Sleep Gadgets

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Disclosures

*I have no commercial relationships to any of the products or companies listed, and inclusion in this talk does not represent an endorsement.*
Types of gadgets

• Wearables to track your sleep
• Devices to help you sleep
• Apps and internet based approaches
Wearables

• All based on measuring movements
• Usually worn on the non-dominant wrist
What do activity monitors do?

• Track rest-activity patterns, with software to quantitate movement and sleep
• Some with programs that estimate types of sleep (e.g. “deep” sleep, REM sleep)

• Advantages
  • Capable of monitoring multiple physiological parameters (e.g. cardiac rhythm) to monitor clinical conditions
  • Technology continues to improve
  • Data can be fed into internet-based therapies for insomnia
  • At a population level, they increase awareness of sleep health
Caveats about using activity monitors

• Data are not necessarily accurate; sleep stage data not reliable
• May increase anxiety about sleep and thus worsen insomnia
• Increase focus on minutes of sleep rather than quality of sleep
• Many devices on the market, few have been properly validated
Blue light blocking glasses

• The circadian clock in the brain is most sensitive to blue light; exposure at night shifts sleep onset later in the night as well as increasing activation

• Wearing amber lenses for 1.5-2 hours before bed improved sleep in individuals with insomnia (both subjective sleep and actigraphy data) in some studies
White Noise Machines

• Emit calming, monotonous sounds (e.g., wind, rushing water)
• Useful to drown out intermittent environmental noises (e.g., traffic, snoring, household noise)
• May also aid individuals with tinnitus
Cooling devices

Ebb Sleep
Cap

Chilipad cube

BedJet
Rationale

• Cooling the brain or dropping core body temperature reduces neural activity and promotes sleep
• Brain and body temperature cool during sleep, particularly during NREM slow wave sleep
• Head cooling devices cause drops in both brain and body temperature
• Evidence for improved sleep with brain cooling device
• Minimal data for other cooling devices
Stimulating slow wave sleep through tones

Dreem Headband (Rhythm)

SmartSleep Deep Sleep Headband (Philips)

Sleep Shepherd Blue (Sleep Shepherd)
Rationale

• Slow waves are prevalent in deepest stages of non-rapid eye movement (NREM) sleep

• Slow wave functions include learning and memory (likely through normalization of synapses), clearance of toxic substances from brain (amyloid and tau proteins)
How it works
Evidence for effects

• Devices increase slow waves during sleep in normal subjects
• Effects greater in younger (<40 yrs) than older (>40 yrs) adults
• No effect on total sleep or sleep stage amounts
• Effects on cognition, daytime function, physiology unclear; more research needed
Electromagnetic stimulation of slow waves using pulsed electromagnetic frequency (PEMF)

SR1 PEMF
Somniresonance

Oska Pulse
Cranial Electrotherapy Stimulation (CES)

Alpha-Stim
Rationale and results

• Delivers stimulation to the brain, PEMF like mild transcranial magnetic stimulation (TMS); CES like very mild electroconvulsive therapy “ECT light”

• Therapies developed for mood disorders and pain relief

• TMS and ECT increase waking brain activity which results in increased slow wave sleep--?? If this is the mechanism

• CES causes deactivation of brain after application

• Very minimal data on sleep effects; some studies suggest improved sleep on self report. One study that measured sleep in lab showed no effect of CES
Newer approaches under development

- Transcranial electrical stimulation; transcranial magnetic stimulation [TMS]
  - “Top down”; can be targeted to specific brain regions
  - May be able to target various brain EEG waveforms
- Other forms of sensory stimulation (e.g., auditory, olfactory, visual, somatosensory, visual, vestibular)
  - “Bottom-up”; less locally specific
Clocks

SmartSleep Wake Up Light Therapy Lamp – Philips
hOmelabs Sunrise alarm clock
Biobrite Sunrise clock
Rationale

• Light wavelength and intensity entrain circadian rhythms and have direct alerting effects
• Circadian system most sensitive to blue light
• Light-emitting clock simulate sundown and sunrise
  • Shift to red spectrum and decreasing intensity in the evening
  • Shift to blue spectrum and increasing intensity in the morning
• Useful for hearing impaired individuals
Cognitive Behavioral Therapy for Insomnia (CBT-I)

• Usually provided by trained therapist
• Computer-based forms available
  • Meta-analysis of 6 RCTs of computerized CBT-I\(^1\)
  • Treatment had good acceptability (78% completed)
  • Estimated that 1 in 4 patients will recover from chronic insomnia with computerized CBT-I

• Examples:
  • Sleepio  [www.sleepio.com](http://www.sleepio.com)
  • VA CBT-i Coach (free)  [https://www.ptsd.va.gov/appvid/mobile/cbticoach_app_public.asp](https://www.ptsd.va.gov/appvid/mobile/cbticoach_app_public.asp)

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Questions?