15.7</td>
<td>16.2</td>
<td></td>
</tr>
<tr>
<td>6.6</td>
<td>15.5</td>
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ISI Total score ranges from 0-28
- 0-7 = No clinically significant insomnia
- 8-14 = Subthreshold insomnia
- 15-21 = Clinical insomnia (moderate severity)
- 22-28 = Clinical insomnia (severe)

Baseline:
No participant in “No clinically significant insomnia” category

Post:
73% of those who received SHUTi fell into “No clinically significant insomnia” category
0% of those who did not receive the intervention.
Other Significant Findings:

- Knowledge gain
- Reductions in:
  - Dysfunctional beliefs
  - Depressive affect
  - Anxiety
  - Fatigue
Limitations

- Small, homogenous sample
- Primary insomnia only
- Low attrition rate (4% at post-assessment)
- WL control group

Future directions

- Larger RCT with national sample
- Recruit for comorbid insomnia
- Different patient populations (cancer, PTSD)
- Compare to Patient Education group
Welcome to Beacon

Beacon is an online resource that provides users free and anonymous access to the best of the internet's Mental Health related websites. An independent panel of experts including doctors and psychologists categorise, review and rate sites and then publish their findings and reviews for the users of Beacon.

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Registered users gain full access to site content
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Web Resources
http://knol.google.com/k/rachel-manber/insomnia/
http://www.sleepeducation.com/
http://www.sleepfoundation.org/article/sleep-related-problems/insomnia-and-sleep
http://www.nhlbi.nih.gov/health/public/sleep/

Books